

ESG IN THE MINERALS INDUSTRY CHALLENGES AND OPPORTUNITIES

16-17 OCTOBER 2024
GLENBURN LODGE AND SPA,
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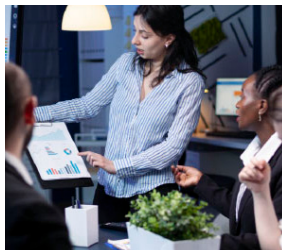
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**THE SOUTHERN AFRICAN INSTITUTE OF MINING AND
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**ESG IN THE MINERALS
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AND OPPORTUNITIES**

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Published by The Southern African Institute of Mining and Metallurgy
Minerals Council South Africa, 7th Floor, Rosebank Towers, 19 Biermann Avenue,
Rosebank, 2196, Republic of South Africa

ISBN 978-1-7764673-5-8

The abstracts in this volume have been for the most part prepared from Word documents
supplied by the authors, with additional typesetting and formatting by The Southern
African Institute of Mining and Metallurgy.

Organising Committee

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FOREWORD

It is my pleasure to welcome you to this inaugural Southern African Institute of Mining and Metallurgy conference 'ESG in the Minerals Industry – Challenges and Opportunities' and the hospitality of the Glenburn Lodge & Spa, situated within the Cradle of Humankind – a World Heritage Site.

Traumatic global military conflicts, the ever-increasing impact of climate change, surging nationalistic sentiment, politics and depressed global economics have made addressing environmental, social and governance (ESG) matters in business increasingly challenging. Under these trying circumstances it can be difficult to focus on the long game and prioritise long-term sustainability as “time is short, survival takes precedence, and every other issue seems more urgent”. Sadly, this short-term sentiment has led to social backlash and deep scepticism that ESG has become superficial ‘greenwashing’ rather than genuine efforts towards long term sustainability. Within this context ESG-Sustainability in mining faces many challenges, economic pressures, regulatory complexity and uncertainty, data and reporting integrity, capital allocation, technological integration, supply chain management, community and stakeholder expectations, and environmental impact locally, regionally and potentially globally, now and decades into the future. However, despite these challenges the industry is making progress, driven by the need for sustainable practices to deliver the minerals and metals that underpin the technology- driven world that we now take for granted.

Responsible mineral industry organisations are focussing on energy efficiency, water conservation and biodiversity preservation with sustained effort to positively impact the lives of employees and mining communities as South Africa cycles through a difficult period of low economic growth, heightened unemployment and political realignment. Concurrently there is growing understanding that true sustainability comes, not from regulatory compliance alone, but through building social capital and strengthening stakeholder relationships that lead to an enduring social licence to operate.

I trust that the proceedings of this conference will allow you to build the additional perspective that enables you to rise to the challenge of embedding ESG in your professional lives and businesses. I encourage you to participate in the proceedings, debate the issues and enjoy networking with solution-oriented people on this journey to enable environmental and social sustainability in the minerals Industry.

Finally, a heartfelt thank you to the Organising Committee, the SAIMM conferencing team and our willing and generous sponsors, without whom this conference would not have been possible.

Take care and please stay safe.

Gordon Smith

Chairperson of the Organising Committee

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Conference Chairperson and Keynote Speaker



Gordon Smith Pr Eng PhD

Independent advisor (post-retirement) and Non-Executive Director

Gordon is a registered Professional Engineer, an Honorary Life Fellow and Past President of the Southern African Institute of Mining and Metallurgy and holds a range of industry technical and managerial qualifications. Gordon has extensive experience in the field of business leadership, strategic planning, operational management, business start-ups, feasibility studies, mineral property valuation, prospect evaluation, mine planning & layout/design, rock mechanics, mine economics, risk management and techno-economic evaluation, with an emphasis on systems analyses and optimization, in a variety of precious metal, base metal, ferrous metals, chrome, diamond and semi-precious stone, coal operations. Following retirement from the Technical, Safety and Sustainability Executive role at Anglo American Platinum Ltd in late 2020 he has been conducting capital project investment assurance reviews across Anglo American plc operations globally. He transitioned to an independent advisor and non-executive director in 2024.

Keynote Presenters



Mzila Mthenjane

CEO
Minerals Council South Africa

Mr. Mzila I. Mthenjane (“Mzila”) is the CEO of the Minerals Council South Africa (“MCSA”), the Advocacy and Impact group whose members represent 90% of South Africa’s mineral output and employ close to 480 000 people . He was previously the Executive Head for Stakeholder Affairs at Exxaro Resources Limited. He has more than 30 years’ combined experience in the resources business (Gold, Platinum and Coal) and investment banking (Corporate and Project Finance).

He has held various board positions as non-executive director in various entities including Pamodzi Gold Limited, Fraser Alexander, Impact Catalyst, Merafe Resources, and Student Support Programme. He was on the Exxaro Executive Committee, intimately involved in stakeholder engagements and strategy.

He is the current Chairman of the Board of the Impact Catalyst and is the former Chairman of the Wits University Mining Engineers Association (WUMEA) and the former President of the South African Institute of Mining and Metallurgy (SAIMM).

Mr. Mthenjane holds a BSc degree in Mining Engineering from the University of Witwatersrand (Wits). He has completed various leadership development training including the Senior Management Development Programme from the Graduate Institute of Management and Technology (GIMT), the ABSIP leadership programme with GIBS and Advanced Management Programme (AMP), with INSEAD.

His leadership acumen has greatly benefited his current role, drawing on his experiences in building and retaining harmonious yet robust relationships with diverse stakeholder groupings.. He is credited with successfully leading the development of Exxaro’s sustainable impact approach, as well as establishing Exxaro’s ESG narrative for stakeholder engagement. Through his leadership, Exxaro has remained among the top performers for integrated reporting, as acknowledged by local and offshore ratings agencies.



Andrew van Zyl

Managing Director
SRK

Andrew has over 21 years of experience in mining. He specializes in valuation of mining projects and companies. Andrew worked in production and project roles up to 2006, when his focus shifted to strategy, business development, and valuation. His focus is the valuation of mineral assets but he regularly works on feasibility studies and due diligence and, on occasion, as expert witness. He has experience as technical advisor to government committees overseeing the negotiation

of mining conventions and rail and mineral terminal concessions. His valuation experience includes: iron ore, manganese, chrome, copper, coal, gold, and the platinum group metals. He is on the council of the SAIMM and is a member of the Institute of Directors. Andrew is the current SAMVAL chair and a member of IMVAL, the International Mineral Valuation Committee.



Michael Solomon

University of Cape Town

Professor Solomon is a mining engineer with 43 years of experience in the gold, platinum, diamond and coal sectors. He was the first operational CEO of Wesizwe Platinum, a large platinum producing underground mine he took the company from first borehole through listing on the JSE and the raising of the full funding for the capital construction of the Bakubung Platinum Mine, which is now in production.

He served on the Board of ASX-listed Gold One (the precursor company to Sibanye Stillwater) as Chairman of the Audit and Risk Committee and the Health, Safety and Environment Committee.

He is an Adjunct Professor in the Department of Chemical Engineering at the University of Cape Town where he specialises in the economic diversification and decarbonisation of mines.

He is a Non-Executive Director of Sedibelo Resources Limited for whom he chairs the Board Technical Committee and sits on the ESG Committee.

He has recently been awarded an Honorary Life Fellowship of the Southern African Institute of Mining and Metallurgy (SAIMM) for his contribution to mining in South Africa. He has served as a Member of Council of the Institute for over a decade and he chairs the SAIMM ESGS Committee.



Reinhardt Sven Arp

Senior Associate
Carbon Trust

Reinhardt is a Senior Associate in the Carbon Trust Africa, with over 7 years' experience in climate change and low-carbon transition advisory. He works across a range of research- and advisory-based projects, supporting private and public sector clients with Net Zero and carbon offset strategy advisory, target setting and feasibility assessments, emissions footprinting (product and Scope 1-3), TCFD assessments, just transition advisory, value chain engagement and sustainable finance.

Reinhardt specialises in mining and metals, energy and sustainable finance sectors. Other areas of interest include circular economy, policy research and advisory, and futures research.

Prior to joining the Carbon Trust, Reinhardt worked for the World Wide Fund for Nature South Africa (WWF-SA) where he gained valuable experience in climate change research and policy advocacy working on South Africa's Carbon Tax Bill, Climate Change Bill, draft Climate Change Mitigation System and just transition research. He also has experience in the circular plastics economy and developed policy recommendations for South Africa's Extended Producer Responsibility regulations during his time at WWF-SA.

Reinhardt holds a Masters in Environmental Economics (M.Econ) from Rhodes University.



Rohitesh Dhawan

President and Chief Executive Officer
International Council on Mining Metals

Rohitesh “Ro” Dhawan is the President and Chief Executive Officer of the International Council on Mining and Metals (ICMM). He leads the Council of 24 CEOs of the world’s largest mining & metals companies in voluntary leadership actions that raise the standards of responsible mining.

Under his leadership, ICMM has undertaken landmark commitments and action on critical sustainable development issues, including the first industry-wide commitment to achieving net zero greenhouse gas emissions, the first collective commitment of any sector on nature positive, pioneering actions on diversity, equity and inclusion, and significant steps towards transparency of the industry’s contribution and performance, including on tax and contract disclosure.

Ro is a Fellow and faculty member of the Africa Leadership Initiative and a Raisina fellow at the Asian Forum on Global Governance. He serves on the Advisory Boards of the Columbia Centre for Sustainable Investment, Concordia, and Resolve. He has served on the UK Government’s Partnering for Accelerated Climate Transitions (PACT) Programme and was named one of South Africa’s climate change leaders for his work with the country’s mining sector.

Ro holds a Master’s in Environmental Change & Management from the University of Oxford in the UK and an undergraduate degree in Economics from Rhodes University in South Africa.



Busisipho Siyobi

Head of Natural Resource Governance Programme
Good Governance Africa

A public policy researcher with a focus on Southern Africa's mineral resources governance and management. Her research expertise includes Environmental, Social and Governance (ESG) integration and corporate social responsibility initiatives that promote sustainability and social inclusion for mining-host communities. Busisipho holds an MPhil in Public Policy and Administration from the University of Cape Town with a research focus on Corporate Social Responsibility within the South

African mining industry. During her Masters, she worked under the Governance of Africa Resources Programme as a research scholar at the South African Institute of International Affairs.

Prior to joining GGA, Busisipho led a research team for the Corporate Intelligence Monitor Desk at S-RM Intelligence and Risk Management consultancy, where she was responsible for overseeing the delivery of due diligence monitoring products and services to various clients. She specialised in conducting monitoring of due diligence and corporate investigations focused on oil and gas and mining industries. At GGA, she has led on research projects examining South Africa's mining sectors regulatory environment and the role of mining codes that aim to promote transparency and accountability in the extractives industries.



Sarah Cooper

Digby Wells

Sarah leads Digby Wells' ESG Division and has over 17 years' experience in the sector. She specialises in the development and implementation of pragmatic ESG strategies to meet current needs and set a path for future ambitions. During 2020 and 2021 Sarah was seconded to Barrick Gold as Group ESG Affairs Manager, helping develop and drive the company's post-merger ESG strategy and disclosures. Sarah also spent time as an ESG Analyst at CDC Group, the UK government's Development Finance Institute, where she helped to develop the organisation's ESG

Toolkit for Fund Managers, and it's first Development Impact Report. Sarah has served on the World Gold Council's ESG taskforce, and the International Mining and Metals Council's Working Groups for Climate change and Responsible Sourcing.

A framework for applying LCA and industrial ecology philosophy to support local renewable energy value chains to drive the just transition

D. Viljoen, J.M. Kruger, M. Solomon, J. Browne, and P. Mtemeli

Carbon Neutral Energy Systems, South Africa

The mining industry is increasingly recognised as a key player in driving global efforts towards carbon neutrality, with many companies setting ambitious targets and developing comprehensive roadmaps to reduce their carbon footprint. Beyond the environmental agenda, the mining sector also faces the challenge of ensuring sustainable post-mine economies for host and affected communities. This paper explores how complementary methodologies - life cycle assessment, social life cycle assessment and industrial ecology - can be applied to connect the inventory of resources within the mine, its surrounding communities, and renewable energy interventions. By linking these inventories, synergistic opportunities for economic diversification and post-mine closure planning are identified. This approach seeks to leverage carbon neutrality efforts not only to mitigate climate impact but also to drive sustainable development, creating new economic opportunities that support resilient communities long after mining activities have ceased.



David Viljoen

Sustainability Engineer

Carbon Neutral Energy Systems (C-NES)

David is a chemical engineer with a specialisation in sustainable mineral development. He is dedicated to ensuring that all stakeholders in the mining industry, including the environment and mining communities, receive inclusive benefits. As a co-founder and director of C-NES and a director at Minecare Evolution, David has worked extensively as a sustainability engineer. His expertise spans bio-based carbon neutrality, energy management, economic diversification, waste-to-energy solutions, post-mine succession planning, and environmental stewardship.

David's notable projects include designing economic diversification strategies and creating an energy and GHG emissions management guideline for a major platinum mine, implementing a clean cook stove program in West Africa, and assisting in the development of the National Mine Closure Strategy.



Jean-Marc Kruger

Sustainability Engineer

Carbon Neutral Energy Systems (C-NES)

Jean-Marc is an industrial engineer who started his career as a business improvement consultant in the mining industry, with a focus on applying systems thinking, lean principles, operation modelling and project management tools in various improvement projects. Since moving into the sustainability field, Jean-Marc has had the opportunity to develop and implement carbon reduction and renewable energy projects for various mining companies. His aim is to contribute to a sustainable future for the mining industry, its surrounding communities and environment, through the advancement and integration of Carbon Neutral and Circular Economy systems. Jean-Marc submitted and presented a paper titled 'PGM mining and processing in the circular economy: a framework towards circularity' at the SAIMM 8th International PGM conference held in Sun City.

Unpacking ICMM water stewardship maturity framework

L. Shand

SRK Consulting, South Africa

Background

According to the EY report, water stewardship is receiving a significant increase in scrutiny from investors. Many mining companies have set targets and are therefore committed to driving water stewardship forward, including stakeholder disclosure. Increasingly, mining companies, investors and governments recognise water as a key risk to expansion of the sector, with projects increasingly constrained by a lack of water, too much water, or social opposition over impacts to water. Issues associated with water and mining are set to intensify. As water risks intensify and attention on the environmental impact of mining continues, there is a growing impetus for mines to adopt a water stewardship approach to build resilience into the business and protect people and the environment.

ICMM Water Stewardship Framework

The recent publication of the ICMM Water Stewardship Maturity Framework (Framework), unveiled in November 2023, aims to guide mining and metals companies towards more responsible water use and management, a critical aspect of sustainable operations. The Framework outlines a standardised approach to water stewardship for the mining and metals industry, recognising that water connects an operation to the surrounding landscape and communities. The Framework aligns with leading external water stewardship guidance and reporting initiatives, including the Global Reporting Initiative (GRI), Taskforce for Climate-related Financial Disclosure (TCFD), the Taskforce for Nature-related Financial Disclosure (TNFD) and the Alliance for Water Stewardship (AWS). The Framework is intended to support organisations to:

- Effectively manage water as a shared resource with critical importance to the business, the local catchment and catchment stakeholders.
- Integrate the critical role of water in many priority agendas (for example, climate resilience, cultural heritage protection, nature-positive approaches, social performance and inclusion, and operational excellence).
- Navigate the complexities presented by a changing climate, increasing demand on shared water supplies and the need for more equitable access to water, sanitation and hygiene for all.

The Framework identifies five key elements of water stewardship:

- Governance and strategy;
- Understanding water context risks and opportunities;
- Integration in business planning and decision-making;
- Performance and measurement; and
- Transparency and reporting.

Conclusion

Water stewardship is a critical part of business strategy, unlocking strategic opportunities that allow a business to thrive by reducing costs and improving water availability through collaboration within the framework; contributing to a more water-secure future. Water stewardship is an important component to mitigating corporate water risk and facilitating business growth. The use of global best practice tools like the ICMM Water Stewardship Maturity Framework or the International Water Stewardship Standard from the Alliance for Water Stewardship (AWS) provide support to an organisation on their water stewardship journey. Lindsay Shand is an Associate Partner, a registered principal environmental geologist and an AWS-credentialed specialist with SRK's Cape Town office. Lindsay has over 20 years' experience in environmental water management, relating to baseline monitoring, water stewardship, and environmental site assessments and remediation of sub-surface contamination. She has managed a broad range of projects in South Africa, Mozambique, Zambia, Swaziland, Nigeria and Ghana, with particular experience in water stewardship and long-term surface and groundwater monitoring projects related to groundwater abstraction and monitoring of the implications thereof.

The impact of climate change on the mining industry

A. van Zyl

SRK Consulting, South Africa

Background

Climate change poses a significant challenge to the mining industry, influencing both operational and strategic decisions. As global temperatures rise and weather patterns become increasingly erratic, the mining sector must adapt to ensure sustainability and resilience. This keynote address will explore the latest research, industry commitments, and the multifaceted impacts of climate change on mining operations. It will also highlight the opportunities and requirements for the industry to contribute to a lower carbon future.

Discussion

Pertinent Research Topics and News Highlights

Recent studies have underscored the vulnerability of mining operations to climate change. Significant research is currently underway to determine the impact of extreme weather events on mining infrastructure, water scarcity, and the carbon footprint of mining activities. The research is in response to increasing pressure from lenders and stakeholders for mining companies to adopt sustainable practices, reduce greenhouse gas emissions and build resilience to predicted climatic changes.

Challenges Posed by Climate Volatility

Volatility in rainfall and other climate events pose unique challenges to the mining industry. The direct and indirect impacts are likely to result in operational disruptions. Extreme weather events such as floods, droughts, and storms can disrupt mining operations, leading to production losses and increased operational costs. Many mining operations are in arid regions where water scarcity is exacerbated by climate change, posing a significant challenge for water-intensive processes. Water scarcity could also become a significant source of conflict with host communities and AI-generated disinformation has the potential to exacerbate these conflicts.

Developing adaptive strategies and resilient infrastructure is critical to managing these risks.

But stricter environmental regulations and shifting market preferences towards sustainable products are also likely to impact the profitability and viability of mining projects.

Commitments to Decarbonise Mining Operations

Major mining companies have made broad commitments to decarbonise their operations. For instance, Glencore, BHP, Rio Tinto, and Anglo American have set ambitious targets to achieve net-zero emissions by 2050. These commitments involve transitioning to renewable energy sources, improving energy efficiency, and investing in carbon capture and storage technologies.

Opportunities Presented by Decarbonisation

Decarbonisation presents several opportunities for the mining industry:

- **Innovation and Efficiency:** Investing in renewable energy and energy-efficient technologies can reduce operational costs and enhance competitiveness.
- **New Markets:** The demand for minerals essential for renewable energy technologies, such as lithium, cobalt, and rare earth elements, is expected to rise, creating new market opportunities.
- **Enhanced Reputation:** Demonstrating a commitment to sustainability can improve stakeholder relations and enhance the industry's social licence to operate.

Trends in Accounting for Externalities

There is an established trend towards accounting for environmental externalities and mitigating them. This includes the adoption of carbon pricing mechanisms, environmental impact assessments, and sustainability reporting. These measures help to internalise the environmental costs of mining and promote more responsible practices.

Requirements for a Sustainable Future

To mine a way to a lower carbon and more sustainable future, the industry will need to:

- **Adopt Sustainable Practices:** Implementing best practices in environmental and emissions management, waste reduction, water stewardship and resource efficiency.
- **Invest in Research and Development:** Develop innovative solutions for reducing the environmental impact of mining.
- **Collaborate with Stakeholders:** Engaging with governments, communities, and other stakeholders to develop and implement effective climate strategies. Build direct relationships with stakeholders to counter misinformation.

Conclusions

The mining industry is at a crossroads, facing significant challenges and opportunities due to climate change. By committing to decarbonisation, adopting sustainable practices, and investing in innovation, the industry can mitigate risks and capitalise on new opportunities. Collaboration with stakeholders and a proactive approach to managing environmental externalities are essential for ensuring a sustainable and resilient future for the mining sector. This keynote address will delve into these themes, providing insights and recommendations for navigating the complex landscape of climate change impacts on mining.

Refinery effluent water reduction and treatment

Z. Ndabezimbi, S. Pule, E. Cupido, and A. Hefer

Rand Refinery (Pty) Ltd., South Africa

The paper outlines various projects implemented at Rand Refinery to reduce effluent generation and freshwater consumption. The refinery generates about 2800 m³ of effluent annually and has initiated projects such as granulation water recycle and silver leach optimisation to address these issues. The granulation water recycle project has successfully reduced effluent volumes, while the silver leach optimisation has further decreased effluent by implementing stoichiometric addition of HCl and NaClO₃. The vibratory shear enhanced processing trial showed promising results for gold recovery from wastewater, though further trials are recommended. The water savings of the effluent reduction projects are monitored by measuring the amount of effluent pumped to service yard effluent storage facilities with the use of flow meters connected on SCADA. Since the effluent reduction initiative of granulation effluent recycle in FY23, the effluent reduced to 2676 m³. In FY24, the stoichiometric addition of HCl and NaClO₃ was implemented in the silver leach process, further reducing the effluent to 2083 m³.

The full paper will be published in the SAIMM Journal



Zintle Ndabezimbi

Junior Process Engineer
Rand refinery

Zintle is junior process engineer with 2 years of experience working alongside her mentor the Senior process engineer. Zintle specializes in process engineering work to support operations and project team with process engineering design on projects, process optimization (through technical investigations and MOC systems), process safety focusing on investigations and implementing engineering controls. She contributes towards improved effectiveness and efficiency. Zintle is excellent in problem solving, she is focused and pays attention to details. She is a very hardworking individual, driven and determined. she is an active listener, her nature is kind, thoughtful and helpful.

Value recovery from mine water treatment

Q. Paulse

Sibanye-Stillwater, South Africa

Addressing the long-term repercussions of mine-impacted water relies on multiple factors, including mining methodologies, regulatory frameworks, and a commitment to environmental stewardship. The heightened awareness of mining's ecological footprint has led to the enforcement of stricter regulations and the adopting of improved practices to prevent environmental degradation. However, effectively treating the water remains an arduous and costly endeavour. The technical complexities and financial burden associated with mine effluent treatment often dissuade investment due to extended payback periods, typically exceeding 15 years. As a result, mining companies generally engage in these projects primarily to meet environmental compliance standards or ensure water security. Sibanye-Stillwater has launched water treatment projects that exhibit favourable financial models; by producing potable water and generating value from the by-products. Despite our current substantial potable water production capabilities and robust environmental discharge treatment systems, our focus continues to revolve around conscientious ecological considerations and the formulation of innovative strategies for the future. A main pillar of the Sibanye-Stillwater strategy is the value recovery from effluent streams, which aims to identify and utilise the resources it contains, thereby promoting sustainability while minimising waste. Various projects have successfully been implemented and key closure initiatives are currently in the R&D phase to manage our effluent effectively and efficiently post-closure. This shift in our approach to water treatment within mining operations involves viewing effluent not merely as waste but as a valuable resource. Implementing value recovery lessens the environmental impact and offers economic benefits by offsetting water treatment costs. Sibanye-Stillwater currently has a potable water treatment plant fleet with a production capacity of 35.7 million litres per day, which operates at a water procession cost of R5.80 and R12.47 per m³ processed. This yields significant savings when we compare it to the municipal water supply cost of R19.24 to R26.65 per m³. The water treatment plants utilise a wide range of technologies which include reverse osmosis, nanofiltration, ion exchange, crystallisers and selective precipitation. The waste from the facilities is being managed by utilising various techniques to prevent any discharge from leaving the mine's boundaries into the natural environment. The systems are currently recovering the following value:

- 55 tons/month of calcium, magnesium and metal carbonates which are currently being re-used internally to offset.
- 15 tons/month of calcium, metal carbonate/sulphate solid precipitates which is being evaluated as a TSF rehabilitation aid.

Sibanye-Stillwater's flagship value recovery project focuses on the generation of high-value fertilisers from our water bodies. The composition of some of our mine waterbodies provides the ideal ingredients for nutrient recovery, which is then transformed into high-value fertilisers. The current pilot work showed an economical and sustainable yield of potassium nitrate (KNO₃) and ammonium sulphate. The potassium nitrate is a water-soluble fertiliser that contains potassium and nitrate ions. It is commonly used as a source of nitrogen and potassium in agriculture. The ammonium sulphate serves as an important nitrogen source for plants, with approximately 21% nitrogen content by weight in the form of ammonium ions (NH₄⁺). The fertiliser production process will now move into the next phase of implementation where we will be generating fertiliser in commercially viable volumes.

Back to the Future: Reverse engineering TSFs for the end land use

J.M. Walls

SRK Consulting, South Africa

The closure of tailings storage facilities (TSFs) is one of the most challenging aspects in the mining sector due to the intricate environmental, social, and economic risks they present. Addressing these risks sustainably requires not merely adhering to regulatory norms but envisioning a future where these landscapes can regenerate and rejuvenate local ecosystems and communities. This paper explores an innovative approach to reverse engineering TSFs to meet sustainable closure objectives and proposes integrating closure planning into the TSF lifecycle as early as possible. The critical question examined is whether we can design a TSF that not only minimises its environmental footprint but also regenerates. The framework for successful TSF closure is multifaceted, involving different stakeholders: tailings engineers focus on physical stability, owners aim for visually integrated and rehabilitated facilities, regulators prioritise liability management and risk assessment, and local communities seek benefits to the environment. Advanced tools such as dam breach assessments, rain-on-grid modelling, landform evolution modelling, rendered images are utilised to bridge the gap between technical complexities and stakeholder understanding. These tools validate design assumptions, predict long-term performance, and visually communicate outcomes to non-technical audiences. Emphasising ecological and sociocultural integration, the paper aligns TSF closure practices with broader environmental, social, governance, and sustainability goals, ensuring the revitalisation of the environment and tangible benefits for local communities.



Justin Michael Walls

Associate Principal/Principal Civil Engineer
SRK Consulting (South Africa) (Pty) Ltd

Justin is a professionally registered engineer with over 17 years of mine waste, water, and environmental engineering consulting experience. His projects span across approximately a dozen countries. Initially, he focused on designing and constructing tailings dams, but eventually, his conscience kicked in. Realizing the importance of addressing past issues rather than creating new ones, he shifted his focus to rather closing them and cleaning up the old messes.

Water stewardship at Kumba Iron Ore

T. White¹, N. Mkhize², and G. McGavigan²

¹Anglo American, South Africa

²Kumba Iron Ore, South Africa

Kumba plays a vital role in regional water security for the Northern Cape Province. The surplus groundwater produced via the active mine dewatering systems at Sishen and Kolomela is supplied to the regional water supply scheme and the Gamagara Local Municipality. This water is of high quality, requiring minimal treatment and supports residents and industry between Postmasburg and Black Rock. As a responsible water steward, Kumba takes this role very seriously and has applied concerted efforts and rigour in developing strategies, plans and standards that align with international best practice. A revised water management strategy for Kumba was developed in 2024. The new strategy incorporates the International Council of Mining and Metals Water Stewardship Framework, the Initiative for Responsible Mining Assurance standard and the relevant Anglo American technical standards, guidelines, frameworks and processes. The strategy details four key focus areas; increasing predictive capabilities, adaptive water management, stabilisation of dewatering networks and optimisation of dewatering distribution systems. Principles that Kumba applies in support of the four strategic elements are strategic dewatering, proactive surface water management, hierarchy of use and diversions for beneficial use. The execution of this comprehensive strategy will enable Kumba to empower its water stakeholders through meaningful engagement and ensure the beneficial use of Kumba's water resources for all. In this paper, we present the rationale behind the development of Kumba's water management strategy and some examples of how it is applied in practice.

Keywords: water stewardship, mine dewatering, beneficial use, adaptive water management, water security, hierarchy of use



Travis White

Principal Hydrogeologist
Anglo American

Travis has extensive experience in large scale mine dewatering, slope depressurization, remote monitoring networks, large diameter drilling, water balances, bulk water supply and capital projects. He is currently in the role of Principal Hydrogeologist with Anglo American Group Technical and previously fulfilled various roles in Kumba Iron Ore. In his time with Anglo American and Kumba, he has been involved in the development of various strategies, frameworks, standards & guidelines including the Kumba Water Management Strategy. Travis is also a presenter in the "Water in mine operations & slope stability" course facilitated by the University of Arizona Geotechnical Centre for Excellence.

An application of a pollution index and multicriteria decision tool in quantifying the hazards of historic mine sites for their repurposing

Z.M. Dzegere¹, I. Watson², and S.E. Mhlongo³

¹University of Witwatersrand, South Africa

²University of Witwatersrand, South Africa

³University of Venda, Venda

Abandoned mines are a threat to the environment as well as the health and safety status of the people in nearby communities. They present numerous problems that negatively affect the socio-economic development of the communities where these mines are found. On the other hand, these sites or their features have the potential of being repurposed for other uses that can help uplift the socio-economic status of host communities. This study aimed to apply a Pollution Index and The Multi-Criteria Decision-Making (MCDM) tools to quantify the hazards of selected abandoned mine sites in the Limpopo and Mpumalanga provinces for repurposing. The study used Pollution Load Index and Modified Degree of Contamination to qualify the level of environmental pollution of the sites and the combination of Analytical Hierarchy Process and TOPSIS to determine the magnitude of physical hazards presented by the major features of the studied abandoned mine sites. The results provided valuable information about the magnitude, extent of pollution in the selected study sites and risks that might have to be considered when repurposing such mine sites. Furthermore, the study helped pinpoint the problems of the abandoned mine sites, thereby facilitating the setting of the objectives and aims of rehabilitation. This information assisted in coming up with the considerations for the reuse of the abandoned mine sites.

Keywords: pollution load index, modified degree of contamination, repurposing, multicriteria decision making, abandoned mines, physical hazards, environmental pollution



Zandile Dzegere

Student

University of Witwatersrand

Zandile is an MSc student at the University of Witwatersrand with a focus on Environmental Geology and Mine closure and heading towards her last year of study/research project. She also has a strong commitment to mentoring and tutoring other pupils so that they can also excel.

From pit to port

W. Mostert

Anglo American, South Africa

Environmental DNA (eDNA) technology represents a significant advancement in ecological monitoring, offering a non-invasive, efficient, and sensitive method for detecting species and assessing ecosystem functions. Historically utilised by scientists and academic institutions, eDNA technology is now being adopted by the conservation sector through NGOs and in the private sector, as demonstrated by the partnership between Anglo American's Kumba Iron Ore (KIO) business, Marketing-Shipping and NatureMetrics over the past three years.

KIO has implemented eDNA sampling across its operations, including the Sishen and Kolomela mines in the Northern Cape, while the Marketing-Shipping business has undertaken marine and benthic eDNA sampling at the port at Saldanha on the west coast. This technology has enabled KIO to monitor biodiversity, track invasive species, assess aquatic system health, and evaluate environmental management strategies effectively to support expansion and conservation activities on site.

The Saldanha port, a meeting point for terrestrial and marine ecosystems, is particularly critical for environmental monitoring due to its role in portside operations including entry and exit activities. eDNA sampling at this site and within the ballast water of ships has facilitated comprehensive biodiversity baselining and monitoring throughout the supply chain with notable insights in relation to invasive species.

The use of eDNA sampling data extends Anglo American's commitment to environmental stewardship from local operations to the global stage, ensuring alignment with international sustainability standards and market expectations. The integration of eDNA data across the value chain – from resource extraction to final sale and shipping – serves as a robust environmental management tool, highlighting Anglo American's commitment to sustainability and setting a precedent for other mining operations worldwide.

This approach not only enhances environmental protection efforts but also reinforces the company's reputation as a leader in sustainable mining practices. Furthermore, the application of eDNA in this pit-to-port approach serves as an example of how multinational corporates operating in different environments globally, can efficiently and rapidly monitor biodiversity across supply and logistics chains in an objective, repeatable manner.



Warwick Mostert

Principal Biodiversity
Anglo American

Warwick is part of the Anglo American Group bringing over 25 years of biodiversity and conservation management experience across different companies, business units and functions. Warwick continues working to deliver a sustainable future for mining – changing the way we extract and use natural resources whilst still delivering positive biodiversity outcomes. Formalising stronger corporate commitments to reverse nature loss is a key focus area and one that relies on active partnerships and collaboration. Warwick has been central to the development and implementation of Anglo American's ambitious targets and commitment to Net Positive Impact and contribution to nature positive outcomes. Warwick started his career as a conservationist and holds qualifications in both Agriculture and Wildlife Management.

Opportunities to improve the wellbeing of the most affected communities by reducing emissions from sources other than mining and industry – case study from work undertaken by SRK in air quality offsets

V. Reddy

SRK Consulting, South Africa

Air quality is a critical determinant of public health, particularly in communities situated near major emission sources. While mining and industrial activities are often the primary focus of air quality management, other significant sources of emissions also contribute to the degradation of air quality. The presentation will explore opportunities to improve air quality in the most affected communities by targeting emissions from non-mining and industrial sources. Specifically, we will examine the implementation of air quality offsets by two of South Africa's largest emitters. Air quality offsets involve compensating for emissions by implementing measures that reduce pollution from other sources. This approach not only helps in meeting ambient regulatory requirements but also directly benefits the communities most affected by poor air quality. The paper will detail the strategies employed in offset programmes, including:

1. **Residential Fuel Switching:** Initiatives to replace solid fuels (coal, wood) with cleaner alternatives (LPG, electricity) in households.
2. **Vehicle Emission Reductions:** Programmes to improve public transportation and promote the use of low-emission vehicles.
3. **Waste Management:** Efforts to reduce open burning of waste through improved waste collection and recycling programs.

Visvanathan Reddy

Partner and Chairman

SRK Consulting South Africa

Vis Reddy holds Master of Science degree (Environmental Geochemistry) from the University of Cape Town and BSc and BSc (Hons) degrees in chemistry and geology from the University of Natal (KwaZulu Natal). He is the chairman and a partner at SRK Consulting (South Africa) and is a Registered Professional Natural Scientist (Pr. Sci. Nat South Africa 400091/03) and has been involved in various aspects of environmental geochemistry over the past 33 years. He has specialised in air quality management and has worked on projects that include emissions and ambient air quality monitoring, dispersion and receptor modelling, air quality impact assessments, training, due diligence audits and compliance audits focusing on air quality issues. Over the past 13 years he has been involved in advising clients on determining the carbon footprint of mining and industrial projects. More recently he has worked on projects identifying offset opportunities and assisted clients with developing plans to mitigate the carbon footprint of mining and industrial projects. Vis has worked extensively in sub-Saharan Africa mining industry and has either been a primary or co-author and reviewer on numerous technical reports related to environmental geochemistry, air quality and climate change.

Opportunities for surface water management in the Wonderfonteinspruit, West-Wits Gold Fields, for sustained deep-level gold mining

B. Govender¹, M. van Biljon², and N. Haripursad¹

¹Sibanye Stillwater, SA Region, South Africa

²SLR Consulting (Africa), South Africa

The West Wits goldfields, located about 54 km west of Johannesburg and widely considered to be the most lucrative goldfields, are matched by an overlying dolomitic aquifer that is regarded as the most extensive karst system in the world. Mined from the late-1800s, mining in this region has been heavily influenced by fluctuating commodity prices and hydro-geological conditions characterising the region. On the latter, a prominent consideration is the hydraulic regime of the Wonderfonteinspruit, the attendant groundwater systems, and the cumulative geo-hydrological implications of these on the adjacent mine voids.

The Wonderfonteinspruit emerges in the north-eastern quadrant of Krugersdorp and flows in a westerly direction, traversing the West Wits goldfields, before its confluence with the Mooi river (close to Carletonville), and eventually draining into the Vaal river system. In the 1970s, a one metre diameter pipeline was constructed over 36 km of the West Wits goldfields, to complement the dewatering of the mines, and limit perennial inflow from the Wonderfonteinspruit into the mine voids. Moreover, it also served to limit attenuation in the Wonderfonteinspruit riparian zone, as retarded flow in this region was considered a precursor to the development of sinkholes, providing preferential flow paths for surface water to rapidly enter the deep-level mine workings.

Historic upstream mining activities (largely unregulated), urban development, and other socio-economic water activities have altered the characteristics of the Wonderfonteinspruit, with negative implications for the downstream deep-level gold mining ventures. Although remedies aimed at augmenting the role of the one metre pipeline were commissioned in more recent times, rapid landscape development and the attendant watershed changes have done little to assist with inundation experienced at the start of this pipeline. The impact of climate change in particular, is evidenced through increased short-episode, high-intensity rainfall events with seasonal deluges that largely escape the one metre pipeline carrying capacity, and flow into the riparian zone of the WFS, and the nearby array of sinkholes. This unintended water bypass is clearly discerned through the need for an increased pumping demand on the underground mine void water interception and management systems of Sibanye's Kloof and Driefontein mines. Creating an operational risk, and escalating infrastructure and utilities costs, this increased influx of surface water into the deep-level mine workings also jeopardises the longer-term sustainability of deep-level gold mining in the region. In the closure perspective, this burden of surface water will also require scrutiny for the post-mining water management opportunities that need to be played out.

A suite of management options to reduce flooding risks in the deep-level mining operations may be considered. This entails catchment transfers, improved attenuation, optimising local water management, and upgrades to mine water management infrastructure. These options however come at a cost and are not necessarily the responsibility of any single user but dictate cooperative approaches between the relevant stakeholders. Such solutions also need to consider water reuse for sustainability and local economic development. Our presentation aims to summarise the challenges, the solutions contemplated and adopting a phased approach to plausible remedies for shared-value creation.

Developing an interactive web-based risk assessment framework from the mine waste atlas: A pilot study in the Northern Cape

B. Koovarjee, J.R.C. von Holdt, M.J. Cole and M. Becker

University of Cape Town, South Africa

We introduce a new risk assessment framework derived from the development of the Mine Waste Atlas, focusing initially on the Northern Cape province of South Africa. This mineral-rich region holds significant historical and ongoing mining activities, which present both economic opportunities and environmental challenges. Addressing these challenges requires a robust, data-driven approach to risk management. This framework integrates environmental and social risk assessments, tailored to the conditions of the Northern Cape. The environmental assessments consider factors such as water quality, land degradation, air pollution, and biodiversity impacts. Social risk assessments address the effects on local communities, including health risks, economic impacts, and social well-being. This ensures that both environmental and societal factors are considered in the management of mine waste.

A key feature of this framework is its integration into an interactive, web-based platform. This platform consolidates diverse datasets on mine waste characteristics, land use, and environmental impacts while creating a user-friendly interface. The interactive nature of the platform will allow for real-time updates and continuous monitoring, making it a dynamic tool for ongoing risk assessment and management. The Mine Waste Atlas project, which is the basis of the risk assessment framework, with the Northern Cape as its pilot phase, aims to fill existing gaps in mine waste management data and provide a comprehensive overview of the risks associated with mine waste sites. By harnessing geographic information systems, spatial analysis tools, and ground truthing, the Atlas offers a detailed and accurate representation of mine waste sites. The automation of the risk assessment process marks a significant advancement in the South African context. This automated system enables continuous monitoring and timely updates of risk assessments, thereby enhancing the practicality and effectiveness of the Atlas. The automation process involves developing coding languages and frameworks to streamline data integration and risk assessment, ensuring that the Atlas remains current and relevant. The pilot project in the Northern Cape serves as a foundational model for expanding the initiative to other provinces in South Africa. As data collection and implementation progress, the framework will be adapted and rolled out to additional regions, ensuring a nationwide approach to mine waste management. This expansion will build on the lessons learned and methodologies developed during the pilot phase, promoting consistency in data collection, analysis, and reporting. The development of the interactive web-based risk assessment framework from the Mine Waste Atlas represents a significant step towards responsible and sustainable mine waste management in South Africa. By addressing both environmental and social risks, this framework enhances the mining sector's ability to manage its impacts and supports the long-term sustainability of mining activities.



Bavisha Koovarjee

Postdoctoral Research Fellow

University of Cape Town

Bavisha Koovarjee is a geologist with a strong commitment to interdisciplinary research. She holds an academic background, including a Bachelor of Science degree in Geology and Geography, a Bachelor of Science Honours degree in Geology, and a Doctor of Philosophy (Ph.D.) in Geology, earned at the University of the Witwatersrand. Currently, Bavisha serves as a Postdoctoral Research Fellow at the University of Cape Town, within the Minerals to Metals Initiative and the Departments of Environmental and Geographical Sciences and Chemical Engineering. Her work is marked by a special emphasis on developing interdisciplinary research skills, bridging the gap between different fields to address complex challenges in the mining industry. In addition, Bavisha promotes youth development and mentorship in her capacity as a member of the executive committee of the Mineralogical Association of South Africa.

Understanding and mitigating mine dust impacts: Lessons learned through multi-stakeholder engagement

J.R.C. von Holdt, S. Adams, and J. Broadhurst

University of Cape Town, South Africa

The mining industry is a significant contributor to the economies of many developing countries. However, the activities associated with this industry often have significant impacts on the surrounding environment and people. The extraction, transportation and downstream utilisation and processing of mineral resources have significant impacts on air quality in resource-rich developing countries. Mining-host and mining-affected communities are potentially exposed to increased air pollution resulting in more severe health outcomes due to the dispersion of particulate matter and gaseous emissions from mining operations. The impact on natural ecosystems can also be significant with soils, vegetation and water resources negatively affected by emissions resulting in further indirect effects on communities. The extensive semi-arid to arid regions of southern Africa exacerbate particulate emissions and makes this region particularly vulnerable to the effects of climate change which may increase dust emission from drier mining operations and natural surfaces. The diverse impacts of atmospheric emissions from mining and related industries are generally not well quantified and understood, or in some instances, these entities simply lack the will and incentives to bring about improvements. To effect change requires an interdisciplinary, multi-stakeholder approach due to the complexities involved. The aim of the network is to improve the socio-economic well-being, health, and environment of mining-affected communities.

In line with the mission and aims of the Mine Dust and Health Network, several events and student projects have taken place from 2016 onwards. The events and projects have been aimed at developing a shared and common understanding of the inter-related health risks and mitigation opportunities relating to mine dust exposure, both more broadly and in the context of two case studies within South Africa, namely (i) the transport, stockpiling and handling of metal ore in Saldanha Bay, and (ii) the gold tailings storage facilities in the West Rand. Through the various events and projects, the network has identified five priority areas of key relevance to mine dust and its impacts, namely (i) exposure and health (ii) monitoring and measuring (iii) policy and law (iv) stakeholder awareness and education and (v) mitigation and rehabilitation. Engagement activities over the past few years have highlighted the inter-related and complex nature of these issues, and the importance of on-going multi-stakeholder engagement and involvement across all mine dust priority areas. The consensus amongst network members is that there is a particular need to identify high risk and vulnerable communities, and to conduct more extensive and long-term surveillance of mining-related dust exposure and health effects in these communities



Johanna RC von Holdt

Lecturer

University of Cape Town

Johanna earned her PhD in Aeolian Geomorphology from the University of Cape Town (UCT) in 2018, where she focused on the drivers of dust emissions from the Namib Desert's dust sources. Following her PhD, she completed a postdoctoral fellowship in Chemical Engineering at UCT, examining dust emissions from mining operations and waste. Since 2020, she has been a lecturer in the Environmental and Geographical Sciences Department.

Her research centers on air quality, with a particular focus on particulate matter and its impact on earth processes and air pollution from both natural and anthropogenic sources. She studies the emission, transport, and deposition of atmospheric particulate matter and its effects on air quality, the environment, and human health. Johanna's work delves into urban and mining-affected areas, landscape changes due to these processes, and soil formation and degradation.

Johanna integrates remote sensing with ground-based observational data, seeking to enhance how we measure, model, and manage air quality. She is committed to developing affordable, locally relevant methods for data collection, including low-cost sensors, citizen science initiatives, and community monitoring. In addition to her academic role, she manages the Mine Dust and Health Network (www.minedust.org) at UCT.

Biodiversity offsets in mining: Contributing to global targets whilst reducing regulatory delays, contingent liabilities and future compliance costs

J. Manuel, M. Theart, C. Eb, and K. Maze

SANParks, South Africa

The 2023 Global Biodiversity Framework (GBF) aims to halt and reverse biodiversity loss. In the face of continued biodiversity loss despite previous multilateral agreements, now, more than ever before, business is expected to contribute to realise a nature-positive world. South Africa, as a signatory to the GBF has prioritised expanding our protected area estate as our apex target for the GBF. The importance of protected area expansion is further reinforced in a recent draft policy, i.e., the 2022 White Paper on Conservation and Sustainable Use of Biodiversity and the 2024 National Biodiversity Economy Strategy. When it comes to environmental compliance, biodiversity offsets have long been used as a conservation action that compensates for significant negative impacts on biodiversity resulting from development projects. Mining, as a place-bound, extensive form of development often gives rise to unavoidable, significant impacts on biodiversity. Many mining projects have had to implement biodiversity offsets over the past two decades, and a lot of those are still currently grappling with discharging those liabilities. We anticipate that mining will increasingly be required to implement biodiversity offsets going forward from both a regulatory and voluntary perspective. Biodiversity offsets have been implemented for more than two decades in South African environmental impact assessment processes, however results have been mixed: Offsets investigations often started post-authorisation, leading to regulatory delays; suboptimal outcomes for biodiversity; insufficient stakeholder engagement; poor enforceability and costly compliance. In 2023, South Africa adopted a National Guideline on Biodiversity Offsets, aiming to provide more consistency in offsets practice. Importantly, biodiversity offsets in South Africa now requires expanding land under formal protection, as well as providing the funds for its management. SANParks, as the national protected area management authority, has a national footprint of 20 parks covering more than 4 million hectares. We have implemented several offsets on behalf of offset liability holders, and are exploring implementing a proactive offsets scheme (also referred to as offset banking) with a multiple-value proposition for developers, competent authorities, SANParks and the broader public:

- Reducing delays and streamlining the environmental regulatory process.
- Increasing assurance that biodiversity offsets will be implemented, thereby derisking the development.
- Decreasing offset costs through the economies of scale of increasing existing parks.
- Expediting the expansion of national parks, with additional funds for management.
- Simultaneously unlocking economic development and increasing environmental sustainability.

There is a growing convergence between the global sustainability agenda, local regulatory requirements, ESG in the mining sector, and the goals of the conservation sector. Biodiversity offsets have a small, yet important contribution to make.



Jeffrey Manuel

Manager: Park Planning and Development
SANParks

Jeffrey is currently responsible for coordinating SANParks' engagements on development plans and applications that potentially impacts on National Parks. Most of his career has been spent mainstreaming biodiversity into environmental management and land-use planning in South Africa. Jeffrey has experience working at an environmental consultancy (Common Ground), a conservation NGO (BotSoc), and in provincial government (DEA&DP), but the bulk of his career was spent at SANBI as a policy advisor. As his career evolved, Jeffrey developed a particular interests in Integrated Environmental Management, Biodiversity Offsets, Systematic Conservation Planning, Spatial Analysis and Prioritisation, and Biodiversity Information Management.

Zero waste to landfill by 2030 – a mining case study

M. Bornman

Sibanye Stillwater, South Africa

South Africa generates 108 million tonnes of waste per annum, equating to about R25,2 billion worth of waste dumped, of which 90% is disposed to over-capacitated landfill sites with 10% of this waste being recycled. These are resources that could have been fed back into the economy by means of recycling, repurposing, and reusing. Sibanye-Stillwater embarked on the zero waste to landfill goal by 2030 to divert 90% of waste from landfills using a 'whole system' through recycling, reuse, recovery, beneficiation technologies, and towards value-adding opportunities which have the potential to create numerous environmental, social, and economic benefits. Sibanye Stillwater will present the waste management initiatives with door-step communities through a collaborative approach, with a focus on the Bojanala District Municipality. By leveraging partnerships among the private sector, public sector, and civil society, this initiative aimed to deliver sustainable impact and benefits, addressing critical aspects of waste management, resource efficiency, and community development. The importance of a collaborative approach in unlocking the Circular Economy and driving socio-economic and environmental development will be demonstrated.



Madeleine Horn

Environmental Manager Specialist SA Region
Sibanye Stillwater

I am ambitious Environmental Specialist with 17 years Environmental Management experience in the PGM and Gold Mining industry. I started my career at Anglo American in 2007 and I accepted an Environmental Unit Manager position in 2016 at Sibanye Stillwater. I do have extensive experience in waste, water, land, Heritage and Air quality management and in Environmental Management Systems and ISO14001 Standards. I currently lead a Specialist Team at Sibanye Stillwater focusing on Waste, Water, Air, Land and Heritage.

Making the energy transition just: Assessing vulnerability of mining communities

M.J. Cole

University of Cape Town, South Africa

Growing concern over the impacts of climate change across the world has led to the widely shared goal for a 'just transition' to cleaner energy sources and reduced dependence on coal. This has significant implications for coal mines and their downstream industries, but also for high-cost platinum mines due to the shift to electric vehicles. This global transition to clean energy will have winners and losers, but with South Africa's dependence on coal and platinum mining industries for energy, jobs and foreign exchange, it is at risk of being on the losing side. Mine closures will result in job losses, depressed local economies, reduced investment in local economic development made by mining companies, and loss of anchor customers and revenue for under-resourced local municipalities. Vulnerability of communities to economic shocks can differ widely between places and regions and can change over time, and depends on three components – exposure, sensitivity, and adaptive capacity. Vulnerability in the context of the 'just transition' is the degree to which a community is susceptible to the transition away from coal, the extent to which coal phase-down may cause social and economic disruption, and the capacity of the people and the government to effectively adapt or cope. This presentation will describe the vulnerability of South Africa's coal communities and municipalities to coal related to the energy transition using quantitative data on coal mines and plants, coal jobs and income, SDG indicators, and governance capacities. It covers five provinces, 11 district municipalities, two metropolitan municipalities and 25 local municipalities. This will provide in-depth insight into



Dr Megan Cole

Research Fellow

University of Cape Town

Dr Megan Cole is an interdisciplinary researcher with over 20 years of experience in mining, climate change and sustainability, and a DPhil from the University of Oxford. She started her career in the mining industry as a geologist, geotechnical engineer and later research manager for Anglo Platinum in South Africa. She led a team of graduates developing the 'mine of the future' and played a key role in developing corporate water and climate change strategies. She was featured in the Mail and Guardian's 'Book of South African Women' in 2009. In 2010 she moved to the UK and worked at the Smith School of Enterprise and the Environment, University of Oxford, on climate change policy and strategy in developing countries. She then undertook a DPhil on measuring sustainable development at global, national, provincial and local levels. Returning to South Africa in 2017, she joined UCT to undertake research on operationalising the SDGs in the mining industry. She has published academic papers on mining communities; SDGs; mine closure risks and opportunities; assessing ESG risks in the mining industry; community vulnerability and the just transition. She has undertaken research for the Water Research Commission, the Minerals Council of South Africa and the World Bank. She is a member of the SAIMM ESGS Committee.

Leave no one behind: Climate change-just energy transition trajectory exclusion scenarios. A case study of Kriel and Carolina in Mpumalanga, South Africa

T. Chidzungu and A. Wafer

University of the Witwatersrand, South Africa

The wide range of climate policies that exist globally and in South Africa include plans for shifting from fossil fuels, especially coal, to a low-carbon economy. This shift is generating new economic value chains that are adaptive, climate resilient, and consistent with transitions. These decarbonisation strategies will bring improvements to the biophysical environment and the socio-economic environment, as they point to industrial development and local job creation potential. However, it could possibly create sacrifice zones that will perpetuate existing socio-economic inequalities and discrimination against vulnerable communities, leading to massive exclusions of impacted individuals and communities. Against this backdrop, the paper aims at reviewing the principle of leaving no one behind (LNOB) through the lived exclusionary experiences of just energy transition (JET)-impacted communities in the two study areas of the Carolina and Kriel mining concession areas in Mpumalanga, South Africa. A qualitative research design utilising semi-structured interviews and survey questionnaires to gather data from 2020 to 2022 was adopted. 230 participants from JET-affected communities, including experts, academics, and policymakers involved in fossil fuels and the renewable energy sector, were purposefully sampled for the study. Collected data was analysed using the content analysis. The study's findings indicate that discrimination and social inequality linked to gender, race, ethnicity, cultural stereotypes, class, and nepotism are major factors contributing to exclusions that compromise the LNOB principle. The findings also identify contextual issues such as land and water ownership rights that exclude people from economic activities such as agriculture within a JET context. The paper argues that a social impact assessment tool that could facilitate inclusivity and address the JET-imposed exclusions is necessary to observe the principle of LNOB in the face of inequalities and discrimination challenges.

Keywords: climate change-just energy transition, exclusion, leave no-one behind, social inequalities and discrimination, South Africa



Dr. Thandiwe Chidzungu

Research Fellow

Wits University Alumnus

I am a social science researcher with more than 7 years' experience in qualitative research dealing with vulnerable communities, in particular mining-affected communities in Mpumalanga Province. I am also an education practitioner with an interest in teacher education, having spent a short stint as an associate lecturer at the University of the Witwatersrand during my PHD studies and a long stint as a high school geography teacher. I am currently a research fellow at the University of Johannesburg focused on educator competence in geography teaching, looking at education for sustainable development in a climate change-JET context.

Transparency reporting on tailings dams: The case of the six largest listed mining companies

C. Crous and L. Marais

University of the Free State, South Africa

Most mines store their waste in tailings dams. Tailings dam failures hold ecological and human risks, as seen from recent failures in Brazil and South Africa. Although the mining industry revised its Global Industry Standards on Tailings Management in 2020, three concerns remain: did it change practice, are the changes comprehensive enough and is enough attention given to non-technical aspects? The paper uses concepts from social constructivism and the changed requirements of the Global Industry Standards on Tailings Management to assess the sustainability reporting on tailings dams for the six largest mining companies in the world. We compare the transparency in reporting before and after the acceptance of these global standards to investigate whether the standards have improved the level of reporting and to identify the remaining weaknesses.



Lochner Marais

Professor of Development Studies
University of the Free State

Lochner Marais is a Professor of Development Studies at the Centre for Development Support at the University of the Free State (UFS). He is also an honorary professor at the Sustainable Minerals Institute (University of Queensland, Australia) and the executive editor of the Journal by Cambridge University Press: Research Directions: Mine Closure and Transitions. He serves on the editorial board of Habitat International and Sustainable Cities and Society and the advisory boards for Housing Studies, International Journal of Housing Policy and Housing and the Built Environment. His research interests include housing policy, small cities and towns (mining and renewable towns and cities) and public health, focusing on children. In addition to concentrating on these themes separately, he focuses on integrating them. The main contribution of his work has been to improve the understanding of the social consequences of mine closure, mining's role in creating place attachment and the relationship between mine closure and social disruption. He is the first researcher to link mine closure and social disruption; he warns against dependencies on mining booms and identifies mine closure as the 6th phase of boomtown development.

Investigating strategies for involving host mining communities in mine closure planning: An integrated stakeholder engagement in the West Rand, South Africa

K. Majela¹, M. Mpanza², and J.R.C. von Holdt¹

¹University of Cape Town, South Africa

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Sustainability challenges are intricate and interconnected and require a collaborative effort from multiple stakeholders. There is an increased accountability for mining companies to implement socially responsible strategies to curb environmental, social and economic impacts in societies, particularly within the context of mine closure and host mining communities. This is primarily because these impacts are disproportionately felt at the community level. Literature highlights that industry best practices promote the need to engage host mining communities in mine closure planning and processes through stakeholder engagement. However, despite this, there is a gap in knowledge on continuous community consultation in mine closure planning through stakeholder engagement. This includes the practical application of the integration of host mining communities in mine closure planning and maintaining ongoing stakeholder engagement with communities. Additionally, the lack of integration of host mining communities is exacerbated by unclear regulatory frameworks that create legislative loopholes for mining companies to treat and maintain stakeholder engagements as an optional administrative activity. Thus, this research uses the West Rand area to enhance the understanding of the impacts of mine closure on host mining communities. This is done to recommend strategies that could potentially improve the integration of host mining communities into mine closure plans within the South African context. To realise the above-stated aim, the study was conducted through a qualitative research approach using thematic content analysis based on four primary research questions: (1) What are the impacts of mine closure in mining host communities in the West Rand region? (2) How do legislative uncertainties influence the decision-making of mining companies concerning mine closure and integration of host mining communities in closure plans? (3) What is the level of communication transparency between host mining communities and mining companies in the West Rand? and (4) What are the existing integration strategies for the inclusion of host mining communities into closure plans in the West Rand? The findings reveal that the impacts of mine closure cuts across the three pillars (environmental, social and economic) of sustainable development. The evaluation of these impacts should take place using a cascading approach. Secondly, the current legislation is ineffective due to institutional capacity, legislative gaps and a phenomenon called revolving door - a mechanism for captured state institutions. Thirdly, there is miscommunication between mining companies and communities due to a lack of established mining community structures, high community illiteracy levels, and the use of technical language in reports. Lastly, existing engagement strategies by mining companies in the West Rand are still ineffective due to selective engagement, lack of feedback monitoring, and lack of clarity and purpose in meetings. Therefore, the study proposes a constructive and proactive stakeholder engagement framework that promotes collaboration and ongoing engagements with host mining communities while elucidating and recommending reforms to the existing legislative ambiguities that hinder ongoing stakeholder engagement, the inclusion of host mining communities and the sustainable closure of mines.

Keywords: stakeholder engagement, mine closure, sustainability, host mining communities, sustainable development



Karabelo Majela

Student/ESG Consultant
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Karabelo is an ESG Consultant with a diverse sectoral focus. His expertise includes E&S due diligence and monitoring, E&S risk assessment, ESG scorecards, reputational risk assessments and ESMS development. In the impact space, he has conducted benchmarking analysis, sustainability reporting, and impact due diligence, research and analysis for clients worldwide. His educational achievements include a BSc with double majors in Geology and Geography and a BSc Honours with majors in Environmental Sciences, Geography, and Environmental Management (with distinction). Currently, he is pursuing his Master of Science degree in Environmental and Geographical Sciences at the University of Cape Town.

Community assets and services provided by coal mines: How do we ensure that these are not lost in the energy transition?

T. Ledger

Public Affairs Research Institute South Africa, South Africa

South Africa has a clear policy goal of delivering a just energy transition (JET): an energy transition that ensures that communities who depend on coal and coal-fired electricity production for their livelihoods are not impoverished by the transition. To date, plans for these remedial strategies have focused largely on formal employment in the various coal value chains. The biggest benefit to communities of coal mining is defined as employment, and thus plans to avoid harm from the transition have focused on how these employees can be reskilled and employed in other sectors. However, there are multiple other ways in which coal mines benefit local communities. The loss of these services and assets will significantly undermine quality of life, and reduce the potential of these areas to develop sustainable post-coal economies. To date, none of the JET policies or programmes have incorporated the continuation and preservation of these services and assets, for the benefit of local communities and local economies. This paper presents an initial high-level detailing of these services and assets in Mpumalanga, and also evidence from ethnographic research in Emalahleni and Steve Tshwete local municipalities documenting the value of these to local communities and economies. It concludes with policy recommendations for how these can be incorporated into JET planning.

Tracy Ledger

Head of the Just Transition

Public Affairs Research Institute

Dr Tracy Ledger is head of the Just Transition programme at the Public Affairs Research Institute (www.pari.org.za). The Just Transition programme is focused on how the state can deliver social justice and equity in the transition in energy, water and food systems (<https://pari.org.za/just-transition/>). Dr Ledger holds a Phd in Anthropology from the University of the Witwatersrand and a Masters' degree in Agricultural Economics from Stellenbosch University.

Environmental, social, and governance impacts lens dashboard

V. Mahadeo¹, G. Sihlali¹, S. Gruber², W. Botha³, T. Swettenham¹, J. Pelders⁴, and S. Ramparsad⁵

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The Mandela Mining Precinct, a collaborative effort between the Department of Science and Innovation and the Minerals Council South Africa, is jointly hosted by the Council for Scientific and Industrial Research and the Minerals Council. This initiative is a testament to the collective commitment to revitalise mining research, development, and innovation in South Africa, ensuring the industry's sustainability. The South African Mining Extraction, Research, Development, and Innovation (SAMERDI) strategy, under which the Successful Application of Technology Centred Around People (SATCAP) programme operates, is a reflection of this shared vision. The SATCAP programme is focused on advancing the 'social' principle of the ESG agenda; more specifically, understanding of mining modernisation's effects, impacts, and challenges for people in the minerals sector and is underpinned by the commitment to listen and respond to industry needs.

The focus areas of SATCAP are:

- Human-technology interaction: Understanding how people respond to and engage with modern technologies
- Jobs: Understanding how modernisation affects employment prospects
- Skills: Determining which skills will be needed by the mining workforce of the future, and how these can be developed in employees
- People-centric modernisation: People are fundamental to possessing the capabilities to achieve organisational objectives, and the same is true for modernisation objectives.

To guide the mining industry across a people-centric modernisation journey, digital data-gathering tools have been developed to enable mines to understand community training and social and SMME needs; the digital leadership capability of the workforce, and a change management blueprint for adopting modern technologies in mining. These tools have further been linked to the environmental social governance (ESG) Impacts Lens Dashboard to enable mining companies to gauge people impacts. The ESG Impacts Lens Dashboard, a product of the SATCAP programme, is a comprehensive tool designed to provide a holistic view of the impacts of mining modernisation. It unveils three dynamic domain-specific dashboards with over 85 specific indicators, which reflect the impact in terms of socio-economic transformation, automation on jobs and change management practices. This comprehensive approach ensures that no aspect of the modernisation process is overlooked, giving mining companies the confidence to gauge people impacts accurately. Firstly, the Socio-Economic Transformation Impact Evaluation Dashboard considers the impacts of social change directly attributable to mining modernisation, possible mine closures, and support and preparation of the local communities regarding engaging in alternative economies, namely entrepreneurship training, skills for engaging in alternate economies, and the development of asset bases in communities. Secondly, the Impact of Automation Dashboard considers the impacts of change directly attributable to the mine's initiatives in terms of automation and digital transformation, namely, the introduction of new processes and technologies, the implementation of skills and training, and the changes in skills profiles and employee levels. Thirdly, the Change Impacts Dashboard aims to understand the changes and impacts around people, technology, organisation, change adoption, and projects, including the critical success factors that should be considered when introducing new technologies for mining modernisation. Distinguished by its integrated approach to data collection, the dashboard integrates a Power BI dashboard with the five digital tools. The indicators are intentionally summarised to align with the business priorities of the South African mining industry, spotlighting the critical facets of cost, safety, people, and productivity.



Vishaylin J. Mahadeo

Junior Engagement Manager

The Research Institute for Innovation and Sustainability (RIIS)

Vishaylin has worked on and been instrumental in several corporate strategy projects spanning various sectors, including mining, entrepreneurship, energy, maritime, and innovation. His expertise focuses on the integration and intersection of human processes with business structures, a passion born from his academic background. His diverse knowledge is bolstered by specialised studies in strategic thinking, utilising behavioural science and neurostrategy. While at RIIS, Vishaylin has supported the research and development of an innovation ecosystem for the South African energy and marine industry. He has been involved in catalysing the digital transformation of the South African mining industry, with a core focus on the impact on people through leading the development of a digital leadership competency assessment tool and ESG Impacts Lens Dashboard for the South African gold and platinum group metals mining sector.

Modern mines and the modernisation of community engagement and benefit-sharing in South Africa

N. Coulson and I. Watson

University of the Witwatersrand, South Africa

The South African mining sector is modernising. Job losses for mineworkers are inevitable, as are reduced work opportunities for communities affected by mining. The arrangements for community engagement and benefit-sharing are well described and regulated in South Africa; however increasingly mines will be unable to rely on the offer of jobs to secure the social licence to operate. Semi-structured key informant interviews were conducted with national civil society stakeholders (n=11) and industry community practitioners (n=10) to consider their perspectives on mine modernisation. It was found civil society and to a lesser extent industry community practitioners were locked out of the discussion on mine modernisation and that the systemic failures that beset the current approach to community engagement and benefit-sharing are set to be aggravated by changes brought about by modernisation. Industry needs to commit to voluntary practices that address current failures or face legal challenges as communities become more organised.



Dr Nancy Coulson

Director (Sarraounia) and Senior Lecturer (Wits)
Sarraounia Public Health Trust and Wits Mining Institute

Dr Nancy Coulson has extensive experience (30 + years) of health promotion and community development work both in the public sector and as a consultant, across South and Southern Africa. In the last ten years she has held a specific interest in capacity development and related institutional and organisation development and has been involved with a wide range of research and education activities for the mining sector. She is a Visiting Associate at the Wits Mining Institute and holds a BSc Hons. M Ed, PhD (Public Health).

A case study on local community employment and skills challenges in South Africa that has broad applications to the mining industry as a whole

D. Wessels

Anglo American, South Africa

Problem Statement: A fundamental reality is that within a typical rural South African mining area, a variety of factors are undermining efforts to source, train and develop local people for increasingly more highly skilled and mechanised underground work. This is evidenced by:

- low progression through school and high dropout rates,
- poor educational performance in mathematics and physical science, in particular,
- limited understanding of mechanical and technical concepts,
- limited interest by male youths in training opportunities, and
- tertiary-educated candidates favouring work in non-mining sectors and urban centres.

These factors are influenced and exacerbated by the harmful effects of scarcity, societal ills and trauma on early cognitive, emotional, and social development; thus potentially hindering their ability to reach their full potential. The problem is compounded by significant influx creating competition for jobs.

This Mining Project case study aggregates statistical data from a variety of sources:

- a detailed household survey (700 households - 80%) of a village neighbouring a brownfields mining project (2023),
- a socio-economic household survey of 2500 households (10%) within the project's area of influence (2021),
- psychometric test results and training outputs from the Company's Construction Training Programme (2023),
- historical matric/ grade 12 results from schools within the project's area of influence, and
- educational enrolment, attainment and progression in South Africa with a focus on Limpopo Province (Census 2022).

As the industry increasingly shifts to modernised/ mechanised underground mining, so the skills requirements change markedly. Mechanised operations utilise advanced technologies, demanding more sophisticated qualifications, skills, and greater proficiency in data management. Survey data from local villages showed that only half of those above 18 years old have matric. Local community members that participated in a Construction Training Programme had a low uptake of maths and physical sciences at school level. Their psychometric scores revealed challenges in cognitive reasoning, specifically in technical and mechanical concepts, detecting patterns and drawing logical conclusions-based information provided. Poor educational performance, within the province and local area, is curbing the ability to source local skills for underground mining. Although pass rates improved in 2023, fewer matriculants (47%) wrote maths than in 2019 (55%). There was an increase in both male (10%) and female (12%) high school dropouts since 2001. According to Census 2022, socio-economic status, geographic location, and gender influence educational progression. Typical challenges and social ills within the area include substance abuse, high levels of domestic violence, child abuse, neglect and malnutrition amongst others. It is the author's view that these factors coupled with intergenerational poverty and trauma (historical and current) have impacted and will continue to impact individuals' developmental building blocks, thereby restricting the local workforce's ability to participate in a highly technological mechanised underground mining operation. The current lack of suitably qualified local candidates results in hiring of non-local people, thus exacerbating influx and the array of associated adverse impacts.



Deon Wessels

Social Performance Lead – Capital Project Portfolio (contracted)
Anglo American / Immersion3 Consulting

Deon Wessels is a consultant with 28 years' experience of which 22 years specializing in Social Performance. Since September 2018 Deon has been working with Anglo American Projects, as a contractor, in managing the Social Performance (SP) requirements of the Future of Mogalakwena Project Portfolio. He is responsible for all SP aspects of the Project Portfolio, which includes (1) Underground Mining Scoping and PFS-A Studies, (2) Exploration Decline Development, (3) Tailings Storage Facility Construction, etc. Deon is also an Investment Assurance Specialist for Anglo American and Project Manager for a major Resettlement Study (+1000 households), which is currently in its 30 month planning phase.

Managing mining project impacts on a community in the context of high levels of biodiversity and the presence of established ASM – a case study from West Africa

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Mining projects have been economic and social disruptors long before the term gained currency with the onset of the Fourth Industrial Revolution. Economically exploitable ore deposits are increasingly located in remote, under-developed corners of the Earth. This is largely a function of the deposits located more centrally being either mined out or production ceasing for socio-environmental reasons. Countries with short (or no) histories of industrial scale mining are becoming the focus of junior companies hoping to develop new mines. However, this can pose a number of challenges exacerbated by jurisdictions less familiar with the regulation of mining projects. This paper focusses on two of these and how they have been addressed at the Dugbe project in Liberia.

Some of the remote areas of interest may have high levels of largely intact biodiversity that may provide key habitat for the survival of endangered species and global ecosystem services (like carbon sequestration), whilst also supporting the livelihoods of local communities. To manage the impacts of new projects on these fragile landscapes, biodiversity offsets become critical. Paying for the creation of these and maintaining their integrity in the medium to long term requires novel partnerships and concepts. Sustainable forestry and the sale of carbon credits provide two opportunities for communities to monetise their forest assets sustainably.

This approach can be challenging where established communities rely on artisanal and small-scale mining (ASM) to supplement (or entirely provide) their livelihoods, stressing the system through ongoing environmental impacts from river dredging and deforestation. ASM brings short-term, often more lucrative, gains than the longer-term sustainable forestry approach. The arrival of an industrial scale project offers both threats and opportunities: loss of access to ore resources and displacement; formal job opportunities; and social development. Avoidance, mitigation and in some cases offsetting of impacts are required to limit the social and environmental costs of new mine development in remote, under-developed settings.



Daniel Limpitlaw

Principal
Limpitlaw Consulting

Dr Daniel Limpitlaw is a mining engineer, specialised in the assessment of both direct and indirect impacts of mining on the environment and the surrounding communities. He has experience through the entire mining life cycle on projects across Africa, the Middle East and the Pacific. Daniel has worked in academia, operational management and at executive level in a gold Junior.

ASM – reducing risks in rapid response swing producers of climate critical minerals

D. Limpitlaw and P. Mitchell

Limpitlaw Consulting, South Africa

Artisanal and small-scale mining (ASM) is uniquely positioned to rapidly respond to market moves due to its low establishment costs and operational overheads. Additionally, many countries with significant ASM populations (such as those in central Africa) have substantial endowments of so-called critical minerals. Demand for these minerals is expected to increase substantially, but erratically, as the global economy embraces the energy transition away from fossil fuels. This transition is likely to be unstable due to speculative actions, exacerbated by geopolitics. Further instability has been introduced into the global economy through climate change-driven undermining of traditional rural livelihoods in many under-developed countries. This is leading to increases in illegal migration. Bolstering rural economies through ASM and new markets for critical minerals may be a way of bootstrapping stalled development in such rural, poorly connected economies. To effect the integration of ASM producers into the global critical minerals supply, risk for investors and the downstream supply chain must be managed by linking improved environmental, social and governance (ESG) performance to higher production and profits for the ASM producers. Linking money in the pockets of miners to improved ESG performance means that ASM can have lower negative impacts without relying on the historically poor enforcement of health, safety and environmental regulations in fragile states. African case study data are presented.



Daniel Limpitlaw

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Dr Daniel Limpitlaw is a mining engineer, specialised in the assessment of both direct and indirect impacts of mining on the environment and the surrounding communities. He has experience through the entire mining life cycle on projects across Africa, the Middle East and the Pacific. Daniel has worked in academia, operational management and at executive level in a gold Junior.

The role of artisanal and small-scale mining in poverty alleviation and rural development

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Mintek, South Africa

Artisanal and small-scale mining (ASM) plays a significant role in many communities worldwide, where formal employment opportunities are limited (Hentschel, Hruschka, and Priester, 2002). The sector is not without its challenges: environmental degradation, health and safety risks, and inadequate infrastructure are significant concerns that must be addressed to ensure sustainability (Hilson, 2002). This paper explores the multifaceted impact of ASM on social communities, considering both positive and negative dimensions. A key point of this study is the potential of ASM to empower marginalised groups such as women, people with disabilities, and youth – leading to economic empowerment and poverty alleviation (Buxton, 2013). Additionally, revenue generated from formalised ASM activities often stays within local communities, supporting small businesses and stimulating local economies (Hilson and McQuilken, 2014). The ASM policy gazetted by the South African government is a testament to the sector's potential to thrive and contribute significantly to the economy (Department of Mineral Resources and Energy, 2020). The policy aims to enable the industry to grow and advance in participation in the mainstream economy and efficiently use its resources (DMRE, 2020). Specifically, it is designed to create an environment that not only allows the sector to contribute to the economic imperatives of job creation and poverty alleviation in South Africa but also purposefully encourages it to do so (Mutemeri and Petersen, 2002). Tensions between large-scale mining (LSM) and small-scale miners are often a result of the perceived threat to LSM through encroachment, illegal activities, and their relationship with local host communities (Maconachie and Hilson, 2011). Initiatives by the LSM to establish ties with host mining communities have been emerging; however, these relationships require patience and realistic expectations from all parties in addressing the needs of small-scale operators and their communities (World Bank, 2013). Very often, these relationships are marred with distrust and are also a result of poverty and lack of opportunities (Hilson, 2009). Opportunities for the ASM sector to do business with LSM present possibilities for establishing economic value chains in those communities (Buxton, 2013).

The challenges faced by ASM include environmental degradation due to limited access to specialised environmental and geological expertise resulting from financial constraints, occupational health and safety risks, lack of proper infrastructure and equipment, lack of funding, the rise of illegal miners, and conflicts over resource access, often characterised by power dynamics between genders (Hinton, Veiga, and Beinhoff, 2003). The inadequate regulation and monitoring of ASM can escalate social issues such as gender inequality, child labour, and discrimination against disabled people (ILO, 1999). We conclude that responsible ASM practices could be fostered through collaborative efforts with various stakeholders, including the government: such as the Department of Mineral Resources and Energy, community leaders, and the ASM community (Mutemeri, Sellick and Mtegha, 2010). These practices, when implemented effectively, can benefit local communities (Hilson, 2002). ASM has a complex and dynamic influence on social communities, shaping livelihoods, local economies, and social dynamics. Through support and proper policy implementation and monitoring, responsible ASM practices can improve livelihoods, promote compliance, and enhance the creation of local economies. Additionally, it will contribute towards GDP and create secondary economies (World Bank, 2013).

Keywords: Artisanal and small-scale mining, ASM, environmental degradation, health and safety risks, economic empowerment, poverty alleviation, South Africa, large-scale mining, LSM, local communities, gender dynamics, policy implementation, sustainable practices, formalisation, economic value chains, marginalised groups, socio-economic impact.

Environmental, social, and governance considerations and sustainable development goals contributions in the minerals industry: A complementary perspective

S. Phakathi

Mjaji Research and Development, South Africa

Mining companies worldwide are increasingly required to account for and disclose their impacts on society, environment and corporate governance through various reporting standards and frameworks. The perception of the contribution of the mining industry by various stakeholders is influenced by the extent to which it addresses the environmental, social and governance (ESG) issues in host communities. In November 2015, the United Nations adopted the 17 Sustainable Development Goals (SDGs) that cut across the economic, environmental, social, economic and governance factors. The recent years have seen the ESG issues gain prominence across the world. For investment and governance related reasons, business organisations are increasingly expected to publicly disclose the negative and positive impact of their activities and practices on the society, environment, economy and people. Indeed, this is a noble step in ensuring responsible and sustainable business practices in the settings in which private sector organisations operate. The irony is that the ESG discourse has lacked impactful integration with SDGs in the sustainability performance standards, frameworks and reports of corporate organisations.

The two acronyms ESGs and SDGs have been treated as dichotomies; as if they do not relate to each other or complement each other, while they seek to address the same objectives of responsible investment, good corporate citizenship and shared value creation. The SDGs are however a much broader framework, albeit non-mandatory, that can enhance responsible investment decision-making and shared value creation objectives than the three-pronged ESG framework considerations. Although non-mandatory, the SDG framework provides a useful starting point for an exercise towards achieving shared value outcomes in host communities. Linking ESG considerations to the SDGs provides business organisations with a comprehensive framework with which to measure the financial and non-financial impacts of their business activities on the wellbeing of society, environment, economy and people. Drawing from a content analysis of published integrated annual reports of listed mining companies, this paper argues that the ESG impacts and contributions of mining firms need not be viewed as standalone activities but as interconnected and complementary. The paper argues that while the content analysis of the integrated annual reports and publicly available data sets depict an encouraging performance impact of mining companies on the SDGs, there is a need to review, consolidate and align the various fragmented reporting standards and frameworks on sustainability performance reports. It is important to link and integrate the ESG framework to the SDGs from financial and non-financial perspectives. This will in turn enhance the investment decision-making processes and accelerate shared value creation in a much more impactful, responsible and sustainable manner.

Reimagining social licence to operate in South Africa's mining sector: Empowering communities through governance, sustainability, and digital inclusion

C. Thekiso

Thekvest Group, South Africa

In an era where environmental, social, and governance (ESG) factors increasingly dictate the future of the mining industry, securing a social licence to operate (SLO) has become more critical than ever. SLO represents the ongoing approval and acceptance by local communities and stakeholders, vital for mining operations' sustainability and success. The concept of SLO has evolved into a critical factor for the mining sector globally, with its significance consistently highlighted in Ernst & Young's Top 10 Business Risks in Metals and Mining since its inception.

In South Africa, SLO's prominence is particularly pronounced, given the country's unique socio-economic landscape characterised by widespread poverty, high unemployment rates, and the disenfranchisement of youth in communities surrounding mining operations. These challenges are exacerbated by overwhelmed and inefficient local governance, as well as the politicisation of economic opportunities, which often leads to exclusion and unrest.

To address these deep-rooted issues, a shift from traditional, paternalistic approaches to one that fosters self-reliance, resilience, and community empowerment is essential. This paper will explore how mining companies can transcend these challenges by adopting an inclusive and sustainable approach to community development, grounded in meaningful economic inclusion and robust governance structures. The paper proposes a transformative framework that integrates mindset transformation programmes to combat learned helplessness and entitlement, empowering local leaders and communities to take charge of their development. The framework emphasises the importance of diversifying income streams through community development trusts, which are structured to receive dividends from mining operations while ensuring robust governance and accountability without undermining cultural norms.

A key element of this approach is the depoliticisation of economic opportunities through transparent and inclusive procurement processes that offer meaningful and bankable contracts. Coupled with targeted interventions such as Procurement and Funding Readiness, Technical and Operational Readiness, and Contractor Operational Excellence programmes, these initiatives are designed to elevate local suppliers' capabilities, ensuring they are well-equipped to seize opportunities in the mining supply chain. Furthermore, leveraging partnerships with original equipment manufacturers and strategic suppliers can unlock additional economic opportunities, fostering a more inclusive and sustainable ecosystem.

To support this transformative agenda, the introduction of a robust grievance mechanism is proposed – one that is transparent, authentic, and deeply empathetic to community concerns. Additionally, the adoption of the Economic Inclusion Integrator (EII) Portal as a seamless digital engagement platform will empower communities to access a wide range of economic and learning opportunities, further enhancing their ability to dictate their own future and destiny.

This presentation will outline practical solutions to achieve these goals, positioning the mining sector as a partner in sustainable development. By aligning economic inclusion with ESG principles, companies can enhance their social licence to operate, ensuring long-term stability and prosperity for both the industry and the communities it serves.

In conclusion, this paper will demonstrate how mining companies can secure their social licence to operate by transforming their engagement with host communities, leveraging digital platforms like the EII Portal, and fostering a culture of transparency, inclusivity, and mutual respect. By doing so, the mining sector can not only mitigate risks but also unlock sustainable economic opportunities that benefit all stakeholders.

ESG in the minerals industry – challenges and opportunities

G.L. Smith

Independent advisor (post-retirement) and Non-Executive Director

The United Nations (UN) 1987 Brundtland report described sustainable development as being development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (UN,1987). This definition recognises the right of future generations to achieve a sustainable level of development and the right to utilise natural resources.

In 2015 the UN Sustainable Development Goals (SDGs) were established as a blueprint to achieve a better and more sustainable future for all. The 17 Goals of the SDGs are interconnected and address global sustainability challenges including those related to poverty, inequality, climate change, environmental degradation, and peace and justice (UN, 2015).

Subsequently the concept of environmental, social and governance (ESG) has evolved in parallel to the UN sustainability initiative. However, ESG as a driver of sustainability is experiencing a backlash from a range of different interest groups with varying socio-political objectives. However, regardless of underlying objectives, the focus on ESG creates an awareness of the interlinkages of ESG aspects that are key to global sustainability and associated business practice.

Subsequently the concept of ESG, in conjunction with the impacts of climate change, has evolved to incorporate the concept of sustainability and is broadly expressed as Responsible Mining across the minerals and metals industry.

The role of mining and metals in driving just and sustainable economic development in Africa

R.S. Arp

Carbon Trust, South Africa

The mining and metals sector is a cornerstone of Africa's economy, contributing significantly to GDP, employment, and infrastructure development. However, this industry also bears a profound responsibility to ensure that its growth translates into equitable and sustainable benefits for all. It is also vulnerable to climate-related physical and transition risks that threaten to undermine the sector's sustainable growth potential. Mining activities must prioritise environmental stewardship, minimising ecological footprints through innovative technologies and sustainable practices. Equally important is the commitment to social responsibility, ensuring that local communities are not only protected but also empowered. This includes fair labour practices, human rights, community engagement, and investments in education, healthcare and environmental protection. Furthermore, the sector must champion economic inclusivity, creating opportunities for local businesses and skills development throughout the full lifecycle of a mine, including post-closure. By aligning with global sustainability standards and embracing transparency, the mining and metals industry can drive transformative change across Africa for a just transition and sustainable economic development. In conclusion, the path to just and sustainable economic development in Africa lies in a balanced approach where the mining and metals sector acts as a catalyst for positive change, ensuring that the wealth generated benefits all stakeholders, now and for future generations.

Responsible mining

R. Dhawan

ICMM, UK

The benefits of mining are global, but its impacts are always local—a responsible industry ensures no one is collateral damage in the rush for critical minerals. This presentation discusses the increased demand for critical minerals seen across the industry and how the industry must step up to produce these materials responsibly. It also discussed the importance of building strong relationships with local communities and Indigenous Peoples, the need to expand adoption of voluntary standards (with a focus on reducing complexity and consolidation), and the need to continue excellent process seen on emissions reduction and respecting nature.

Strategic enviro-social stakeholder engagement: An environmental toolkit for effective mine community engagements

P. Ramphisa

Sibanye-Stillwater, South Africa

The complex and dynamic nature of environmental problems requires flexible and transparent decision-making that embraces a diversity of knowledges and values. Stakeholder participation is critical for supporting community development and environmental management. Environmental management and compliance issues have sometimes been neglected in the stakeholder engagement arena. The aim of the paper is to report on work conducted towards the integration of environmental management issues into community stakeholder engagement. There are several issues in mining that affect communities, including air quality, waste management, water management, heritage management and noise related issues. Although attempts are made to adopt best practices, stakeholders are not always informed about measures implemented to ensure good environmental performance and management. Mitigation measures to avoid, minimise and mitigate negative environmental impacts are not always reported to community stakeholders and non-governmental organisations (NGOs) due to the lack of effective stakeholder participation.

The following challenges were identified:

1. Stakeholders were not capacitated to understand technical issues relating to environmental management.
2. Other than community-related environmental complaints, there was a lack of clarity as to what community members and NGOs would like to be informed about when it comes to environmental management and compliance.
3. Engagements with communities and NGOs on environmental issues were not effective because the stakeholders had limited awareness regarding environmental management and compliance.

A proactive engagement approach was used to determine issues with which communities and NGOs would like to engage when it comes to mine environmental management and compliance. The issues identified were used to develop an environmental toolkit informing community stakeholder engagement. The environmental toolkit identified all the key environmental issues and execution of mechanisms to ensure effective engagement with the communities and NGOs. The following positive outcomes were realised from the developed environmental toolkit:

1. Effective engagements based on what stakeholders needed to know and regarded as significant based on their own perspectives, instead of the mine's viewpoint.
2. Capacity building was achieved through stakeholder empowerment and education. This bridged the gap between technical environmental requirements and community environmental awareness.
3. Improved enviro-social community engagements creating fertile ground for partnerships towards community environmental management initiatives and the realisation of environmental, social and governmental (ESG) goals.

Participation in environmental decision-making is increasingly becoming regarded as a democratic right and is enshrined as such in environmental legislation and the United Nations Economic Commission. By harnessing stakeholder engagement and integrating it with the management of the natural environment, partnerships for positive community environmental stewardship can be developed. Such partnerships can benefit the environment through the promotion of environmental awareness amongst communities. Consequently, creativity and innovation and the minimisation of both mine- and community-related environmental pollution can be achieved. It is the hope of the researcher that the learnings from the development of the environmental toolkit be used in other mines and communities to promote multi-stakeholder environmental stewardship and the implementation of ESG efforts.

Being aboveboard: The “G” in ESG actioned in the minerals industry

B. Siyobi

GGA, South Africa

At its heart, governance is about people and processes – the ability to develop an appropriate ethical leadership style that will deliver strong business performance without excessive risk-taking and compromising of people and the environment. Ethical leadership requires transparency, accountability and alignment to be consistently prioritised and practised. This approach becomes more critical to take on for high-risk sectors such as the extractives industries. For many decades, the extractives sector has overlooked serious issues related to environmental, social and governance factors that have negatively impacted people and the environment. Abuse of human rights, unsafe working conditions and environmental degradation have all been prevalent in the mining sector and corporates are equally responsible for changing this narrative and further promoting good governance. With rising interest and concern of how corporates conduct business by multiple stakeholders, it has become clear that corporate responsibility needs to be improved and that requires effective governance processes. The delivery of strong and ethical codes of practice is reliant on effective accountability mechanisms and decision-making processes that support all critical decisions impacting investors, people and the environment. This enables corporates to better handle risks and uphold financial and social integrity.

The keynote will further cover the following key themes:

- Role of institutional investors and responsible investing
 - Financial integrity and capital allocation
- The importance of inclusive governance
- Sound transparency and accountability mechanisms
- Effective corporate governance and mining codes
- Impact of governance on investment opportunities

Systemising the process of collecting and preparing the ESG declarations

D. Kok

NxGN, South Africa

This paper addresses the pressing challenges listed companies face in meeting environmental, social, and governance (ESG) disclosure requirements. Despite the growing emphasis on ESG factors, companies need help with conflicting standards, decentralised data capture, and manual tools, leading to delays and compromised data quality. Leveraging extensive practical experience with corporate clients, we identify common pitfalls and inefficiencies in ESG reporting practices. Our findings highlight the need for integrated data management systems and clear regulatory guidelines to mitigate these issues. We propose a robust framework for improving ESG compliance and reporting, simplifying the process and enhancing data reliability and timelines. This paper provides a comprehensive understanding of the ESG landscape, a validated approach to overcoming prevalent challenges, and a forward-looking perspective on the evolution of ESG disclosures, benefitting both industry and academic audiences.



Dirk Kok

CEO

NxGN (Pty) Ltd

Dirk Kok is a veteran data analytics expert with over two decades of experience in software architecture and data management, with a strong focus on the mining industry. As the co-founder of NxGN, he transforms complex data into actionable intelligence, driving operational excellence and strategic decision-making for mining operations.

With his extensive background as a software architect in mining, retail banking, capital markets, and IT security, Dirk brings a unique cross-industry perspective to data analytics challenges. His expertise lies in optimising data collection processes, integrating disparate sources, and employing advanced visualisation techniques to uncover valuable insights.

Dirk's approach combines rigorous analysis with a keen understanding of business objectives, enabling mining companies to enhance operational efficiencies, optimise resource allocation, and identify growth opportunities. His collaborative style ensures solutions are tailored to each organisation's needs, consistently delivering tangible business impact.

Passionate about the transformative power of data, Dirk is committed to helping mining executives navigate the digital landscape and leverage data as a strategic asset in an increasingly competitive global market.

Change impact evaluation dashboard for the adoption of modern mining technologies

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As the South African mining industry modernises, appropriate change management becomes imperative for the adoption of new technologies. Additionally, the need to understand and measure the impact of changes has been identified. This project is a continuation of work funded by the Mandela Mining Precinct's Successful Application of Technologies Centred Around People (SATCAP) programme, which lends support to the environmental, social, and governance (ESG) agenda. The aim of this project was to verify a Change Management Blueprint developed in 2022 and interlink it to an impact evaluation (IE) dashboard. A literature review was conducted on indicators for change management relevant to technology adoption, and practices relating to dashboard design. Workshops were held with mining partner stakeholders to validate the Change Management Blueprint. Validation involved pilot testing of a digital Shiftboss logbook. The design and development process for the dashboard reflected the Standford Design Thinking methodology, and co-creation workshops were held towards the development of the IE dashboard. Key learnings during the verification process included those relating to technology readiness and functionality, contents on the device, the procedure, change management considerations, and behavioural considerations. Furthermore, modernisation and digitisation governance were added to the critical success factors (CSFs) of the blueprint, based on the findings. The Change Management Blueprint provided guidance to the indicators included in the Change IE Dashboard. The Change IE Dashboard was developed using Power BI software, and comprises sub-dashboards with 17 key indicators, including:

- *Organisational impact:* Business process results; safety results; and financial results.
- *People impact:* Number of people using the technology; people's proficiency in using the technology; and people's satisfaction with the new technology.
- *Change adoption impact:* People's awareness, desire, knowledge, ability to use, and support for the new technology.
- *Technology impact:* Leadership readiness, organisational readiness, technology readiness, and policies, procedures, and process readiness.
- *Project indicators:* 3PRS Blueprint step progression (CSFs, prepare, pilot, plan, roll-out, and support); and project management (time, scope, quality, and budget).

The Change IE Dashboard is a sub-component of an ESG Impacts Lens Dashboard, along with a Socio-Economic Transformation IE Dashboard, and Impact of Automation Dashboard. Additionally, a Business Priorities Impacts summary represents data from the sub-dashboards relating to the internal workforce, external stakeholders, safety, cost, and production. The Change Management Blueprint and dashboards are available, along with a user-guidelines and supporting videos, on the Mandela Mining Precinct's website. Implementation of the dashboard by the mining industry is intended to assist with improved understanding and evaluation of impacts associated with changes in technologies.



Wessel Pretorius Botha

Senior Researcher

Wessel has conducted research for both private and government institutions within the following industries: Mining, Construction, Renewable Energy, Motor Industry, Manufacturing and Production (various), Water Services, Services (Management, Delivery, Financial) and Forestry. He has taken a personal interest in investigating and understanding the impact that technology has on people and the identification of future skills requirements. He has also operated within the educational and regulatory structures by developing Sector Skills Plans for various SETAs, developing 5-year strategies and conducting large scale skills audits. His core skill is described as developing models from academic research and applying this to real-world solutions.

Towards ethical sourcing: Strengthening mineral supply chain due diligence in response to changing customer needs and regulations

A. Naidoo

Anglo American, Singapore

This paper explores the evolving landscape of ethical mineral sourcing, emphasising developments on both customer demand and regulatory frameworks. On the customer/consumer front, there is a noticeable rise in transparency demands, where detailed disclosures of mining locations and practices have become the norm. Certification programmes such as Fairtrade and Conflict-Free labels have gained traction, assuring consumers of ethical practices. Technological advancements, especially blockchain, are instrumental in documenting supply chains, enhancing trust. Brands now prominently incorporate ethical sourcing into their identities, responding to consumer preference for sustainability. From a regulatory perspective, significant strides include the Dodd-Frank Act in the U.S. and the European Union's Conflict Minerals Regulation, both of which impose stringent disclosure requirements to combat sourcing from conflict zones. The Global Reporting Initiative further compels companies to transparently report social and environmental mining impacts. Moreover, the OECD's due diligence guidelines and alignment with the United Nations' Sustainable Development Goals underscore a commitment to ethical mining practices. National regulations are progressively imposing stricter environmental and labour standards, fostering improved local mining conditions. Emerging trends highlight the influence of investors prioritising environmental, social, and governance criteria, increasing industry-wide adoption of collaborative initiatives such as the Responsible Mining Initiative and Initiative for Responsible Mining Assurance (IRMA). Additionally, there is a growing emphasis on respecting indigenous rights, ensuring that mining operations are culturally sensitive and consent-based. Companies are now held to higher accountability standards by consumers and regulators alike, driving a significant shift toward sustainable and fair mineral sourcing practices. This paper aims to provide insights on how Anglo American is going through this journey with its own mines and sourcing minerals from third parties: implementing a responsible commodity sourcing policy, having its own mines certified by IRMA and implementing a transparency and provenance blockchain digital solution called Valutrax.



Anesan Naidoo

Head of Sustainability
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After graduating with engineering degree (Iscor Bursary) I started working as an engineer at Sishen Mine, I registered as a Professional Engineer and obtained my GCC, I was engineering manager at Sishen Mine and Kolomela Mine, then went on to become General Manager of Logistics for Kumba Iron Ore. In 2017 I relocated to Singapore to head up Sales and Trading for Anglo American. Two years ago I became the head of Sustainability for Anglo American Marketing with focus areas of scope 3 decarbonisation, Ethical Value Chains and looking to develop a pathway to sustainability premiums for highly sustainable mining raw material/commodities

Effective stakeholder engagement: An essential mechanism for enhancing company ESG performance beyond compliance

R. Mokate

Concentric Alliance, South Africa

Embedding environmental, social, and governance (ESG) considerations in company strategy design, decision-making, and implementation has become an important metric against which companies' performance and reputation are assessed, especially in the mining industry, which substantially impacts local environments and communities. Effective stakeholder engagement is critical to ensuring that mining companies can embed ESG. Stakeholder engagement with interested and affected parties in mining jurisdictions is important in building a foundation of trust, establishing healthy constructive relationships, and securing the social licence to operate. A successful stakeholder engagement framework can contribute to good governance in mining jurisdictions during all phases of mining development. Such frameworks can lead to establishing mutual accountability between mining companies and stakeholders, effectively managing conflict and grievances, and resulting in better social and economic development outcomes where mining happens. The mining sector is facing increasing scrutiny from governments, civil society, and affected communities, all of whom are deeply concerned about the environmental and social impacts of mining. These concerns range from land degradation, to limiting access to water, health impacts from pollution, stifling economic diversification, and labour and human rights abuses. Managing these risks in consultation and partnership with affected stakeholders is not just a necessity but a critical component of ESG performance. Inclusive processes not only demonstrate a commitment to partnership but also allow parties to manage conflicts of interest constructively.

Effective stakeholder engagement frameworks rely on excellent knowledge of interested and affected stakeholders, especially those that can impact company processes. This includes properly identifying stakeholders, how they network and interact with each other, and how they can influence mining companies or other stakeholders. Stakeholder engagement around mine sites has historically focused on local governments and traditional leadership. However, it is increasingly necessary to consider a broader framework that includes community resources such as schools, medical facilities, local businesses, faith-based and community-based organisations, and informal community leaders. A more inclusive approach to community and stakeholder mapping can help companies identify partners and counterparties with a genuine interest in socio-economic development and in ESG-related outcomes. Well-structured and genuine consultation frameworks at the inception of mining create opportunities for trust-building and contribute to norm formation with stakeholders. This can result in long-term, productive engagements and avoid future pitfalls, such as violent conflict and protest action. Due to their inclusive nature such engagements can also result in positive and diversified economic outcomes, as parties can mutually envision the future. In the long term, they can facilitate an easier exit when closure processes commence, both because there is mutual trust and because there has been genuine consideration of life after mining. An effective stakeholder engagement framework is critical for ESG performance. It can substantially limit mining's negative impacts while positively improving the lives of the people where mining happens. Importantly, well-structured stakeholder engagement can contribute to the formation of norms that result in coexistence and partnerships between mining companies and interested and affected stakeholders.



Dr Renosi Mokate

Executive Director
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Renosi is an experienced development economist and policy analyst and has been an Executive Director at the World Bank and a Deputy Governor of the South African Reserve Bank. She is the former Executive Dean of the University of South Africa (“UNISA”) Graduate School of Business Leadership. She was previously an independent consultant for the Ministry of Finance and National Treasury as well as a member of the Investigation Steering Committee of the Municipal Demarcation Board. Renosi was Deputy Chairperson of the Presidential Economic Advisory Council from 2019-2024, which gives her a unique insight into government and economic policy.

Renosi has extensive experience in stakeholder engagement, particularly in bridging gaps between the public and private sector, often finding herself facilitating negotiations between government and business. She has a deep interest in the socio-economic development of rural communities, having facilitated resettlement negotiations, advised companies on best practice for the distribution and/or investment of development funds, and contributing to company and government policy on community development.

Redefining sustainability: Advancing ESG governance in response to contemporary issues

D. Nyabongo

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Good environmental, social and governance (ESG) governance will set in place the structures and processes by which a company, its supply chain, stakeholders and employees will perform ethically, manage risk and create value. Governance has traditionally sat on the periphery of ESG – seen as good corporate behaviour, rather than being attached to the wider social and environmental goals of ESG. As a result it will often sit separately within the internal structures of a firm. But there are contemporary drivers forcing ESG governance to change. And because of the scrutiny the industry attracts, mining companies will need to be on the front-foot. This paper will look at some of the key contemporary trends that will shape ESG governance and offer practical advice on how to deal with them. These trends include:

Integration of ESG as a business strategy itself. ESG and its constituent issues can no longer sit on the periphery or be divided between so many business functions. Rather than environmental or social objectives being considered additional to core business, they are now forming an integral part – particularly given the role of mining in the energy transition. ESG policies, processes and objectives will be embedded across a firm, with a clear delineation of responsibilities and a dedicated board/executive level lead.

The rise of social sustainability. The idea of sustainability is being redefined – historically environment has taken the greatest focus, but, according to a survey S-RM conducted earlier this year, social sustainability will be a growing concern and budgetary focus for mining firms over the next five years. This means dedicated attention on such issues as human rights, diversity and inclusion, modern slavery and data protection. Here, the mining sector is highly exposed.

Rise of regulation and reporting requirements. A raft of regulation is going to be enforced in the next five years, including the EU's CSRD and CSDDD, and multiple pieces of national legislation. The scale of the CSDDD, in particular, is vast as companies will need to look right through their value chains for environmental and social issues – mining companies will fall into scope and have different requirements pushed onto them. Mandatory reporting is also going to grow as access to capital is increasingly reliant on ESG performance. This will place a growing burden on governance structures.

Advance of Artificial Intelligence (AI). There is much greater use of this to gather, process, analyse and interpret ESG data, so it can support reporting and risk management. It is particularly valuable in the mining sector – for example, satellite imagery regarding human rights, or blockchain for the supply chain. However, there is a growing concern of the energy intensiveness of AI, and its ethical implications, so we may see regulation here too.

Scrutiny and a greater focus on impact. Scrutiny of ESG policies and programmes comes from a wider range of stakeholders, is more comprehensive and is increasingly successful in driving change – including from regulators. Mining firms will need to adapt their governance processes to avoid falling victim to these reputational issues.



Diana Nyabongo

S-RM

Diana Nyabongo is a director based in S-RM's Cape Town office. She provides consultancy support and advice to a range of investor and corporate clients across Africa, including in the mining industry. She is particularly experienced in stakeholder engagement, strategy building and supporting with intelligence and regulatory compliance. Prior to S-RM, she worked at a global research organisation focused on developing innovative policy approaches to economic development.

Navigating ESG governance and the sources of corporate liability: Aligning standards, policies, and legal requirements in Africa; and understanding the forms of legal and non-legal liability for ESG failures

P.A. Novotny

Webber Wentzel, South Africa

Regulators, investors, and consumers are demanding that companies provide transparent disclosures on environmental, social and governance (ESG) risks and opportunities, and take action to improve ESG performance. As best practice frameworks and soft law standards continue to evolve, how should companies approach the mapping of standards and frameworks that apply to their public disclosures and organisational controls, and how should they align these with legal requirements and stakeholder expectations? Do different considerations apply to companies in Africa?

- The 'alphabet soup' of frameworks continues to expand, creating operational, resourcing and cost challenges for companies seeking to walk the talk. While industry associations strive for harmonisation and convergence of the many reporting frameworks, nuanced requirements remain and new standards are increasingly published.
- Beyond reporting and disclosure, international jurisdictions are increasingly imposing laws and regulations informing sustainable, ethical and responsible business practices, such as the EU Corporate Sustainability Due Diligence Directive, the EU Deforestation Directive, the EU Forced Labour Ban, Modern Slavery Acts in Australia, the UK and Canada, the French Duty of Vigilance Law, the German Supply Chain Due Diligence Act, the Dutch Child Labour Due Diligence Law. While in force in international jurisdictions, such laws are progressively being drafted to have extra-territorial effect, expanding their scope to multinational companies with footprints across geographies. Understanding the reach and impact of these laws, particularly for companies operating in Africa where many raw materials are sourced, and for companies with complex supply chains, is becoming crucial.
- Corporate duties of care are also evolving to take ESG considerations into account. Multiple senior counsel opinions have been issued across the globe to suggest that the fiduciary duties of directors must include considerations of climate change and biodiversity loss impacts in business decision-making. Litigation has also been a critical process to drive the development of soft law principles in the ESG arena.

Companies that fail to grapple with their ESG risks and opportunities may face financial, reputational, and legal consequences and place their businesses, brands, and social licences to operate at risk. Advancements in technology, the proliferation of social media, and increased global connectivity have also led to a more engaged and aware public, with the incidences of public allegations of ESG failures attributable to corporate conduct exponentially increasing as a result.

- Sources of legal liability for ESG failures include civil law (contract, delict, common law, constitutional law, statutory, property law, nuisance) and criminal law (for common law and statutory offences).
- But recent global trends in litigation, business and human rights, responsible sourcing, and sustainable investing practices are changing the scope of liability in the ESG context.
- Other avenues of non-legal liability include penalties for breaches of ESG requirements in contracts, loss of funding for contraventions of ESG financing covenants, membership revocations from industry associations, community/activist disengagement or disruptions, reputational and brand repercussions, loss of geographic footprints, market fluctuations, de-listings from stock exchanges.
- Unique claims are also being brought to dispute resolution and corporate forums, such as greenwashing and colourwashing allegations in consumer and advertising tribunals, shareholder activism through company AGMs, and multinational disputes through OECD contact points.

These new market developments identify a need not only to understand the evolving frameworks and requirements informing corporate governance, but also a need to take a proactive, structured approach to ethical and transparent governance through the implementation of adequate policies, risk management practices, capacity building, governance systems and controls.



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Paula-Ann is an environmental regulatory and ESG / BHR lawyer at Africa's leading full-service law firm, Webber Wentzel. Beyond the full scope of environmental regulatory and compliance advice, her experience extends to advising clients on ESG and Business and Human Rights-related impacts, risks and opportunities, such as opining on dedicated environmental and climate change related laws, advising in support of project development and strategic M&A activity, conducting human rights due diligence, establishing governance systems and controls, and regulatory mapping

ESG integration into SAMCODES

A. McDonald

SRK Consulting, South Africa

The South African Mineral Reporting Codes (SAMCODES), comprising SAMREC, SAMOG and SAMVAL, set out the principles for public reporting of, respectively, Exploration Results, Mineral Resources and Mineral Reserves for Solid Minerals, Oil and Gas Reserves and Resources, and the valuation of these. The SAMCODES form part of the requirements of the Johannesburg Stock Exchange Listing Rules and are recognised by international stock exchanges. Following the ESG Inquisition held by the GSSA in August 2021, and increasing international demands for transparent disclosure of environmental, social and governance (ESG) aspects as these affect Mineral Resources and Mineral Reserves and their valuations, a Working Group was established in November 2021 to submit recommendations to the SAMCODES Committees regarding the minimum level of ESG disclosure that would be required. Work has initially been focused on the SAMREC and SAMVAL Codes and updating the SAMESG Guidelines. An extensive stakeholder and landscape mapping exercise was conducted to define the expectations of stakeholders. One of the findings was to establish the correct balance between existing technical disclosure and the influence of ESG factors, while not burdening the companies and competent persons with excessive additional reporting obligations. The Working Group recognised that ESG aspects form part of the general term of Modifying Factors which govern the conversion of Mineral Resources to Mineral Reserves. As such, balanced reporting of all factors, not only ESG ones, is required. Significant effort has been applied to carefully craft appropriate ESG disclosure requirements into the SAMREC and SAMVAL Codes. We also recognised that we had to achieve the appropriate balance between recommended requirements to be included within the SAMCODES text and supporting guidance that is better placed in SAMESG Guidelines. To maintain alignment with similar developments in other national reporting codes, the Working Group recommends the adoption of the E, S and G definitions that were developed by the ESG sub-committee of the Committee for Mineral Reserves International Reporting Standards (CRIRSCO). These definitions were approved by CRIRSCO in 2023 and will be incorporated into the next version of the template. Draft documents setting out the recommendations from the Working Group are planned to be circulated to the SAMREC, SAMVAL and SAMESG Committees at the end of June 2024. Work will continue to determine appropriate ESG disclosure requirements for the SAMOG Code.



Andrew McDonald

Principal Engineer
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Has been responsible for engineering studies of mineral projects, valuations of mineral properties and compilation of public reports for the major stock exchanges over the past 25 years.

Is registered as a Chartered Engineer through the Institute of Materials, Minerals and Mining in London and is a Fellow of the SAIMM.

Was the Chairperson of the SAMCODES Standards Committee for 2022 to 2023.

Is the Chairperson of the SAMCODES ESG Working Group from Nov'21 to present.

Navigating the complexities of supply chain ethics: Strategies for addressing human rights abuses and forced labour

B. Satorre

S-RM, United Kingdom

The shift from voluntary-based human rights regulations to mandatory-based human rights laws proves one thing: the need to place human rights protections at the centre of business strategies, but this new approach also comes with new challenges. Human Rights due diligence across global supply chains represent uncharted territory for many organisations. Addressing its complexities vary from sectors, type of goods, services and sourcing geographies. Unlike any other due diligence process, for identifying human rights risks it is about assessing impacts on people, rather than just businesses. These adverse impacts encompass diverse issues sometimes hidden by the activities within those supply chains such as: health and safety concerns, right of housing or freedom of association, as well as illegal working practices like forced and child labour. While many organisations have already embarked on their human rights due diligence journeys within their own operations, there are others which may find it demanding to delve into their supply chains, not knowing where to start or how to address the unknown challenges that might surface. How can an organisation navigate this complexity? This session will address: A) How to map and prioritise human rights risks across global supply chains following the UN Guiding Principles on Business and Human Rights (UNGPs) which provides a global framework defined in four key criteria for prioritising human rights issues: scope (the number of people likely to be affected), scale (the significance of the impacts), irremediability (the ease of remedying harm), and likelihood (the certainty of impacts occurring). B) When and where organisations should implement human rights impact assessments (HRIA) and what approach and methodology should they follow to demonstrate compliance with international human rights obligations. Hence, we will examine an array of methodologies from stand-alone HRIA focus on thoroughly examining the impact of a specific policy, project or intervention to showcasing how businesses can use integrated assessments by considering human rights alongside other ESG factors or sector-wide HRIA looking at the broader impact of policies or activities within a specific sector. C) How business can address human rights violations, particularly forced labour, through ensuring remedy for any that occur in spite of these efforts. In addition to highlighting the importance of integrated findings into current management systems as well as embedding monitoring processes to assessing its effectiveness.

Human rights issues in supply chain are complex, contextual, and ever-evolving. Companies must comply with expanding regulations that include a range of enforceable local and international laws if human rights issues are uncovered. By working closely with suppliers and implementing due diligence processes, companies will learn how they can reduce and prevent human rights risks before they become major issues, protecting the people within their supply chains, and demonstrating a commitment to ethics and compliance.



Belén Satorre Berbegal

S-RM

Belén has over a decade of international experience in ESG and human rights, working for both private and non-profit organisations. Her expertise lies in ESG investigations to eradicate risks and build best-practice human rights programmes, particularly within multinational companies. She has advised FTSE 100 and FTSE 250 companies on implementing and deploying human rights impact assessments across global supply chains. She has also held varied roles for Amnesty International, UNHCR and UNESCO in Costa Rica, and The Spanish Agency for International Development Cooperation (AECID) conducting human rights research in Mexico and Ecuador. Belén holds an MSc in International Migration and Public Policy from The London School of Economics (LSE), an MA in Responsible Management and Sustainable Economic Development from the United Nations University for Peace, and a first-class Journalism degree from the Complutense University of Madrid and the University of California Los Angeles (UCLA). She has been an active speaker at LSE about ‘Women in Human Rights’, other European and Latin American universities, and for The Institute of Corporate Responsibility and Sustainability.

ESG strategic planning for effective governance and sustainable value creation

B. Gaetsaloe

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Introduction

In today's rapidly evolving business environment, environmental, social and governance (ESG) considerations have become pivotal to corporate strategy and operations. The integration of ESG factors into strategic planning is not only a moral imperative but also a key driver of long-term sustainable value creation. As stakeholders increasingly demand transparency, accountability, and sustainability from organisations, companies must navigate the complex ESG landscape with a clear and strategic approach.

This paper explores the critical elements of ESG strategic planning, emphasising the role of effective governance in fostering sustainable value. A case study of a large rough diamond trader will be used as the backdrop of integrating strategy and ESG.

Context

ESG considerations are vital for a mining company to ensure sustainable operations, maintain regulatory compliance, foster positive community relations, attract investment, and enhance overall corporate performance. They form the foundation for long-term success and resilience in the highly scrutinised and impactful mining industry. In fact, it is often said that ESG grants mining companies their social licence to operate. These considerations can be seen across the diamond value chain from the upstream players to mid-tier and downstream actors. In fact, due to the often harmful environmental and social impact of mining, ESG imperatives are paramount for the industry.

Key Themes to Be Explored in the Presentation

Strategic Planning for ESG Integration

Strategic planning for ESG involves a comprehensive assessment of the organisation's current state, stakeholder expectations, and future trends. Key considerations include:

Materiality Assessment: How do you identify and prioritise those ESG issues that are most relevant to the business and its stakeholders?

Goal Setting and Metrics: How do you establish clear, measurable ESG goals aligned with the company's vision and values? How do you ensure the right metrics and key performance indicators for tracking progress and ensuring accountability?

Embedding ESG into corporate strategy: How do you integrate ESG goals into the overall corporate strategy and decision-making processes? How do you ensure that ESG is an integral part of the corporate strategy and not a 'bolt-on' to the strategy?

Risk Management and Compliance: How do you implement robust risk management frameworks to address ESG-related risks, including regulatory compliance, supply chain risks, and reputational threats?

Reporting and Communication: How do you design and ensure transparent reporting and effective communication of ESG performance to stakeholders through sustainability reports, investor briefings, and public disclosures? How do you use reporting to further educate stakeholders on the importance of ESG to long term success?

Effective Governance for ESG Success

Governance plays a critical role in the successful implementation of ESG strategies. Key governance considerations include:

Board Oversight: How do you establish a dedicated ESG committee at board level to provide oversight and guidance on ESG matters?

Executive Leadership: How do you ensure that senior executives are accountable for ESG performance and are incentivised to achieve ESG goals?

Stakeholder Engagement: How do you maintain open and constructive dialogue with stakeholders, including investors, employees, customers, and communities?

Continuous Improvement: How do you promote a culture of continuous improvement and innovation in ESG practices? How do you build a system that allows you to learn from best practices, and adapt to emerging trends and challenges?

Sustainable Value Creation

Effective ESG strategic planning and governance lead to sustainable value creation by enhancing operational efficiency, reducing risks, and unlocking new opportunities for growth. Companies that successfully integrate ESG into their core strategies can achieve competitive advantages, attract long-term investment, and contribute positively to society and the environment.

Conclusion

In conclusion, navigating the ESG landscape requires a strategic and integrated approach that aligns governance structures with sustainability goals. By prioritising ESG in strategic planning, organisations can create enduring value for all stakeholders and contribute to a more sustainable and equitable future. Based on a case study of a large rough diamond trader, this paper will provide insights, best practices, and actionable strategies for companies aiming to excel in their ESG journey.

Empowering ESG: The strategic role of boards and senior leaders

Z. Ntshona and A. Jara

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There is a renewed focus on sustainability by the investment community and the developed world, driving the development of environmental, social and governance (ESG) global assets - estimated to exceed \$50 trillion by 2025 and representing more than a third of the projected \$140.5 trillion in global assets under management. South Africa has commitments under international treaties such as the Paris Agreement and Kyoto Protocol and in line with these commitments, the Environmental Impact Assessment (EIA) Regulations were published under the National Environmental Management Act, 1998. The EIA Regulations list activities which may not begin without an environmental authorisation, and specialist studies must be undertaken as part of the application process for an environmental authorisation. These specialist studies may include a climate change assessment, as held by the High Court in the recent judgment of *Earthlife Africa Johannesburg v Minister of Environmental Affairs and Others*. In addition, the President signed the Carbon Tax Act 15 of 2019 into law on 22 May 2019, which imposes a carbon tax on emitters of greenhouse gases and on 23 July 2024, the President signed the Climate Change Act which sets out to enhance South Africa's ability and capacity to reduce greenhouse gas emissions, and build climate resilience, while reducing the risk of job losses, and promoting opportunities for new job opportunities in the emerging green economy. These laws do not ignore the importance of the "social license to operate" which requires projects to ensure that their activities are not undertaken to the detriment of the livelihoods of surrounding communities, recognising that it is imperative for communities to be included in discussions relating to development projects. However, a lacuna (or gap) still exists in the legal framework regarding which communities should be consulted by companies. Being the last in the acronym, 'governance' can be overshadowed by the environmental and social aspects in obtaining the license to operate. Yet it is the role of the board, as the governing body of any organisation, to strategically direct the empowerment of ESG as a tool for the sustainability of the organisation and its stakeholders at large. Considering that ESG has come to form an integral part of the fiduciary duties of a governing body, any board would be foolish not to consider ESG. But what are the benefits of empowering ESG, and what are the tools available to the board in empowering ESG? Although governance is not listed as capital to be integrated into business models, without governance the six capitals cannot exist, and the legislation enacted would not come to life, thus risking the organisation's license to operate. There appears to be a shift in thinking and leadership on ESG – should boards lead this shift, and if so, should they lead by empowering ESG?



Ziyanda Ntshona

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Ziyanda has over 19 years' experience in mergers and acquisitions, and corporate and commercial transactions. She has expertise in all aspects, including reorganisations, private equity and general corporate transactions in South Africa and the rest of Sub-Saharan Africa. Ziyanda has represented a number of international and local clients and has worked across various sectors, including mining, health, financial services, telecommunications, real estate and private equity. She has led various award-winning teams, including the team that worked on Amplat's establishment of its ESOP for R8.3bn (shortlisted for BEE Deal of the Year 2022: DealMakers).

Ziyanda was awarded the Up-and-Coming Lawyer of the Year (2023) at the Chambers Africa Awards, and has been recognised by various other directories, including Best Lawyers and Legal 500.



Athi Jara

Director
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Athi Jara is a Director specialising in Mining and Environmental Law at Poswa Incorporated, a legal firm based in Johannesburg, South Africa.

She was until recently a Director at Werksmans Attorneys where she advised clients on mining related matters and on all mining legislation including the Mineral and Petroleum Resources Development Act, 2002, the Mineral and Petroleum Resources Royalty Act, 2008, the Mining Titles Registration Act, 1967, the Precious Metals Act, 2005, the Diamonds Act, 1986, the Broad-Based Socio-Economic Empowerment Charter for the Mining and Minerals Industry, 2018 and the Regulations Pertaining to Financial Provisioning for Mitigation and Rehabilitation of Environmental Damage caused by Reconnaissance, Prospecting, Exploration, Mining or Production Operations. She also advises on environmental legal matters, including providing advice on the provisions of the National Environmental Management Act, 1998, the National Water Act, 1998, the National Environmental Management: Waste Act, 2008, the National Environmental Management: Air Quality Act, 2004, the National Environmental Management: Biodiversity Act, 2004, the National Environmental Management: Protected Areas Act, 2003, the National Heritage Resources Act, 1999, the Water Services Act, 1997.

ESG's role in a risk-based approach to effective water management

M. Damhuis

Digby Wells, South Africa

The water cycle is made up of multiple, interlinked elements and components, each of which contribute to mine water environments, systems and water management processes. When coupled with social and ecological water demands mine water management becomes a complex process with dynamic inputs, multiple stakeholders and levels of uncertainty associated with each individual component of the water system. Narrative-driven leadership within a risk management framework allows the most opportunity for integration into existing processes and strategies, incorporating stakeholders into decision-making process and increasing the operation's adaptive capacity to respond to environmental, social or governance changes over time. ESG goals and objectives can be leveraged to provide the common narrative in water management systems, enabling effective water management through a shared consciousness amongst stakeholders and role players.



Matthew Damhuis

Matthew Damhuis, Digby Wells

Matthew manages the Water Services Division at Digby Wells and has over 14 years' experience in hydrogeology and mine water management. He specialises in the development of holistic and practical water management strategies and implementation plans that focus on beneficial water use and management outcomes for the operations, surrounding communities and the receiving water environment

South Africa's mineral resource availability as a potential driver for transitioning to a circular economy

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The aim of this paper was to establish if mineral resource scarcity is a driver for South Africa to transition to a circular economy. The project objectives were achieved by investigating economically viable minerals remaining in South Africa, South Africa's critical/strategic minerals, and resource scarcity as a driver for South Africa to transition to a circular economy. The study found that some minerals in South Africa such as iron ore, lead, manganese, gold, and cobalt have less than 50 years of economically viable mining remaining. At least 18 minerals can be classified as critical/strategic: aggregates, bauxite, chromite, cobalt, copper, gold, graphite, iron, limestone, lithium, manganese, nickel, phosphorous, platinum group metals, rare earth elements, silver, titanium, and vanadium. The classification was based on the minerals' economic importance, supply risk and potential use in the development and manufacturing of emerging technologies.

The findings suggest that scarcity of mineral resources is a critical driver for the country to transition to a circular economy. Other identified drivers include socio-economic factors, climate change commitments, and business objectives. All minerals are non-renewable resources and at risk of depletion, therefore sustainable extraction and use are critical. Priority should be directed at investigating circular economy opportunities and substitutes for commodities at risk of being depleted within the next 50 years. There is an opportunity for South Africa to transition from a minerals export-based model to one that promotes local mineral beneficiation and manufacturing of end products.

Keywords: circular economy, critical minerals, critical raw materials, resource scarcity, strategic minerals



Sumaya Khan

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Ms Sumaya Khan is currently a senior researcher in mining at the CSIR. Her projects focus on Critical Minerals Global Competitiveness, Circular Economy, Sustainable Development Goals in the mining sector, and skills development related to mining modernisation. Sumaya recognises the complex and interconnected nature of the mining sector and believes in the value of a systems thinking approach to research projects.

Before joining the CSIR, Sumaya worked as an Engineering Geologist in civil engineering and rock engineering consulting firms, where she had the opportunity to visit many mining operations within the African continent, Europe and Asia.

The cost of carbon neutrality: A weighted average cost of energy approach

J.W.C. Browne, M.H. Solomon, D.G. Viljoen, P.S. Mtemel, and J. Kruger

Carbon Neutral Energy Systems, South Africa

Achieving carbon neutrality is a priority for many companies striving to align with global sustainability goals. However, the economic challenge of transitioning from traditional fossil fuels to renewable energy sources remains significant. This paper explores a strategic methodology to manage and minimise the financial burden of this transition, specifically focused on the mining industry in South Africa. By leveraging the concept of a weighted average cost of energy (WACE), the paper argues for an optimised energy mix that balances the costs of individual renewable energy interventions, high and low, against the overarching goal of reducing overall energy expenses. Drawing parallels with the Pareto principle, the paper emphasises the importance of targeting 'quick wins' (renewable energy solutions that are both cost-effective and impactful) before addressing the more challenging and expensive aspects of energy replacement. The analysis highlights how focusing on these initial, high-impact interventions can significantly lower the WACE, making the journey to carbon neutrality more financially viable. The final segments of energy replacement, characterised by their high costs and implementation difficulties, are approached with a nuanced strategy, acknowledging their necessity while optimising their cost impact through a diversified and balanced energy portfolio. Through this weighted average cost framework, companies can achieve a lower overall cost of energy while progressing towards carbon neutrality. The paper presents a fictitious case study, based on a real mining operation, to develop strategic recommendations to illustrate the feasibility and benefits of this approach, ultimately contributing to more sustainable and economically sound energy transition strategies for mining companies.



James Browne

Renewable Energy Engineer

Carbon Neutral Energy Systems (C-NES)

James Browne is a renewable energy engineer with training in Mechanical Engineering from the University of Pretoria, complemented by an Honours in Engineering and Technology Management. Certified by the International Association of Energy Engineers as a Renewable Energy Professional, James specializes in techno-economic analysis and economic modelling on diversified renewable energy projects with particular focus on the decarbonization of the mining industry.

James has hands-on experience in the development of energy management and diversified energy mix strategies, as well as guidelines for implementation of related projects, for major mining companies in South Africa. As a founder and director of Carbon Neutral Energy Systems (C-NES), James' goal for the South African mining industry is to see the long-term implementation of renewable energy mix which balances short term results and long-term sustainability.

Harnessing multispectral data for sustainable mining: Advancing ESG objectives while navigating limitations and exploits

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SRK, South Africa

The mining industry is under increasing scrutiny for its environmental impact, particularly regarding air and water quality. Traditional methods of monitoring and managing these aspects often lack the real-time data necessary for proactive environmental management. This paper delves into the innovative use of multispectral data to establish cost-effective, continuous early warning systems for managing air and water quality risks. Multispectral imaging, which captures data at various wavelengths across the electromagnetic spectrum, offers a comprehensive view of the environmental footprint of mining operations. It enables near real-time monitoring of key indicators such as air and water quality, land use changes, and vegetation health at significantly lower costs compared to physical monitoring. By integrating satellite imagery from sources like Sentinel-5P, MODIS, Sentinel-2, and Landsat, stakeholders can gain actionable insights. While multispectral data has its limitations – such as spatial resolution constraints, cloud cover interference, and data availability – these issues can affect the accuracy and reliability of analyses. However, the data can still identify risks for further investigation, ensuring quicker identification and resolution of issues, thereby focusing on more costly physical sampling efforts. The paper will discuss how to overcome these limitations and demonstrate how multispectral data can be used to proactively address environmental issues without increasing monitoring costs.



Wesley Harrison

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Dr. Wesley Harrison is a Principal Geophysicist at SRK Consulting with over eight years of expertise in processing, modelling, and interpreting electrical and electromagnetic geophysical data. His work spans groundwater and mineral exploration, geotechnical studies, and infrastructure investigations. Wesley is proficient in various geophysical methods, including electrical resistivity imaging, gravity, magnetic, seismic reflection/tomography, magnetotelluric, and ground-penetrating radar. He has also utilized hyperspectral and radar satellite data for engineering applications. Notably, Wesley has developed fundamental mathematical equations to combine different electrical and electromagnetic datasets, enhancing the overall quality of geophysical data for exploration and modelling.

Road to carbon neutrality – opportunities, innovations, and strategic implications for the mining industry

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Carbon Neutral Energy Systems, South Africa

The South African economy is fundamentally linked to its rich mineral resources, creating a complex relationship known as the minerals-energy complex. While this sector is crucial for both domestic and global markets, it is confronted by multifaceted challenges such as declining productivity, increasing operational costs, fluctuating commodity prices, and the urgent need to address environmental concerns and achieve carbon neutrality. As the world races to limit global warming to 1.5°C, as discussed in the Paris Agreement's mandate and sustainable development goals, the mining sector faces increasing pressure to reduce its carbon footprint and transition towards carbon neutrality. This industry is critical in providing raw materials needed for low-carbon energy transition, yet it also contributes significantly to greenhouse gas emissions. Transitioning to carbon neutrality ensures a sustainable supply of these materials while reducing the industry's energy consumption and environmental impact. Carbon neutrality in the mining industry is essential for mitigating climate change and addressing energy security and sustainability while improving air quality and ecological recovery. Achieving carbon neutrality drives innovation and investment in green technologies, enhances reputation and stakeholder trust, and supports a just transition to a low-carbon economy. Exploring the concept of carbon neutrality and its importance for the mining industry, particularly in South Africa, involves examining the strategic implications for mining companies, including the challenges and opportunities they face on the road towards carbon neutrality. Against this backdrop, this paper outlines the various factors which will play a pivotal role in carbon neutrality of the mining industry, necessitating a dual focus on resource provision and internal decarbonisation.

Keywords: carbon neutrality, mining industry, environmental sustainability, green technologies, strategic implications.



Patronella S. Mtemeli

Sustainability Engineer

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Patronella is a skilled Project/Sustainability Engineer with a Master's degree in Chemical Engineering. She specialises in developing and implementing comprehensive sustainability management systems and community programs that drive social and environmental benefits. Her work ensures projects meet regulatory standards while positively impacting local communities and ecosystems. Passionate about creating a sustainable future, Patronella continually seeks to innovate and improve processes, aiming to leave a positive legacy through responsible development and environmental stewardship.

Transformative ESG dynamics: Unveiling pathways to sustainability in South African mining sector

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The paper provides a comprehensive review of environmental, social, and governance (ESG) factors in the South African mining sector, addressing key challenges such as data transparency, stakeholder engagement, and regulatory standards. An in-depth analysis of 116 national and international policy documents revealed significant gaps in ESG reporting. A new, innovative and digital framework is recommended to enhance sustainability and accountability in mining operations. This framework, supported by both qualitative and quantitative data, aims to align the sector with global sustainability goals, introducing innovative ESG practices. It emphasises the importance of collaboration between government, industry stakeholders, and communities for a sustainable mining environment, linking theoretical concepts with practical applications for a shift towards responsible mining. Moreover, the research highlights the necessity of operational innovation and policy alignment for strategic ESG practice improvement. Conclusively, it offers a comprehensive strategy for ESG integration in the sector, providing practical guidance for mining companies to enhance sustainability efforts, based on a systematic policy review.

Vuyiswa Mvelase

Digital Mining Laborator

The Sibanye Stillwater, Wits University

Vuyiswa Mvelase is a mining engineer with a finance background who focuses on environmental, social, and governance (ESG) in the mining and energy sectors. She has worked on ESG projects in the recent past and is currently working on creating a digital framework to reduce carbon emissions in underground metal mines. She is presently an MSc student at Wits University's Sibanye Stillwater Digital Mining Laboratory, DigiMine.

Exploring the embeddedness of environmental stewardship in gold and platinum mining

N. Haripursad

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Embedding in this context is defined as entrenching environmental stewardship firmly and deeply into operations. Mining has been perceived as lacking environmental stewardship and seems to be progressively moving toward protection, restoration, and sustainable use of natural resources that contribute to communities and society. The purpose of the paper is to explore the relationship between strategy, leadership, and environmental management systems, and their role in improving environmental performance. The methodology used is engaging with the organisation through on-site interviews and testing the aspects of the environmental management system against the environmental performance. Evidence is collected from semi-structured interviews with environmental practitioners, leadership across gold and platinum group metals (PGM) operations, and NGOs within South Africa. The analytical boundaries will be focused on intangible aspects for improving environmental performance such as awareness of employees; environmental knowledge, skills, and expertise of environmental practitioners; the commitment of leadership; cross-functional coordination; and the integration of environmental issues in strategic planning processes. A matrix will be developed to demonstrate the levels of environmental embeddedness. This paper will help to enhance the practical applications and insights into organisational change and environmental performance.

Beyond compliance: Enhancing due diligence and supply chain transparency to address human rights risks

P. Dela

Webber Wentzel, South Africa

In a world where corporate responsibility extends well beyond profitability, businesses are facing escalating demands to uphold human rights across their operations and supply chains. Stakeholders, regulators, and consumers now expect companies to not only comply with legal requirements but to proactively integrate human rights considerations into their operations. Beyond Compliance: Enhancing Due Diligence and Supply Chain Transparency to Address Human Rights Risks explores the imperative for companies to transcend mere legal compliance and to adopt comprehensive strategies that integrate human rights considerations into every facet of their operating models, including their supply chains.

Background and Importance

The complexities of modern supply chains, which often span multiple countries with varying regulatory frameworks, present significant challenges for managing human rights risks. Traditional compliance approaches are increasingly seen as insufficient. Instead, businesses are called upon to engage in rigorous due diligence and maintain high levels of transparency to prevent, identify, and address potential human rights impacts throughout their own operations as well as their supply chains.

Key Focus Areas

This presentation outlines essential methodologies and practices for enhancing due diligence and transparency, advocating for a holistic approach that includes risk assessment, stakeholder engagement, policy integration, and continuous monitoring. The key focus is risk to people rather than risk to business.

Advanced Due Diligence Practices:

- Risk Assessment: Systematic mapping and assessment of supply chains to identify potential human rights risks, including the use of human rights impact assessments.
- Stakeholder Engagement: Engaging with affected groups and collaborating with NGOs to obtain insights into local conditions and expectations.
- Policy Integration: Developing and implementing robust human rights policies that align with international standards and ensuring effective communication and training throughout the organisation and supply chain.
- Methodologies for assessing business respect of human rights.

Enhancing Supply Chain Transparency:

- Supplier Engagement: Establishing clear agreements with suppliers to ensure transparency and building their capacity to meet human rights standards.
- Technological Solutions: Utilising technologies such as blockchain to enhance traceability and data analytics tools to monitor supply chain activities and identify potential human rights risks.
- Public Reporting: Committing to regular and detailed public reporting on due diligence efforts, including supply chain maps and disclosures on human rights impacts.

International Developments and Local Implications

Recent international developments such as the Corporate Sustainability Due Diligence Directive approved by the Council of the European Union on May 24, 2024, are set to significantly impact the mining sector globally, including in South Africa and Africa at large.

This directive mandates that companies operating in the EU as well as those in their supply chains (including African and South African mining companies within scope) conduct rigorous due diligence across their supply chains to prevent human rights abuses and environmental harm. As many African minerals, including those from South Africa, are destined for the EU market, South African mining companies must align with these new requirements. The directive affects industries supplying critical minerals for products like catalytic converters, green steel, and electric vehicle batteries. South African mining companies supplying minerals such as iron ore, lithium, platinum, and diamonds to European markets, must now enhance their due diligence processes to meet these stringent EU standards.

This development underscores the necessity for these companies to adopt rigorous human rights and environmental practices, ensuring compliance and fostering sustainable and responsible operations throughout their supply chains.

Challenges and Solutions

The journey toward enhanced due diligence and transparency is not without challenges. Companies must navigate complex supply chains, varied regulatory landscapes, and potential resistance from suppliers. This paper addresses these challenges by offering practical solutions, such as investing in advanced technologies for supply chain monitoring, fostering partnerships with stakeholders, and regularly reviewing and updating due diligence practices to ensure continuous improvement.

Conclusion

Adopting a proactive approach to human rights due diligence and supply chain transparency provides significant benefits beyond risk mitigation. Businesses that integrate these practices effectively can enhance their reputation, build stronger stakeholder relationships, and secure investor confidence. This paper serves as a comprehensive guide for companies aiming to lead in responsible business practices, demonstrating that going beyond compliance is not only a moral imperative but also a strategic advantage in today's interconnected global economy.



Pooja Dela

Partner
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Pooja has been at the firm for 15 years and specialises in all aspects of high stakes and high value corporate and commercial dispute resolution including the intersection with administrative and constitutional law, public procurement, business and human rights, the law on corruption and bribery, as well as mining and mineral law. Pooja also specialises in media law and defamation, crisis and reputation management and data protection. She has been involved in various Constitutional Court proceedings and matters requiring legislative interpretation and government / corporate accountability. She has litigated at every level of the South African judiciary.

She has advised clients in the public and private sectors, including non-profit entities, and non-governmental organisations in a variety of fields including the broadcasting, transport, insurance, retail, construction, oil and gas, mining and aviation industries. She has also conducted significant business and human rights related risk and impact assessments and has expertise in reviewing governance structures and policies, conducting regulatory and institutional framework mapping as well as human rights due diligence.

She has been recognised both internationally (shortlisted by the IBA as one of ten in the world) and domestically as a leader in Rule of Law litigation in South Africa.

Pooja spent a year at the Constitutional Court of South Africa as a clerk. Her expertise has been recognised by Legal 500.

The business case for measuring and reporting greenhouse emissions, with a focus on Scope 3 emissions

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In recent years, the urgency to address climate change has driven companies to assess their environmental impact more closely. Greenhouse gas (GHG) emissions reporting has become a pivotal aspect of corporate sustainability strategies and managing decarbonisation. While significant progress has been made in reporting Scope 1 and Scope 2 emissions, these often represent just a fraction of a company's total carbon footprint. Scope 3 emissions, which encompass indirect emissions throughout the value chain, including those from suppliers and product use, can account for a substantial portion of a company's overall GHG emissions. Despite their significance, Scope 3 emissions are frequently overlooked or underreported due to the complexities involved in their measurement and reporting. This oversight not only presents a risk to businesses in terms of regulatory compliance and reputational damage but also represents a missed opportunity for innovation and leadership in sustainability. By embracing comprehensive GHG accounting, including Scope 3 emissions, companies can gain insight into high-impact areas within their business and value chain, foster stronger relationships with stakeholders, and enhance their competitive advantage.



Theron Moonsamy

Manager

Carbon Trust Africa

Theron has a career that spans over a decade and impacts across a multitude of sectors primarily in industry and energy. He first cut his teeth as an engineer in the petrochemical sector before transitioning to sustainability consulting with a specific focus on carbon accounting, decarbonisation strategizing, renewable energy, green hydrogen economics and ESG reporting.

Coal mine legacies and the just transition: Opportunities for regenerative post-coal futures

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It is becoming increasingly recognised that the transition to a low-carbon economy needs to be done in a manner which is not only socially and environmentally responsible, but also consistent with a regenerative and circular economy. This is particularly important in coal-intensive jurisdictions where coal mining, processing, and combustion often constitute the main economic activities, and which are also frequently characterised by high levels of pollution and environmental degradation. Whilst the loss of employment and livelihoods is probably deemed the most critical socio-economic risk associated with closure and downscaling of coal operations, the ineffective rehabilitation of coal mines and coal waste piles can also pose a serious long-term risk to the health, safety, quality of life, and even the livelihoods of local communities, particularly where these are linked to crop and livestock farming. This calls for a strategic approach towards mine closure which serves the dual purpose of both removing long-term environmental liabilities and promoting local economic diversification, ultimately supporting restorative justice in coal regions. This paper explores opportunities for the development of such an approach through the integrated application of options for the repurposing of both degraded mine land and large-volume coal wastes, based on the findings from two multi-disciplinary programmes at the University of Cape Town.

A number of potential options have been identified for integrating the downstream application of wastes streams across the entire coal value chain with a view to developing niche applications which focus on the rehabilitation and remediation of coal mines. Studies at the University of Cape Town have indicated, furthermore, that subsequent cultivation of industrial crops provides an alternative option for post-mining land-use, due to their potential to utilise similar resources (land, infrastructure, and labour) and to promote economic diversification and economic growth beyond mining. Fibre-producing plants, such as hemp, kenaf and bamboo, present a unique opportunity due to their potential to create multi-product value chains, as well as to absorb contaminants from soil and sequester carbon dioxide. In most cases technical feasibility of the technologies and their integrated application still needs to be demonstrated, either at the pilot or commercial scale. Even in cases where these technologies are demonstrated, commercial implementation will require the development of a more rigorous business case, which considers the environmental, economic, socio-technical, and regulatory aspects of the proposed options.

Systematic review and industry implications of carbon emission models for underground metal mines

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This paper examines journal articles published between 1994 and 2024 and provides a systematic overview of carbon emission models in underground metal mines using bibliometric statistical approaches. Through a thorough analysis of peer-reviewed journal papers and conference proceedings, with a focus on data-driven models, the study highlights trends, techniques, and datasets used in the mining and energy sectors. The research critically assesses the development and application of carbon emission models, revealing important advancements while identifying knowledge gaps. By considering key factors such as the type of datasets used, carbon sources considered, spatial modelling, and the models' effectiveness in predicting and reducing emissions in underground mining activities, the study provides a comprehensive understanding of the field. The research aims to contribute valuable insights into the creation and utilisation of carbon emission models, with the intent of guiding future research and improving decision-making in the mining industry. Ultimately, this work promotes the adoption of more sustainable practices by identifying effective modelling approaches that can support efforts to reduce carbon emissions. The findings offer a foundation for refining carbon management strategies in underground metal mines, with implications for both industry practices and environmental policy.

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The business case for measuring and acting on climate-related risks and opportunities in the mining and minerals sector

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Background and context

South Africa's mining, metals and minerals sector faces unprecedented challenges from both the physical impact of climate change and transition risks. Responding to climate change responsibly presents significant opportunities for positive disruption across the sector, and a just transition in South Africa and the broader continent. According to Minerals Council South Africa, in 2022 the mining sector contributed 7.3% to South Africa's GDP (R483 billion) and employed over 469,000 workers. In the same year, mineral exports amounted to R882 billion, equivalent to almost 14% of GDP. This valuable contribution could be at risk as the physical impacts from climate change, such as floods, droughts, extreme weather events and rising temperatures, become more widespread. Transition risks, like the European Carbon Border Adjustment Mechanism also present significant risks to the sector, and could negatively impact its international competitiveness. However, responding to climate change also presents significant opportunities for the sector and for enabling a broader just energy transition in South Africa.

The role of voluntary sustainability standards for mineral raw materials in catalysing responsible mining practices: Case study of IRMA implementation at Anglo American Platinum

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Anglo American Platinum has committed to having all its operations undergo third-party audits against responsible mine certification systems, namely the Initiative for Responsible Mining Assurance (IRMA) by 2025. This commitment was in response to growing stakeholder demand for traceability and provenance.

This paper explores and aims to provide a nuanced perspective of the implementation of this responsible mining audit across its platinum-group metals (PGM) operations, including lessons learned and challenges experienced using a case study approach involving three mining sites. These sites are acknowledged in their various capacities as: the first site globally to undergo this audit, the first PGM mine in South Africa to implement the audit, as well as the first mine globally to conduct a surveillance audit.

In our experience multi-stakeholder initiatives (in this case IRMA) foster increased stakeholder engagement, which can build trust. It has fostered trust and credibility with customers through increased visibility and traceability of the mineral value chain and has improved on-site practices. Audits however are not a silver bullet and have their limitations, including that they are limited in time and scope. Additionally, summarising inputs and performance into a score does not always account for the unique operating contexts. The role of these audits cannot be undermined in their ability to improve performance; however for this performance to be sustainable and credible, a functioning rule of law is required.

Keywords: responsible mining, stakeholders, audits, standards, supply chain, sustainability, risk management

**initiatives, standards and schemes used interchangeably throughout the paper*



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Mahlogonolo leads the implementation of responsible mining standards across Anglo American sites and has held various roles within the Technical and Sustainability department, Anglo American and has extensive experience in leading sustainability initiatives. Prior to working with Anglo American, Mahlogonolo has held roles with the WWF-SA and Department of Mineral Resources. She is passionate about proving product provenance throughout the value chain and the role of third-party frameworks and certifications as a conduit to validating responsible mining practices/ responsible sourcing. She is also passionate about the role they play in improving mine practices.

