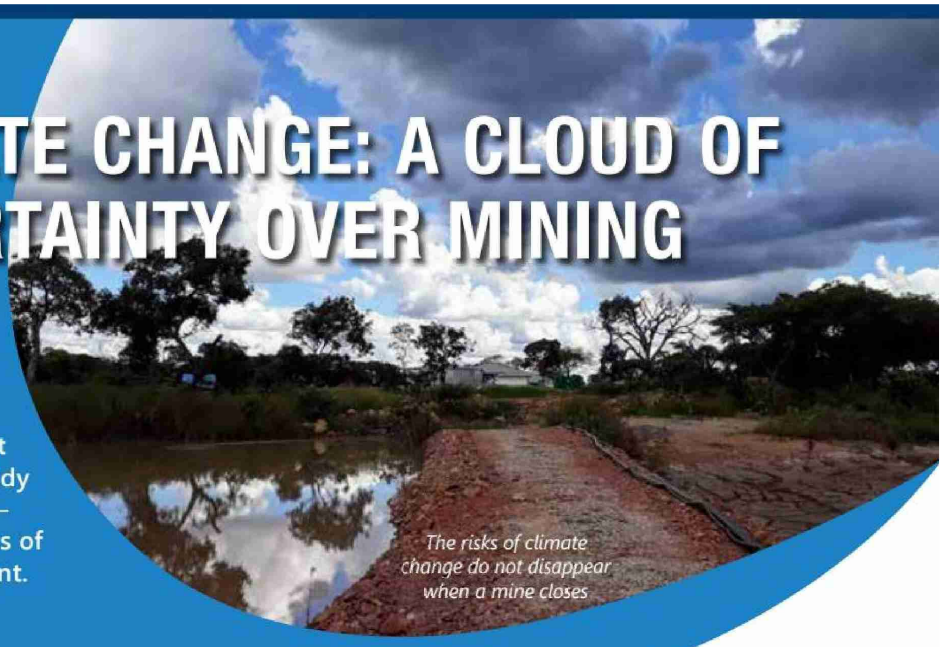
Publication: Water & Sanitation Africa

Title: CLIMATE CHANGE: A CLOUD OF UNCERTAINTY OVER MINING **Publish Date:** 01 January 2021

CLIMATE CHANGE: A CLOUD OF UNCERTAINTY OVER MINING

A key impact of climate change on mining is the new level of uncertainty that it brings to an already risk-laden sector – especially in terms of water management.



The risks of climate change do not disappear when a mine closes

According to Peter Shepherd, partner and principal hydrologist at SRK Consulting, one of the first questions a mine developer must ask is whether the site has access to enough water to sustain operations. The rule is straightforward: no water, no mine.

"The challenge now is that climate change has cast doubt on what we believe the future holds for rainfall patterns and temperature trends. We might be able to conduct the necessary technical water studies and establish that we have water available at this time, but will the water source be sustainable in the future?" questions Shepherd.

There is one thing worse than not finding enough water for a new mine development, and that is to find out – after the mine is built – that the water supply has reduced and become insufficient to sustain the mine.

"This uncertainty leads to many other questions that need to be asked. For instance, will the mine's infrastructure, employees and surrounding communities remain safe as the environment changes?" explains Shepherd.

An uncertain future

He highlights that storm frequency and intensity – as well as rainfall depth – are among the main parameters in mine water management that are vulnerable to climate change. Changes in temperature are also expected to continue, altering evaporation levels from storage dams, process dams and tailings facilities.

"The planning of any infrastructure has previously been done on the basis of historical rainfall sequences and levels. The fundamental risk that climate change introduces is that we can no longer merely rely on data from the past to accurately represent what will occur in the future."

Changing rainfall patterns could see more frequent, smaller rainfall events, which may increase the erosion of streams and affect mine infrastructure in new and destructive ways. If an effluent dam has been designed to deal with a one-day storm, the occurrence of two or three rainfall events – even if they are smaller than the traditional 1-in-50-year storms – may cause spillages and even environmental damage.

"We may need a change in design to cater for smaller events, such as low flow channels. Larger rainfall events occurring more often will require greater diversion channels, and dirty water dams will need to be adequately sized," says Shepherd.

Longer dry spells will also take their toll – a trend that Shepherd has already observed in the Rustenburg area over the past decade. It is likely that mines will require buffer dams, where water can be captured during the wet season, for use when water supplies run short.

Shepherd emphasises that the risks of climate change do not disappear when a mine closes, but rather place even greater responsibility on mine owners to ensure the safe maintenance of mining infrastructure after closure. This is especially relevant to large structures like tailings dams, whose integrity and safety can be affected if

Andrew van Zyl, director and principal consultant, SRK Consulting

Peter Shepherd, partner and principal hydrologist, SRK Consulting

management strategies are not adapted to suit altered weather patterns.

Adapting to climate change

As mining companies adapt their water management strategies to the demands of climate change, they are also working to reduce their role in the emission of greenhouse gases, which lies at the root of this phenomenon.

As a major energy user, the mining sector is making significant strides in reducing its carbon footprint, says Andrew van Zyl, director and principal consultant, SRK Consulting. Trends in this regard range from steadily reduced fuel consumption in mining trucks and changes in the shipping of mined bulk material, to increased on-mine energy generation from renewable sources.

"In just one year, from 2018 to 2019, global mining companies' investment in renewable energy rose fivefold. After committing to 900 MW of renewable energy capacity in 2018, mining companies announced a further 4 500 MW in projects the following year," says Van Zyl.

Most mines have proactively reduced their carbon footprints by improving energy efficiency through the use of modern equipment and technology across all mine functions. In South Africa, using hydrogen fuel to power mining haul trucks is being trialled in the hope that diesel could be replaced in this application.

Van Zyl notes that several local mines also intend to install their own renewable energy generating facilities as soon as there is a clear regulatory framework to facilitate these ventures.

"The mining sector's investment in renewable energy projects is an important opportunity as South Africa implements an Integrated Resource Plan that envisages a lower-carbon economy. The planned reduction in the use of coal to generate the country's electricity also has significant socio-economic implications," he says.

"With coal's share in South Africa's energy mix expected to drop from more than 80% currently to around 30% by 2050, the country needs to plan for a just transition from coal to other energy sources. Ongoing trends make it likely that the replacement of ageing coal infrastructure with renewables will be in the interest of the climate, and more economically attractive. Planning for this transition will maximise opportunity and can mitigate some of the negative impacts in areas currently dependent on coal," ends Van Zyl. ws

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