

A CRITICAL REVIEW OF THE REGULATORY FRAMEWORK OF THE MINING OF TIGER'S EYE GEMSTONE.

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Abstract

Tiger's eye (TE) mineral is currently mined on small scale mining in Griqualand West, Northern Cape Province. TE, a popular gemstone comprising an intergrowth of quartz and altered amphibole fibres, coexisting with crocidolite asbestos mineral within the Asbestos Hills Subgroup of the Ghaap group in the Transvaal Supergroup.¹ Mining and processing of asbestos has been banned in South Africa since 2008², which prompts the question of whether its restrictions overlap with the mining and processing of tiger's eye. The major issue which raises legal and environmental implications is that mining of tiger's eye within the Banded Iron Formation (BIF) of the Asbestos Hills Subgroup in Griqualand West Basin results in exposure of workers and the environment to the harmful crocidolite asbestos fibres.

Therefore, the study investigated whether the banning of asbestos mining include the prohibition of tiger's eye mining and identify the legal and regulatory implications resulting from the mining. The DPSIR (Drivers, Pressures, State, Impacts and Responses) method was used to assess the implications of mining tiger's eye in the context of sustainable extraction and use of the nation's mineral resources. The study recommends that the authorities should halt issuing mining rights and permits for tiger's eye as it cannot be safely mined due to its coexistence with the banned crocidolite asbestos minerals.

Keywords: *Tiger's Eye Mineral, Crocidolite Asbestos. Mining. DPSIR Methods. Regulatory Framework,*

RESEARCH METHODOLOGY

Basically the research methodology adopted in this study is quantitative. Consequently, a combination of legal comparative and legal historical methods, based on jurisprudential analysis, is employed. Legal comparative method is applied to find solution, especially for the interpretation of legal principles and related regulations. The purpose of historical research method on the other hand is to establish the development of legal rules, interaction between law and scientific research and also to propose solutions or amendments to the existing law or constitutional arrangement, based on practical or empirical and historical facts. Concepts are analysis, arguments based on discourse analysis, developed. A literature and case law survey of the constitutional prescriptions and interpretation of statutes is made. This research is also library based and reliance is made of library materials likes textbooks, reports, legislations, regulations, case laws, articles and papers presented on the subject in conferences.

INTRODUCTION

Tiger's eye mining on both private farms and communal land was identified as the driver which releases the banned crocidolite asbestos fibres (Ledwaba, 2014 and Kenan et al., 2018).^{3,4} The release

¹*Mindat.org. (n.d.). Tiger's Eye: Mineral information, data and localities. Retrieved October 18, 2021, from <https://www.mindat.org/min-3960.htm>*

²*Regulations for the Prohibition of the Use, Manufacturing, Import and Export of Asbestos and Asbestos Containing Materials*

³*Kenan, A. O., Opperman, R., & Pieterse, L. (2018). A Report on Tiger's Eye in the Griqualand West, Northern Cape.*

⁴*Ledwaba, P. F. (2014). Tiger's eye in the Northern Cape Province - potential for employment creation and poverty alleviation. The Journal of The Southern African Institute of Mining and Metallurgy, 114(11),*

of crocidolite asbestos fibres exerts pressure on the environment and would be harmful to the exposed public through inhalation route. Figure 1 shows the coexistence of the tiger's eye and the crocidolite asbestos minerals.



Figure 1: Coexistence of crocidolite blueish asbestos minerals sandwiching the tiger's eye minerals (Kenan et al., 2018).

In 2012, the Department of Mineral Resources and Energy (DMRE) had records of 15 mining permits issued for tiger's eye on private farms while over 100 miners exploited tiger's eye on communal land (Ledwaba, 2014).⁵ The current state is that asbestos-related products are banned from mining, manufacturing and processing because of asbestos pollution and health issues⁶. The impact and implication is that the tiger's eye cannot be mined without releasing some amount of crocidolite asbestos fibres, which are considered to have an adverse environmental and human health effects (Rasmeni et al. 2016).⁷ Several countries in Africa particularly South Africa (SA) and Europe (Eu) established that there is no safe exposure level for asbestos-containing materials (Myers, 1980).⁸ According to Myers (1980), asbestos fibres were proven as the cause of mesothelioma, lung cancer and asbestosis.⁹ In South Africa, asbestos materials and goods were identified as the first pathway which exposed thousands of workers who were employed in factories to asbestos fibres. The second environmental exposure pathway was found to be associated with rocks that were mined for other minerals but also contained trace asbestos fibres. Thirdly, the use of asbestos cement for construction resulted in the exposure of asbestos fibres to the general public.

Application and discussion of the of the DPSIR framework to the air quality around the tiger's eye and asbestos legacy mines.

The content below has been established through scientific and legal processes, which led to the appropriate response for each part of the chain from the drivers to the impacts:

- Firstly, the mining of tiger's eye and asbestos minerals to extract useful raw materials for the purpose of manufacturing commercial products is the main source or driver.¹⁰

881–885. http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2225-62532014001100005

⁵Ibid

⁶Section 2 of Regulation No. 341 of the Environment Conservation Act No. 73 of 1989.

⁷Rasmeni, S., Chetty, D., Sebola, P., & Seripe, K. (2016). Tiger's eye in the Northern Cape Province, South Africa-grading, distribution, small-scale mining, and beneficiation potential. *Journal of the Southern African Institute of Mining and Metallurgy*, 116(6), 587–592.

⁸Myers, J. (1980). *Asbestos and asbestos-related disease in South Africa*.

⁹Ibid

¹⁰Phillips, J.I., Rees, D., Murray, J. & Davies, J.C.A. (2012). *Mineralogy and malignant mesothelioma: The South African experience. Chapter 1*.

- Secondly, the problem or pressure include the transformed landscape and land use, as well as the infrastructure that has not been decontaminated or rehabilitated, formation of waste heap that contain short fibres, unrehabilitated mine dumps that continuously release the inhalable contaminated fine dust and asbestos fibres.
- Thirdly, the quality of the physical, chemical and biological states of the natural environment is adversely affected. Airborne mineral dust reduces the quality of the inhalable air. These dust materials are very fine in terms of their diameter sizes and have large surface areas where other dangerous airborne pollutants (such as a chemical or a pathogen) can attach and be transported together until they reach vulnerable receptors. The absence of vegetation cover on mine out areas adversely affects the animal life and the entire local biodiversity which is life supporting.
- Fourthly, the main impacts are on human health and their livelihood. Human beings that live close to the mine dump sources are at risk of inhaling the airborne fine mineral dust. These very tiny inhalable dust with asbestos fibres easily pass through the protective mucous and hair in the nose during breathing and are deposited deep in the lungs where they cause respiratory diseases.¹¹

Kwata et al., found that the poor rural communities that are adversely affected have very few public health care facilities in their proximity.¹² Most individuals who are no longer working after the mine closure cannot afford private medical services. The study also identified the absence of alternative post-rehabilitation mine closure socio-economic opportunities. In some cases, the illegal miners are stripping the copper wires and unintentionally bringing buried asbestos fibres to the surface.

Figure 2 shows examples of the content from the main drivers, the pressures, the state of the environment, the resultant impacts and appropriate the legal responses. Consequently, a clear environmental management plan (EMP) must be developed and followed so that acceptable environmental conditions can be attained.

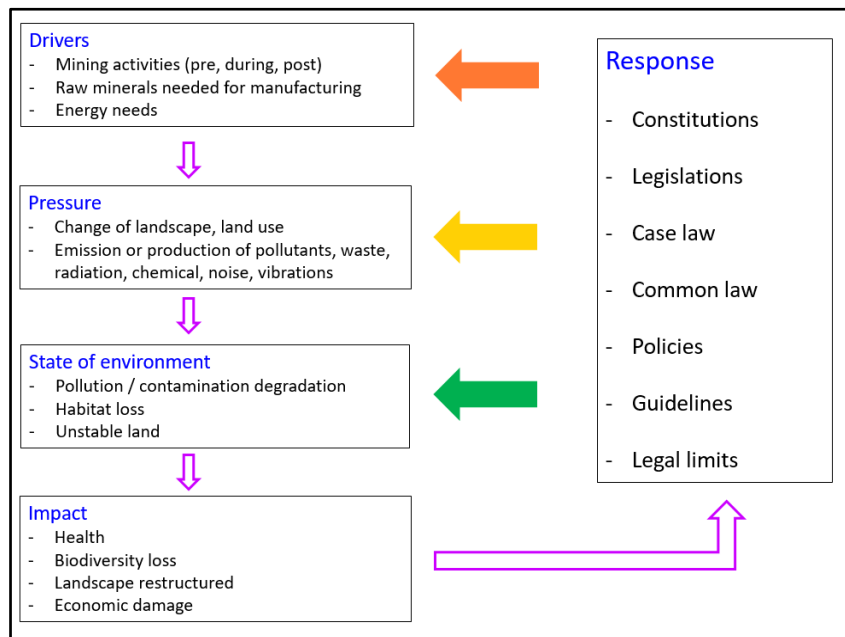


Figure 2: DPSIR framework indicating the actual process of theme depiction and integration process of science to the law (Adapted EEA, 1997).¹³

¹¹Annegarn, H.J. & Scorgie, Y. (2002). "Air Quality – Chemistry and Physics of the Atmosphere. MSc Course Work Notes, University of the Witwatersrand.

¹²Kwata et al., 2018/2019 FY Report. Dust and Air Quality Report. Council for Geoscience.

¹³European Environmental Agency (EEA). 1997. Air Pollution in Europe.



Legal frameworks for both tiger's eye and asbestos were investigated to determine inferences in terms of mineral administration due to their coexistence. Crocidolite asbestos fits the definition of asbestos fibres which have been banned by both South Africa and European countries.¹⁴ In South Africa, tiger's eye was initially managed in terms of Tiger's Eye Control Act 77 of 1977 and was amended by Act 48 of 1979¹⁵ and Act 8 of 1981¹⁶. The aim was to regulate and control the mining for and the purchase, sale, acquisition, receiving, disposal, delivery, conveyance and dispatch of the mineral. It was later governed under the Minerals Act 50 of 1991 as legislation regulating all minerals in SA. Currently, all the above-mentioned statutes have been repealed and replaced with the Minerals and Petroleum Resources Development Act 28 of 2002, which has also been amended several times. In 2012, South Africa placed restrictions on the export of tiger's eye except by an export permit issued in terms of section 6 of the International Trade Administration Act.¹⁷

Mineral development goes through different stages, from application to prospecting, mining and finally mine closure. These processes invoke the interpretation of integration between social, economic development and the protection of the environment. From a social viewpoint, the Constitution guarantees everyone a right to an environment that is not harmful to their health or wellbeing and allows sustainable development that balances the socio-economic needs with the environmental factors for the benefit of current and future generations.¹⁸ The meaning and understanding of what constitutes "harm" in section 24(a) of the Constitution require both scientific and legal interpretations. Scientific practice relates human health to a specified standard value, while legal theory answers the question based on the obligation that was created from the contractual perspective, delictual law and law of damage or loss context.

This implies that the issuing or granting of rights and permits in terms of sections 17(1)(c) and 23(1)(d) of the MPRDA concerning tiger's eye mining requires formal application of the collection and dissemination of environmental information and the conduct of environmental impact assessments on how exposure of asbestos fibres will be managed. The environmental requirements and protection are influential throughout the MPRDA.¹⁹ However, the requirements are managed through section 2 of the National Environmental Management Act 107 of 1998 (NEMA) as an integrated approach despite being obligatory within section 37 of the MPRDA.

In execution of the environmental right within the Constitution, the organs of state are bestowed with authority to protect and determine pollution within the environment through the prism of section 2 of NEMA which outlines National Environmental Management Principles. Furthermore, tiger's eye mining is required to be a sustainably extracted as stated in section 2(4) of the NEMA. However, the release of banned crocidolite asbestos fibres during the small-scale mining of tiger's eye renders such operation non-compliant with environmental principles and regulations. Therefore, section 2(4)(a)(viii) of NEMA provides that negative impacts on the environment must be prevented, while protecting people's environmental rights.

According to Kenan et al. (2018),²⁰ delineation of crocidolite asbestos is used as an exploration model for discovery of tiger's eye because of their unavoidable coexistence.

In conclusion, the pollution and hazard posed by airborne crocidolite asbestos fibres to the environment and human health have been identified as an unacceptable risk that cannot be effectively mitigated, as required by both the MPRDA and NEMA. Therefore, the future exploitation

¹⁴According to *Abatement Asbestos Regulations 2020: No. 1196 of Occupational Health and Safety Act No. 85 of 1993 and Directive 76/769/EEC on dangerous substances and preparations (Restrictions) Regulations of 2002.*

¹⁵*Tigers' Eye Control Amendment Act No 48 of 1979*

¹⁶*Tigers' Eye Control Amendment Act No 8 of 1981*

¹⁷*International Trade Administration Act 71 of 2002*

¹⁸*Section 24 of the Constitution of South Africa.*

¹⁹*Sections 16(4)(a), 18(2)(c) & (3)(c), 22(4)(a), 24(2)(b) & (3)(d), 17(1)(c) & 23(1)(d) of the MPRDA.*

²⁰Kenan, A. O., Opperman, R., & Pieterse, L. (2018). *A Report on Tiger's Eye in the Griqualand West, Northern Cape.*

of tiger's eye appears to be unsustainable due to the association of tiger's eye with crocidolite asbestos deposits. Additionally, South Africa is one of the signatories to many clean environmental conventions with an obligation to uphold the ban on the mining and use of asbestos.

It is recommended that authorities halt issuing mining rights and permits for tiger's eye because extracting crocidolite asbestos minerals is currently environmentally unsustainable. In the context of the coexistence of the two minerals, it is currently impossible to mine tiger's eye without releasing the asbestos fibres. The recommendations are in line with environmental management that place people and their needs at the forefront of concerns and serve their physical, psychological, developmental, cultural and social interests equitably in terms of section 2(2) of NEMA.

CONCLUSION

In conclusion, the study investigated whether the banning of asbestos mining includes the prohibition of tiger's eye mining and identify the legal and regulatory implications resulting from the mining. *The paper* recommends that the authorities should halt issuing mining rights and permits for tiger's eye as it cannot be safely mined due to its coexistence with the banned crocidolite asbestos minerals. The research and finding have been established through scientific and legal processes, which led to the appropriate response for each part of the chain from the drivers to the impacts which necessitated the researcher to draw conclusion as enunciated above.

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- [15] Tigers' Eye Control Amendment Act No 48 of 1979
- [16] Tigers' Eye Control Amendment Act No 8 of 1981
- [17] International Trade Administration Act 71 of 2002
- [18] Section 24 of the Constitution of South Africa.
- [19] Sections 16(4)(a), 18(2)(c) & (3)(c), 22(4)(a), 24(2)(b) & (3)(d), 17(1)(c) & 23(1)(d) of the MPRDA.
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