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THEORIES AND PRACTICES ON DEPOSIT BONDS USE FOR ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT IN KENYA'S TITANIUM MINING PROJECT

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ABSTRACT

This article analyses the use of economic incentives, particularly the Environmental Performance Deposit Bonds (EPDBs) in enhancing sustainable environmentally sound mine operations and closure. This is through a review of the environmental challenges and management practices at the Kwale Mineral Sands Project which is Kenya's largest mining project. The article reviews the legal challenges around the effective regulation and application of the bonds for environmental management in upstream mining, as well as how the titanium mining project is undertaking environmental management as the mine approaches its closure deadline in 2023. It is important to note that Base Titanium, the company undertaking this project voluntarily deposited environmental reclamation deposit bonds of USD 512,000 to the environmental regulator, as financial assurance for good environmental practices. The data used in the analysis is from literature review, key informant interviews, interview schedules, and focus group discussions. Results indicate that Base Titanium is working hard to comply to the environmental standards and practices, applying the mitigation hierarchy approaches, as well as a robust mine reclamation process. The lack of a proper legal and regulatory framework governing Environmental Performance Deposit Bonds (EPDBs), as well as a non-existent deposit bonds registry systems and guidelines is a challenge to their effective institutionalization. The public and key stakeholders are also unaware of the existence of the bonds, unlike the well-laid down public participation principles in the Environmental (and Social) Impact Assessments (ESIAs) and Environmental Audits (EAs). While the study acknowledges that Base Titanium is greatly expanding the discourse on sustainable finance models for environmental management in Kenya, the lack of legal clarity and coherence is a major impediment for progressive growth in this area.

Keywords: Environmental Performance Deposit Bonds (EPDBs); Sustainable Development; Remediation; Environmental and Social Impact Assessments (ESIAs).

1. INTRODUCTION

The failure to institutionalize a proper financing regime for sound environmental management practices is a major challenge to upstream mining across the entire value chain in most mine rich countries in Africa and beyond¹. The resultant impacts of this neglect are however most pronounced at the eventual end of the mining cycle², where the financing needs for the complex mine environmental reclamation, rehabilitation, restoration, and remediation usually skyrocket³. As the mining companies' propensity to shirk on these responsibilities increases due to weak regulation, poor enforcement and compliance and the huge information asymmetry between the regulators and the companies, the huge financing responsibility is almost always left to the already encumbered public finance system⁴. Sustainable finance instruments utilizing economic incentive approaches are therefore critical in encouraging good environmental management behaviors to mining companies, using price signals that impose direct impacts to their top-lines and bottom lines⁵. The mining company directors, executives and shareholders take notice, once the profitability of their mining ventures is seen to be in jeopardy, and hence financial provisioning for environmental risks and reclamation costs is important in the quest towards sustainable

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¹ D. Nell, *Optimising Production through Improving the Efficiency of Mine Compressed Air Networks with Limited Infrastructure* (Doctoral Dissertation, North-West University (South Africa). Potchefstroom Campus).

² Festin, E. S., Tigabu, M., Chileshe, M. N., Syampungani, S., & Odén, P. C. "Progresses in Restoration of Post-Mining Landscape in Africa." *Journal of Forestry Research* 30(2) (2019): 381–96.

³ Damilola Olawuyi, *Extractives Industry Law in Africa* (Springer, 2018) 1-25.

⁴ A. Morrison-Saunders, M. P. McHenry, A. Rita Sequeira, P. Gorey, H. Mtegha & D. Doepel. "Integrating Mine Closure Planning with Environmental Impact Assessment: Challenges and Opportunities Drawn from African and Australian Practice ("2016) 34 (2) *Impact Assessment and Project Appraisal* 117–28. <https://doi.org/10.080/14615517.2016.1176407>.

⁵ C Perrings, "Environmental Bonds and Environmental Research in Innovative Activities." (1989) 1 (1) *Ecological Economics* 195–97.

mining⁶. It is a strategy seldom applied in Africa, and hence mine closure and post-closure management remains a challenge, reinforcing the consensus that infusing sustainability in mining remains a mirage⁷.

Environmental Performance Deposit Bonds (EPDBs) are important financial assurance schemes where refundable payments are made to the regulating authority (in Kenya's case the National Environmental Management Authority) before a potentially polluting or risky activity is undertaken constituting an appropriate security for good environmental practices.⁸ EPDBs are innovative means of realizing the economic incentive benefits for environmental management. Through this instrument, bond payments are returned if the environmental damage of the activity in question does not exceed certain thresholds or stays within the legally permissible thresholds⁹. In instances where there is a breach of compliance, the "forfeited collateral is then immediately made available to the regulator to remedy the performance failure". This implies that the burden of proof for environmental damage associated with production or extraction activities is shifted from the regulator¹⁰ to the investing firm to prove compliance with existing regulations on environmental management. The companies are also expected to shoulder the full costs of environmental reclamation, remediation and restoration¹¹. Thus, Environmental Performance Deposit Bonds (EPDBs) are

⁶ G. Omedo, Muigua, K., & Mulwa, R. "Financing Environmental Management in Kenya's Extractive Industry: The Place of the Polluter Pays Principle" (2020) 16 (1) *Law Env't & Dev. J.*

⁷ Festin, E.S., Tigabu, M., Chileshe, M.N. et al., "Progresses in Restoration of Post-Mining Landscape in Africa."

⁸ Republic of Kenya, "Section 2, of the Draft Environmental Management and Coordination (Deposit Bonds) Regulations, Defines Environmental Performance Deposit Bonds as Economic Instruments Where Advance Payments Are Made to the Respective Regulating Authority before a Potentially Environmentally Damaging Activity Is Undertaken, Mostly during the Official Licensing Procedures."

⁹ Ibid

¹⁰ D. Gerard, & Elizabeth J. Wilson. "Environmental Bonds and the Challenge of Long-Term Carbon Sequestration." (2009) 90 (2) *Journal of Environmental Management* 1097-1105.

¹¹ R. N. Stavins, Robert N. "Economic Incentives for Environmental Regulation." Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University., 1997; R. N. Stavins et al, "Experience with Market-Based Environmental Policy Instruments" (2003) 1 *Handbook of Environmental Economics* 355-435.

oftentimes classified as “insurance premium taxes”, and theoretically fit into the deposit-refund system definition¹². This is because, the amounts deposited with a performance bond can only be refunded when the affected firm fulfils its environmental management obligations¹³, and which the regulator would have to approve¹⁴.

The only mine where EPDBs are being used as a financial assurance for good environmental management is the Base Titanium’s Mineral Sands Project in Kwale County. This provides a good case study in understanding the applicability of EPDBs in the country, an advance assurance scheme expected to contribute to the Polluter-Pays Principle¹⁵. The main objective of this article is to assess how EPDBs are being applied for management of environmental challenges in Kenya’s upstream mining industry. To achieve this, the paper analyses how the ‘voluntary’ application of EPDBs is impacting on Kenya’s largest active upstream mining venture, the Base Titanium’s Mineral Sands project that is found along the coastal region in Kwale County. To achieve this, the article is divided into eight sections. Section one provides the broad context for the use of Environmental Performance Deposit Bonds, with a specific focus on the upstream mining sector. It also analyses some of the environmental risks found across the entire upstream mining value chain. Section two discusses the methodology applied in the study including a description of the area where the study was done, while section three provides the key results. Section four provides detailed analysis and results on the environmental risks observed in the Kwale Mineral Sands Project and the criticality of sustainable finance. Section five, six and seven provide the environmental management strategies undertaken by Base Titanium, and the potential utility of the performance deposit bonds, as well as uncovering the key inspiration behind the

¹² R. N. Stavins, “Economic Incentives for Environmental Protection:” *ibid.*

¹³ R. N. Stavins (n.11).

¹⁴ United Nations Environmental Programme. “The Use of Economic Instruments for Environmental and Natural Resource Management.” Training Resource Manual, 2009. <http://hdl.handle.net/20.500.11822/7802>.

¹⁵ Republic of Kenya, “Polluter-Pays Principle Basically Advances That the Polluter Should Ultimately Bear the Financial Cost of Measures to Reduce Pollution According to the Extent of Either the Damage Done or the Rate at Which They Exceed Acceptable Levels (Standard) of Pollution.”

mining company's decision to voluntarily deposit reclamation funds to the environmental regulator even without express guidance by the law. Section eight discusses the main conclusions and recommendations from this study.

2. FINANCING ENVIRONMENTAL MANAGEMENT IN THE MINING SECTOR

Environmental management is a major contributor towards sustainable extraction of natural resources. For many jurisdictions, unsustainable mining practices have left permanent impacts on the health of ecosystems, and even led to release of harmful carcinogenic substances into the environment¹⁶. The extraction of natural resources in many jurisdictions including Kenya is expected to lead to significant environmental disturbances¹⁷ across the five main mining stages (exploration, feasibility and licensing, development and construction, production, closure and post-closure)¹⁸. This is especially key during the exploration and development phases which involve significant physical disturbances of ecosystems through clearing of the mining area, excavations, and construction of structures such as dam walls, open pits, pipelines, settling ponds and others¹⁹.

There are various types of mines, surface mining (open pit and strip mining), alluvial mining, underground mining, deep sea mining²⁰. All these methods require the deployment of

¹⁶ Damilola Olawuyi, 'Corporate Accountability for the Natural Environment and Climate Change', in Ilias Bantekas and MA Stein (eds), *Cambridge Companion to Business and Human Rights* (Cambridge University Press 2021); F. Mwaura, "An Audit of Environmental Impact Assessments for Mining Projects in Kenya." (2019) 119 (5) *Journal of the Southern African Institute of Mining and Metallurgy* 484–93. <https://dx.doi.org/10.17159/2411-9717/143/2019>.

¹⁷ Festin, E. S., Tigabu, M., Chileshe, M. N., Syampungani, S., & Odén, P. C. "Progresses in Restoration of Post-Mining Landscape in Africa" (2019) 30 (2) *Journal of Forestry Research* 381–96.

¹⁸ Government of Kenya, and Habitat Planners. "Strategic Environmental and Social Assessment (SESA) For The Mining Sector In Kenya." 2016.

¹⁹ Nicholas Bainton, Sarah Holcombe, "A Critical Review of the Social Aspects of Mine Closure." *Resources Policy* 59 (2018): 468–78. <https://doi.org/10.1016/j.resourpol.2018.08.020>.

²⁰ Albert K. Mensah, Ishmail O. Mahiri, Obed Owusu, Okoree D. Mireku, Ishmael Wireko, and Evans A. Kissi. "Environmental Impacts of Mining: A Study of Mining

sophisticated equipment and tools, which are all unleashed onto some virgin territories to harvest the riches in the earth's strata²¹. The equipment ranges from some rudimentary tools such as those applied in the artisanal mining area to heavy machinery that is used in the large-scale mining operations. Eventually, such mines have the potential to lead to soil erosion, chemical contamination of surface and ground water, release of other non-chemical contaminants, mineral leaching (acid drainage) and land-use disruptions arising from the mining activities²².

The mine closure stage is even more critical as the importance of proper mine closure is vital for sustainability of the environment²³. After extraction of the required mine concentrate, there is significant production of mine waste including mine tailings whose management presents the most difficult challenge to the mining process²⁴. Mine tailings are basically 'mixtures of crushed rock, processing fluids, washeries' that remain, and which require to be disposed of or stored safely²⁵. Exposure of these mine tailings to the environment leads to continued physical and chemical processes, such as oxidation which makes the management of mine tailings even more complex.²⁶ Several ways are used to manage the resultant mine tailing waste, including riverine disposal which has since become unacceptable in most jurisdictions due to the deleterious impacts on the riverine ecosystems where most of the

Communities in Ghana." *Applied Ecology and Environmental Sciences* 3 (3) (2015): 81–94. <https://doi.org/10.12691/aees-3-3-3>.

²¹ Ibid

²² Robert Kibugi & KameriMbote et al. *Mineral Resources and the Mining Industry in Kenya, Environmental Governance in Kenya: Implementing the Framework Law*(EastAfrican Publishers, Nairobi, 2008).

²³ Festin, E. S., Tigabu, M., Chileshe, M. N., Syampungani, S., &Odén, P. C. "Progresses in Restoration of Post-Mining Landscape in Africa" (2019) 30 (2) *Journal of Forestry Research* 381–96.

²⁴ A. Morrison-Saunders, M. P. McHenry, A. Rita Sequeira, P. Gorey, H. Mtegha & D. Doepel. "Integrating Mine Closure Planning with Environmental Impact Assessment: Challenges and Opportunities Drawn from African and Australian Practice, Impact Assessment and Project Appraisal. 34:2 (2016): 117–28. <https://doi.org/10.1080/14615517.2016.1176407>.

²⁵ D. Kossoff, W.E. Dubbin, M. Alfredsson, S.J. Edwards, M.G. Macklin, K.A. Hudson-Edwards,. "Mine Tailings Dams: Characteristics, Failure, Environmental Impacts, and Remediation." *Applied Geochemistry* 51 (2014): 229–45.<https://doi.org/10.1016/j.apgeochem.2014.09.010>.

²⁶ Ibid

waste was directed to²⁷. Other methods of managing the waste include use of a tailings dam, which is erected around a mined area to slow down the rate and pace at which the mining wastewater is released back into the environment.²⁸ Tailing dams are generally utilized to recycle the water being used in the mining process, as all the rock and earth matter are allowed to settle at the base, while the water is processed for re-use at the mining facility²⁹.

The storage of these tailings requires proper management to avert a situation where they are released into the ecosystems through seepage, foundation failure of the tailings dam, overtopping or as a result of mine tailing dam failures.³⁰ Tailing dam failure is a major concern in the entire mining cycle³¹. The major causes of tailing dam failure includes weakening of the coarse soil embankment around the tailing dams, increased waste water height beyond the dam height, lack of reasonable regulation on tailing dam design standards, high cost of mine tailing dams monitoring during operation and closure among many others³². The failure of mine tailing dams portends serious consequences and grave ramifications to the environment and the economy, contaminating water and soil systems posing serious threats to biodiversity.³³ Gold mining is known to utilize some dangerous chemicals, such as mercury which ultimately percolate to the water and soil systems, portending even more risks to the flora and fauna. Even more dangerous are some carcinogenic substances that sometimes seep from the mines, and which have the potency to stay within the

²⁷ C. Vogt, "International Assessment of Marine and Riverine Disposal of Mine Tailings." In Proceedings of the 34th Meeting of the London Convention and the 7th Meeting of the London Protocol, London 1 (November 2012).

²⁸ Festin, E. S., Tigabu, M., Chileshe, M. N., Syampungani, S., & Odén, P. C. "Progresses in Restoration of Post-Mining Landscape in Africa." *Journal of Forestry Research* 30(2) (2019): 381–96.

²⁹ *Ibid.*

³⁰ V. Hatje, Pedreira R.M.A, de Rezende, C.E. et al. "The Environmental Impacts of One of the Largest Tailing Dam Failures Worldwide." *Science*. Rep 7, 10706, 2017. <https://doi.org/10.1038/s41598-017-11143-x>.

³¹ L. Zongjie, Junrui Chai, Zengguang Xu, Yuan Qin, Jing Cao. "A Comprehensive Review on Reasons for Tailings Dam Failures Based on Case History" (2019) *Advances in Civil Engineering* <https://doi.org/10.1155/2019/4159306>.

³² World Mine Tailing, "A Compendium of the Recorded Incidents of Mine Tailings Failure Is Maintained at the WMTF, www.worldminetailingsfailures.org.

³³ *Ibid*

ecosystem for more than 30 years.³⁴ Examples of this have been reported in Brazil³⁵ as well as Ghana around the mining towns of Obuasi, Amansie and Adansi Districts where arsenic contamination of the soils and water were established through various scientific analysis³⁶.

The combination of all these factors makes mining quite hazardous to the environment, yet the economic benefits of mining far outweigh these impacts³⁷. During the decision-making processes on mining, most governments and private sector actors often seek to make some concessions, that often result in externalities. Mining introduces a lot of chemical and non-chemical pollutants into the atmosphere that bring into sharp focus the need for clean-up, before, during and after the mining process. Stronger regulation by the governments is therefore important to facilitate proper clean up, restoration and rehabilitation of the mining area. This is even more rife during mine decommissioning and closure where many companies simply shirk on their responsibilities, leaving a trail of abandoned mines replete with ecological catastrophes of unimaginable proportions.³⁸ Countries with a long history of mining are grappling with this challenge. For instance, Australia and Canada are recorded to have over 50,000 and 10,000 abandoned mines respectively³⁹. The use of environmental

³⁴ C.K. Bempah, & Ewusi, A. "Heavy Metals Contamination and Human Health Risk Assessment around Obuasi Gold Mine in Ghana." (2016) 188 *Environmental Monitoring Assessment*, Ghana 261. <https://doi.org/10.1007/s10661-016-5241-3>.

³⁵ Flávio F. Carmo, Lanchotti, Andressa O., Kamino, & Luciana H.Y. "Mining Waste Challenges: Environmental Risks of Gigatons of Mud, Dust and Sediment in Megadiverse Regions in Brazil Sustainability 12." *Environmental Risks of Gigatons of Mud, Dust and Sediment in Megadiverse Regions in Brazil Sustainability*. 12 (2020): 20. <https://doi.org/10.3390/su12208466>.

³⁶ K. Collin, Tayet all. "Human Exposure Risks Assessment of Heavy Metals in Groundwater within the Amansie and Adansi Districts in Ghana Using Pollution Evaluation Indices" (2019) 27(1) *West African Journal of Applied Ecology*, University of Ghana 23–41.

³⁷ A. Morrison-Saunders et al, "Integrating Mine Closure Planning with Environmental Impact Assessment: Challenges and Opportunities Drawn from African and Australian Practice, Impact Assessment and Project Appraisal" 34:2 (2016): 117-128. DOI: 10.1080/14615517.2016.1176407.

³⁸ James William Boyd. "Financial Responsibility for Environmental Obligations: Are Bonding and Assurance Rules Fulfilling Their Promise?" *Resources for the Future*, 2001. <https://ssrn.com/abstract=286914>.

³⁹ Santiago J. Dondo. *Financial Assurance for Mine Closure: A Regulatory Perspective from the Argentine Context*, Centre for Social Responsibility in Mining (Sustainable Minerals Institute, The University of Queensland, Australia, 2014) <https://www>.

regulation is therefore important to manage this pervasive challenge.

The ongoing extraction of mineral resources in Kenya is expected to lead to significant environmental disturbances. During the exploration and development phases of the mining activities, physical disturbances of ecosystems through clearing of vegetation and construction of structures leads to soil erosion, chemical contamination of surface and ground water, non-chemical contaminants, mineral leaching (acid drainage) and other land-use disruptions⁴⁰. The question then arises, as to the kind of environmental reclamation, rehabilitation, remediation and restoration needs of these disturbed areas⁴¹ and how much these would cost to the regulator(s) at the eventual departure of the investors. The instruments available to redress these problems in Kenya are majorly command and control instruments and are generally acknowledged to be expensive as they require regular supervision, are time consuming, and often prone to misuse by the authorities charged with enforcement actions. In addition, they are inhibitive to internal research and development by the would-be-polluters since the burden of proof for environmental degradation lies elsewhere, with the regulatory bodies.

The greatest challenge in using command-and-control instruments alone is the fact that they cannot avail the required financing for long-term environmental management since they mostly rely on the constrained public finance system and the over-burdened judicial system. For the mining industry, the amounts of resources dedicated by the public finance system through the budgetary system by most governments is often too modest and incomparable to the huge resources applied by the mining companies, and especially the costs associated with effective mine closure. Kenya's situation is further complicated by entrenched private sector interests that even culminated in an executive order

csrm.uq.edu.au/media/docs/637/Occasional%20P%20Series-%20rtf%20-%20Santiago%20(2014).2.pdf.

⁴⁰ Robert Kibugi, and Kameri Mbote et al, *Mineral Resources and the Mining Industry in Kenya, Environmental Governance in Kenya: Implementing the Framework Law* (East African Publishers, Nairobi, 2008)

⁴¹ Miller C. George. "Use of Financial Surety for Environmental Purposes." A Study for the International Council on Metals and the Environment, ICME, 1998. <http://www.icmm.com/document/65>.

that waived payment of Environmental Impact Assessment (EIA) fees, implying that environmental management is now fully funded through the dwindling and erratic budgetary allocations to the regulator⁴². In essence, the mining companies are left off-the hook after mine closure, while the government is left to finance the mandatory cleanup and restoration obligations at mine closure. With tightening fiscal space as well as competing demands on the government's budgets, the environment is left unattended with dire consequences as the mining companies waltz off to their next mine expedition.

3. METHODOLOGY

To establish the importance and need for sustainable finance to ensure sound environmental outcomes in upstream mining using Environmental Performance Deposit Bonds, this study applied key informant interviews, questionnaires, focus group discussions and literature review. A set of research questions covering environmental deposit bond management and bond features were administered to key informants through a structured interview. In addition, content analysis of the environmental deposit bonds for the extractive resources as stipulated in the various legal and regulatory instruments such as Environmental Management and Coordination Act (EMCA) Cap 387 of the Laws of Kenya. The review also analyzed how performance deposit bonds have been framed in other jurisdictions, and how this compares to Kenya's evolving deposit bond regulatory framework.

4. RESULTS AND DISCUSSION

3.1 Environmental Management Principles Governing Mining in Kenya

Kenya is striving to integrate environmental protection across all the mining stages. This is through an environmental management edifice anchored on a synergetic interplay of both command-and-

⁴² G. Omedo, Muigua, K., & Mulwa, R. "Financing Environmental Management in Kenya's Extractive Industry: The Place of the Polluter Pays Principle (2020) 16 (1) Law Env't & Dev. J.

control (CaC) and economic incentive tools within the law. Enforcement of these regulations is expected to mostly start during the official licensing stages. According to the country's environmental laws, mineral exploration is expected to be undertaken in a manner that causes minimal interruptions to the environment. Environmental Impact Assessments (EIA), including social assessments are expected to be undertaken before award of the exploration license. This is equally important for the other stages including the feasibility, development, construction, production and the final closure stages. After closure, the post-closure management reverts to the national and county governments.

To avert negative environmental impacts during the mining stages, Environmental Management Plans (EMPs) are integrated alongside the key documents during the official licensing stages. Annual Environmental Audits are also expected to be done to confirm compliance with the EMPs. The environmental regulator reserves the right to undertake inspections and monitoring at the mining facility at any time, even without notice. The bulk of the environmental protection activities during the development stages occurs with great levels of supervision by the regulatory authorities. The Environmental Audits that are undertaken annually avail much needed assurance that firms are complying with their EMPs. The challenges escalate during the final stages of the mining process when the mineral deposits have been exhausted.

During mine decommissioning, the key mining equipment, machineries, site offices and infrastructure have to be removed. Efforts to restore the mined environment to its original or even better status then commence. The complexities involved in mine decommissioning require that substantial financial resources are available to ensure effective environmental reclamation⁴³, restoration⁴⁴ and remediation⁴⁵. The question then

⁴³ Geoffrey Omedo, "Action That Tackles Site as Human-Service Provision, Either by Making Use of the Mined Area for Agricultural Related Activities, Targeting the Production of e.g. Food, or for Developing Infrastructures in Which the Endpoint Would Be Either Green-Spaces (Such as Parks) or the Built-Environment."

⁴⁴ Ibid.

⁴⁵ Ibid.

arises, as to the kind of environmental reclamation, rehabilitation and restoration needs of these disturbed areas, the dismantling and demolition of infrastructure and the removal of any residual materials⁴⁶and how much these would cost to the regulator(s) at the eventual departure of the investors. Once the mineral deposits have been exhausted, the investors are often in a hurry to move to new fields for mining, and the propensity to shirk on their environmental management plans is quite high. This is the likely scenario facing Base Titanium’s Kwale Mineral Sands Project, as mine closure commenced in 2021.

3.2 The Case of Base Titanium and Performance Deposit Bonds in Kenya

Kenya’s titanium mining project located in Msambweni District in Kwale County is without doubt the largest mining expedition in the country since independence.⁴⁷ The project was first unveiled in 1997 when Tiomin Resources, an Australian Mining Company was first issued with the Special Prospecting License (SPL 173) in 1997⁴⁸. The SPL was subsequently re-assigned to its newly registered Kenyan subsidiary Base Titanium in July 2010. Base Titanium officially commenced operations in 2013⁴⁹, culminating in completion of aerial survey in June 2015 which identified areas with significant deposits of titanium. The company then undertook ground-truthing and applied for a variation and renewal application of the Special Prospecting License, that was eventually received on 26th May 2016. Armed with a valid license and as a condition for commencement of works, Base Titanium undertook an Environmental and Social Impact Assessment (ESIA) for its exploratory ventures, which detailed a comprehensive environmental rehabilitation and restoration plans⁵⁰⁵¹. The project site for the mining operational covers two large dunes, that are divided by River Mukurumudzi,

⁴⁶ Miller C. George (n. 41).

⁴⁷ Base Titanium, “Overview”, www.basetitanium.com, accessed 12 January, 2022.

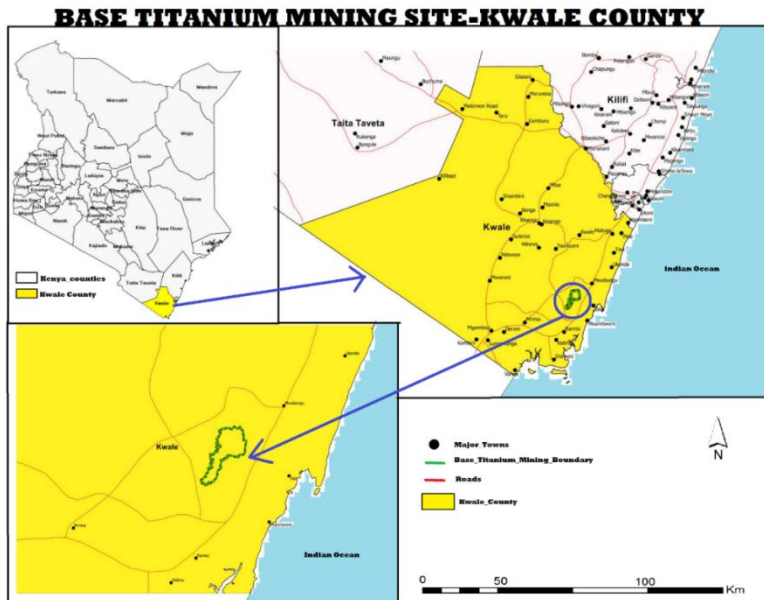
⁴⁸ Base Titanium, “Environmental Audit Report, 2017”, www.basetitanium.com, accessed 12 January, 2022.

⁴⁹ Ibid

⁵⁰ Base Titanium Limited, “Kwale Mineral Sands Project Environmental And Social Impact Assessment Report .”

⁵¹ Republic of Kenya, “Section 72 (3) (c), Mining Regulation Act.”

a permanent river that provides water to the downstream communities as it glides towards the Indian Ocean.⁵²



The Kwale Mineral Sands produces three critical mineral resources, the Ilmenite (titanium-iron oxide) used in the production of paint and pigment; Rutile (titanium oxide) used in the industrial production of pigment, titanium sponge and metal; and Zircon (zirconium silicate) used in the manufacture of ceramics.⁵³ The plant has five key facilities consisting of the mining area, the processing plant (with the wet concentration plant and the mineral separation plant); the tailings separation plant; the product storage and the general office area.⁵⁴ The entire operation is quite heavy, involving significant earth movement to clear vegetation in the sections to be mined; collecting moved soil at a strategic place for subsequent use in mine rehabilitation; mining process applying two technologies (the dozer technology and the hydraulic technology); and using water to prepare thick slurry consisting of the high mineral concentrate for

⁵² Base Titanium, "Base Titanium - Biodiversity Corridor." www.basetitanium.com, accessed 12 January 2022.

⁵³ Base Titanium, "Kwale Mineral Sands Operations." www.basetitanium.com.

⁵⁴ *ibid*

further processing in the plant. According to expert respondent at Base Titanium⁵⁵, the entire mineral processing does not use any chemicals, but only applies gravity, magnetic and electrostatic separation to obtain the three key minerals (rutile, ilmenite and zircon).⁵⁶

In preparation for closure and reclamation of the mine area, Base Titanium has established an indigenous trees species and grass regeneration program, which is currently boasting over 100 species of plants and grasses. The trees and shrubs are being progressively used in the gradual rehabilitation program that has been commenced in sections of the mining area where mineral resources have been exhausted⁵⁷.



Figure 1: The Tailings Storage Facility Undergoing Progressive Reclamation
Source: Study Findings, 2020

⁵⁵ Geoffrey Omedo, "Interview with Dr. Georgina Jones, Base Titanium," 2018.

⁵⁶ Base Titanium, "Kwale Mineral Sands Operations." www.baseresources.com.au, accessed 12 January, 2022.

⁵⁷ Base Titanium, "Base Titanium - Biodiversity Corridor." www.baseresources.com.au, 12 January 2022.

The company has also begun additional exploratory drilling programmes in areas adjacent to the current mine area, which is likely to extend its Special Mining Lease from 2023 onwards. The company recently undertook airborne geophysical and radiometric survey, which identified additional areas with great mineral deposit potential. This was incorporated in a fresh license application from the Government of Kenya⁵⁸. The company's exploratory drilling expedition in two of the areas (Magaoni and Muhaka) has however hit some turbulence with sustained political resistance, as local communities demand for more compensation⁵⁹, even as new land speculators dig in for a long duel with the company over relocation and resettlement to pave way for the mining exercise⁶⁰.

When the current mineral reserves are exhausted, the company will have to cease operations in their current mining base. The mine infrastructure will be decommissioned with focus shifting to environmental reclamation, remediation and/or restoration. The company has been voluntarily depositing some cash deposits to the environmental regulator (NEMA) as an environmental performance deposit bond. This is a good practice, which no other company engaged in active mine exploration or extraction in Kenya has ever done, although the law required for this as a sustainable financing mechanism for environmental restoration fund established by EMCA 1998. It is noteworthy to add here that the company has been setting these bonds, even before the coming into effect of a specific set of regulations that have been mooted to guide the operationalization of Section 28 of EMCA 1998. This is through the Environmental Management Coordination (Performance Deposit Bonds) Regulations 2014, that are still awaiting formal endorsement by the Ministry of

⁵⁸ This new license application is mired in controversies, as local politicians and the county government of Kwale continue to offer sustained resistance to the plans by the national government to award the license to Base Titanium. While this mining operation is quite strategic to Kenya's national mining development plans, the unresolved questions around benefit sharing of mineral revenues and unclear governance schemes around mineral rights awards between the national level governments and the local level governments continues to simmer below the veneer disguised as community discontent or environmental considerations.

⁵⁹ Geoffrey Omedo, "Focus Group Discussion in Kwale"

⁶⁰ Kayumba Angelani, "Challenges and Prospects of Equitable Benefit Sharing in Mining Sector: A Case Study of Titanium Mining in Kwale County, Kenya."

Finance. To date, Base Titanium has cumulatively deposited a total of 53 Million Kenya shillings equivalent to 527,267 USD to the regulator. In discussion with the company, it was reported that the company would have continued making more deposits but was requested by the regulator to await the promulgation of the requisite regulations to govern these deposits⁶¹.

There are questions, as to how these funds are eventually going to be released or utilized for environmental reclamation, should the regulator deem Base Titanium's reclamation and restoration efforts to be either adequate or inadequate, given the lack of deposit registry standards. Questions also abound whether the funds deposited to date (USD 527, 267), are sufficient for mine reclamation, and what methodology was utilized by the company to determine the amount that were advanced to the regulator as financial assurance for environmental reclamation. Without adequate reclamation standards, and with little capacity in undertaking deposit bond assessments, in an environment with a clear regulatory lacuna and countless ambiguities, the environment and communities are likely to be exposed when the Kwale Mineral Sands mines eventually close in a year⁶². According to their Mine Closure Plan deposited with the Ministry of Mining and NEMA, one year will be used to dismantle the mine. Three years will thereafter be required to restore vegetation, while constant environmental monitoring will still be expected on site. It is still acknowledged that rehabilitation will pose a challenge, as there are already competing interests on the expected land-use (post-closure), mining infrastructure, as the devolved and national government, regulators and local communities will want to exercise control over these during the mine closure⁶³.

3.3 Entrenching Performance Deposit Bonds in Kenya's Law

The drafters of Kenya's principal environmental framework law, the EMCA 1998 (Amended 2015) were very visionary and progressive. They bequeathed to Kenya a robust piece of legislation, that even anticipated the role and place of deposit bonds as a means of achieving sustainable finance for

⁶¹ Geoffrey Omedo, "Interview with Dr. Georgina Jones, Base Titanium," 2018.

⁶² Geoffrey Omedo, "Expert Focus Group Discussion in Kwale."

⁶³ Geoffrey Omedo, "Focus Group Discussion in Kwale."

environmental management. This is why Section 32 of the EMCA noted that performance deposit bonds would provide the critical sources of finance for the National Environmental Restoration Fund⁶⁴. It defined the deposit bonds as environmental management financial assurance schemes, meant to provide an economic dis-incentive for firms wilfully failing to adhere to best available practices in environmental management. The Act directed that refundable deposits, set by the Cabinet Secretary in charge of Finance be paid into a Restoration Fund, to be treated as such until the same are refunded to the compliant entities. To provide some clarity on the means of realizing the bonds, Section 28 requires the National Environment Management Authority to “....create a register of those activities and industrial plants and undertakings which have or are most likely to have significant adverse effects on the environment when operated in a manner that is not in conformity with good environmental practices...”.

Clearly, the fact that over 22 years later, none of the means to realizing these legal requirements exists suggests challenges in institutionalizing the performance deposit bonds in the country. The sad reality is that currently, no deposit bonds registry exists, no deposit bond amounts have been set in the law, and there is little if any, demonstrated capacity and public awareness on this important environmental assurance scheme in place. It is an indictment on the laxity with which the various actors have taken the subject of innovative finance, even as a plethora of production, exploration and extraction activities continue to rely on dwindling public finance for environmental management. Kenya’s deposit bond regulatory instruments have also been bedeviled by some regulatory complexities that will make their effective application for environmental management difficult to achieve⁶⁵. The eight complexities that are currently impacting on Kenya’s EPDBs regulation are captured in Table 1 below.

⁶⁴ Republic of Kenya, “Amended section 32, EMCA of 2015,” 1998.

⁶⁵ Omedo, Geoffrey and Muigua, Kariuki and Mulwa, Richard, “Sustainable Finance in Kenya: Regulating the Environmental Performance Deposit Bonds.”

Table 1: The Eight Complexities of Regulating Deposit Bonds

Complexity	Kenya’s Regulatory Frameworks Regulatory Framework
1. Time Value of Deposited Bonds	Interests on deposit bonds to accrue to the regulator (EMCA), introducing the moral hazard dilemma.
2. Scope of Environmental Deposit Bonds	Kenya’s EPDB’s only covers environmental reclamation, completely locking out social impacts.
3. Binding Instrument: Cash or Financial Instrument	Regulation specifically requires cash deposit, completely locking out the insurance and financial bonding instruments.
4. Deposit Bond Size and Amounts	Not clear on how to compute the correct amount of the bond, but “ <i>may constitute appropriate security for good environmental practice</i> ” – summation of reclamation steps or percentage of project costs.
5. Terms of Payment	Bond should be paid before Licensing process, and release of bond amounts after completion of mining process, but Kenya’s bond regulations not clear.
6. Liability Period	Draft Bonds regulation has 24 months for application of release of bonds by developer, while the legislation (EMCA) has 6 months, implying a conflict that needs to be corrected.
7. Public Participation	Public participation should be key before release of deposited funds, but provisions for this lacking.
8. Review of Bonds	Regulator can increase or reduce the bond after review of compliance by the developer, without proper guidelines to avoid abuse.

Source: Field Survey, 2018

5. ENVIRONMENTAL AND SOCIAL IMPACTS AROUND THE MINERAL SANDS PROJECT

Large scale mining operations of Base Titanium’s magnitude are known to contribute significant environmental and social impacts that often require strict government regulatory action to enforce in the public interest. An assessment of the mining operation by Base Titanium demonstrates numerous potential challenges to the environment as well as the social fabric in the otherwise pristine ecosystems along the Kenyan coastal area. Some of the observed challenges includes heavy earth movements that is drastically impacting on the land topography, with huge stockpiles of earth

soil, large clearings of land for mining and construction of the plant infrastructure, exposed open shallow and deep pits, and a huge tailings dam storage facility. All these have the potential to contribute to acid mine drainage, complete changes to the terrain that could lead to permanent diversions of rivers and streams.⁶⁶ Soil contamination is also another challenge that can manifest through this heavy mine operation which could lead to permanent distortion of the soil structure and quality.⁶⁷

From observations and interviews with local communities and key informant individuals, the area where the largest impact was likely to be observed in the region is in water management. The operation is quite water intensive, as the entire operation relies heavily on permanent water flow. There are potentially significant challenges likely to occur to the water courses in the site areas (*surface and groundwater*). Base Titanium derives their water from a man-made dam constructed on River Mukurumudzi as the main water expert respondents are quite insistent that some element of chemical use in the mining process has the likely impact of leaking and contaminating water sources. This can even occur during servicing of the plant, where discharge of chemicals is rife. In addition, any failure within the tailing's storage facility would portend serious ramifications to the water resources in the area, as all wastewater is treated here before being discharged to the River Mukurumudzi. The damming of this river was also reported by the local communities as impacting on their livelihood due to reduced water access and fishing opportunities to the communities living downstream the mine area.⁶⁸

Expert respondents also noted that unsustainable ground water extraction is also known to impact negatively on the water table, making it harder for local communities to have access to ground water. The combination of tailings storage dam, especially where

⁶⁶ Base Titanium, "Base Titanium Ltd Environment and Social Impact Assessment Summary Report (2012)."

⁶⁷ Abuodha, J. O. Z., and Patrick O. Hayombe, "Protracted Environmental Issues on a Proposed Titanium Minerals Development in Kenya's South Coast."

⁶⁸ J. O. Z. Abuodha, and Patrick O. Hayombe. "Protracted Environmental Issues on a Proposed Titanium Minerals Development in Kenya's South Coast." (2006) 24 (2) *Marine Georesources and Geotechnology* 63–75.

chemical use is rife in the extraction process has the likely impact of leading to hazardous substances that can portend grave impacts to flora and fauna, sometimes for a very long period. Even worse are acid mine drainage and introduction of carcinogenic matter into the water systems, which would manifest in long-term health impacts to the communities and this ecosystem. In terms of the most frequent health challenges reported by the local communities, respiratory ailments were quite high, implying that fears of negative potential impacts associated with air pollution, nuisance such as vibrations, traffic and dust remained an area of concern. Generally, the fear of biodiversity changes (some permanent, and which can lead to extinction of some indigenous endangered species) and introduction of invasive species within the area under the titanium mining or adjacent ecosystems is a concern that continues to fester among most of the respondents interviewed in this study.⁶⁹

All these environmental threats including the potential tailing dams collapse, acid mine drainage, chemicals leakage, ground water pollution, unsustainable abstraction, biodiversity stress among many others observed in this project all require robust environmental management plans that infuses strong command-and-control (inspection, enforcement, and compliance by regulatory officers), as well as a robust economic incentive regime. The fact that the environmental regulator NEMA receives insufficient budgetary allocations⁷⁰, with only around 500 staff undertaking enforcement and compliance functions across the whole country implies a weak capacity to ensure proper environmental management⁷¹. The lack of sufficient technical capacity within the regulatory institutions to properly ensure effective mine closure and post-mine closure⁷² is another key challenge that necessitates the need for robust financial provisioning instruments, to ensure the mining companies invest not just in end-of-pipe solutions but institutionalize a culture of

⁶⁹ Ibid

⁷⁰ Geoffrey Omedo, "Focus Group Discussion with EGP Project Technical Committee."

⁷¹ Geoffrey Omedo, "Interview with Mr Edward Wabwoto - NEMA, Environmental Impact Assessments."

⁷² "Geoffrey Omedo, Interviews with Mr. Peter Odhengo, Mr. Obadia Mungai, Ms. Faith Pesa, Mr. Reagan Awino."

good environmental management across the entire value chains. The risk of forfeiture of the deposited funds by the companies is expected to send strong price signals to the decision makers in the companies, and encourage them to undertake proper mine closure, cleanups, reclamation, rehabilitation, restoration, and remediation. This is the case observed in the Kwale Mineral Sands Project where Base Titanium has been undertaking progressive reclamation and restoration of the mined areas, to ostensibly recover their reclamation funds deposited with the regulator at the start of the mining operations⁷³.

6. ANALYZING BASE TITANIUM'S ENVIRONMENTAL MANAGEMENT PLANS

For these reasons, it is critical for such mining operations to inculcate international best practices in environmental management⁷⁴, even when the local legal and regulatory frameworks are weak or non-existent. Consequently, the operations at the Kwale Mineral Sands Project require strict adherence to environmental management best practices, some of which have been enshrined in Kenya's law. To drive this, it requires a deliberate focus and environmental stewardship by the top echelons of the company to good environmental practices, even where regulatory vacuums and weak inspection and enforcement are rife. Otherwise, the fragile ecosystems around the mine area, would be exposed to permanent damage, which would visit catastrophic consequences to the flora and fauna in this region.

⁷³ Geoffrey Omedo, "Interview with Dr. Georgina Jones, Base Titanium," 2018.

⁷⁴ Robert Sroufe and others. "Environmental Management Practices." (2002) 40 Greener Management International10.9774/GLEAF.3062.2002.wi.00004

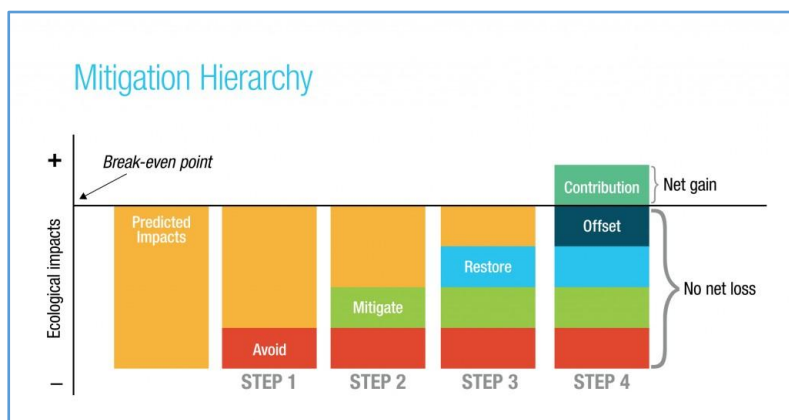


Figure 2: Base Titanium's Mitigation Hierarchy Framework
 Source: Field Survey, 2018

A careful analysis of the Base Titanium’s Environmental and Social Impact Assessment 2014,⁷⁵ and the annual Environmental Audits undertaken in 2015,⁷⁶ 2016,⁷⁷ 2017⁷⁸ and 2018⁷⁹ demonstrates that the company has invested heavily in environmental management across its entire operational systems. It specifically utilizes the Mitigation Hierarchy Framework⁸⁰ (*avoidance, minimization, rehabilitation/restoration and offset*⁸¹) to manage risks and potential impacts envisaged from its entire mining cycle. Base Titanium has integrated environmental management plans into all aspects of its mining operations. The company observes the provisions of the EMCA (Amended) Act 2015⁸² and its EIA regulations 2003⁸³, EIA (Amendment Regulations), 2009⁸⁴; Air Quality Regulations, 2006;⁸⁵ Water

⁷⁵ “Base Titanium, Environmental Audit, 2015.”

⁷⁶ “Base Titanium, Environmental Audit Report, 2016.”

⁷⁷ “Base Titanium, Environmental Audit Report, 2017.”

⁷⁸ Base Titanium, “Base Resources Limited Annual Report 2017.”

⁷⁹ NEMA, Kenya, “Environmental Audit Report, 2018.”

⁸⁰ Base Titanium, “Base Titanium Ltd Environment and Social Impact Assessment Summary Report (2012).”

⁸¹ William N S Arlidge and others. “A Global Mitigation Hierarchy for Nature Conservation” 2018.

⁸² Government Printer, Nairobi, “Environmental Management and Co-Ordination (Amendment) Act, No. 5 of 2015, Laws of Kenya.”

⁸³ Republic of Kenya, “Environmental (Impact Assessment and Audit) Regulations, (2003).”

⁸⁴ Republic of Kenya, “The Environmental (Impact, Audit and Strategic Assessment) Regulations.”

Quality Regulations, 2006⁸⁶; Waste management Regulations, 2006⁸⁷; the Wetlands, River Banks, Lake Shores and Sea Shore Management Regulations, 2009⁸⁸; and the Noise and Excessive Vibration Pollution Regulations, 2009⁸⁹.

Table 2: Mitigation Hierarchy Framework in Base Titanium's Reclamation Strategy

Mitigation Hierarchy Framework Principles	
A. Avoidance	Some of the sensitive ecological sites in the mining site have been preserved, as well as some cultural trees, shrubs, riverbanks and hills.
B. Minimization	Technologies applied minimize chemical use, as well as some deliberate efforts to minimize environmental impacts through regular monitoring, dust management, local community integration in the environmental management and other examples
C. Rehabilitation/Restoration	Tree and grass species have been transferred from mine areas and preserved within a robust nursery, and to be used in rehabilitation/restoration
D. Offset	Base Titanium has deposited some 527,000 USD with NEMA as deposit bond for good environmental practices

Source: Field Survey, 2018

The Mitigation Hierarchy Framework is hinged on Kenya's rubric of environmental management laws, regulations and policies, as well as global best practice to realize the offset pillar. The Table below shows all environmental management related licenses and permit authorizations that Base Titanium has obtained for the Kwale Mineral Sands project.

⁸⁵ Government of Kenya, "The Environmental Management and Co-Ordination (Air Quality) Regulation."

⁸⁶ "Environmental Management and Coordination (Water Quality) Regulations, (Cap. 387)," 121.

⁸⁷ Republic of Kenya, "Legislative Supplement No. 37, Waste Management Regulations."

⁸⁸ Republic of Kenya, "Legal Notice No. 3, Wetlands, Riverbanks, Lake Shores and Sea Shore Management Regulations."

⁸⁹ Government of Kenya, "Noise and Excessive Vibration Pollution Regulations."

Table 3: Base Titanium's Compliance with Regulatory Environmental Standards

License and Legal Register required	License Number	Date Issued	Date of Expiry	Entity
Special Mining Lease	SML No. 023	06/07/2004	06/07/2025	Ministry of Mining
EIA License	NEMA/EIA/5/001	25/07/2008		NEMA
Effluent Discharge License	NEMA/WQ/ED L/ 3458	13/06/2017	12/06/2018	NEMA
TSF Settlement Ponds A	WARMA/30/MS A/3K/10836	16/09/2014	15/09/2019	WARMA
TSF Settlement Ponds B	WARMA/30/MS A/3K/10837	16/09/2014	15/09/2019	WARMA
TSF Settlement Ponds C	WARMA/30/MS A/3K/10838	16/09/2014	15/09/2019	WARMA
WARMA Groundwater Abstraction Permit	BH1/WRA/66/MSA/3K/10564 /G	17/01/2014	17/12/2018	WARMA
	BH3/WRA/30/MSA/3K/10564 /G	17/01/2014	17/12/2018	WARMA
	BH6/WRA/66/MSA/3K/10229 /G	02/03/2011	17/12/2018	WARMA
	BH7/WRA/66/MSA/3K/10472 /G	28/02/2014	26/02/2018	WARMA
WARMA Surface Water Abstraction Permit (Mukurumudzi Dam)	WARMA/30/MS A/3K/10084/S	03/03/2014	28/02/2019	WARMA
Mukurumudzi Dam Statutory Inspection		08/2017	08/2018	WARMA
Air Emissions License				NEMA
Radiation permit	RCA/COA/122	11/08/2017	30/06/2018	DOSH
Rehabilitation Bond	NEMA / EIA / 5 / 2 / 001	25/07/2008		NEMA

Source: Field Survey, 2018

Interviews with government staff working for regulator institutions seem to confirm the position by Base Titanium.

Government respondents paid glowing tribute to how environmental management was being undertaken by Base Titanium in the project.⁹⁰ The successive Environmental Audits demonstrate a compliance to the environmental management plan, and sustained engagement with the local communities living around the mine area. The company undertakes several regular environmental monitoring of key standards, highlighted in the Table below.

Table 4: Environmental Monitoring Plan for the Base Titanium

Monitoring Programmes	Frequency
Meteorological Monitoring	Daily
Water resources Monitoring (Surface Water Flow; Surface Water Quality; Groundwater Level; Groundwater Quality; Saltwater Intrusion)	Weekly
Wastewater and Storm water	Regularly
Ecological Monitoring (Vegetation; Herpetofaunal; Macro-invertebrate)	Monthly
Air Quality	Weekly
Radiation	Weekly
Noise	Weekly
Waste	Regularly
Rehabilitation	Quarterly

Source: Field Survey, 2018

The findings from the two FGD’s conducted in the area neighboring the project was however contrary to the picture painted by the management and the government regulators. The local community representatives detailed some key challenges that have been witnessed in their areas since the commencement of the Kwale Mineral Sands project.⁹¹ The communities reported that damming upstream cut-off River Mukurumudzi from supplying fresh water to the mangroves at the ocean confluence leading to drastic mangrove forest degradation; as well as decline in the fish species that used to breed in the mangroves.⁹² They also reported rising cases of bleaching and death of the corals, a factor they associated with some form of unknown chemical pollutants which they wanted further analysis by an independent actor.⁹³ In terms

⁹⁰ Geoffrey Omedo, “Interview with Mr. Zephaniah Ouma on Environmental Impact Assessments.”

⁹¹ Geoffrey Omedo, “Focus Group Discussion in Kwale.”

⁹² Geoffrey Omedo, “Focus Group Discussion in Kwale.”

⁹³ Ibid

of livelihood impacts, members of the community noted that rice farming had been abandoned because of reduced flooding of the river associated with damming upstream and increased human wildlife conflicts since some wild animals especially monkeys and baboons are moving closer to homes because of forest clearing leading to crop destruction⁹⁴. Although effluent discharge data suggested little effluent discharge into the River Mukurumudzi, communities still reported discharge of wastes into the river, as well as incidences of high air pollution (dust) as a direct result from the mine.

The environmental management team at Base Titanium however associated to increased dust to normal weather conditions, especially during the dry seasons. Another key impact that was reported by the community members in the FGD's and interviews was the observed lowering of the ground water table as a result of the massive boreholes that had been sunk in the area to provide the huge water needs of the Mineral Sands project. It is instructive to note here that Base Titanium has four boreholes in the area, to supplement the water that is sourced from the dam on Mukurumudzi River. Efforts to recycle the water for use within the operations ameliorate the huge water demand for the mineral processing plant. Other reported challenges by the community respondents are reduced biodiversity richness due to changes in land use; and regular and sustained noise pollution due to heavy machinery.

⁹⁴ Ibid

Table 5: Environmental Management Community Proposals& Feedback

Community Proposals on Environmental Management	Feedback from Base Titanium & EIA/EA
Base Titanium should use the borehole water for their operations and allow the River Mukurumudzi to continue flow as it used to before the mining started;	The operation is water heavy but more than half of the use is from recycled water. Extraction within the water permits by WARMA. In 2018, total abstraction from Mukurumudzi River was 4,451,776m ³ , 1,226,172m ³ from the three boreholes, 8,828, 772m ³ recycled implying 61% use of recycled water.
The company should strive to make minimal disturbance of the environment;	Mine Reclamation and Restoration ongoing, as per Mine Closure Plan and the ESIA. Indigenous tree species stored for use in restoration.
Adequately compensate communities for the losses associated with their extraction process;	Compensation was done for the land, as guided by the National Land Commission.
The company should stop direct effluent discharge of waste into river/stream	No direct effluent discharge in the rivers.
They should control dust emissions;	Dust control measures are adequate and have never gone beyond the 600mg/m ² . Shrub planting exercise ongoing at the Tailing Storage Facility as a sustainable measure
Harvest rainwater for use in the mines;	Surface run-off into Mukurumudzi Dam and the Tailing Storage Facility lead to less abstraction from boreholes in 207 & 2018
They should organize regular medical checks for possible impacts of mining on human health in the region;	Medical checks done as CSR. No chemical use in entire operation and radiation levels below the 5mSV/annum
Rehabilitation should be gradual but involve community members;	Community represented on the Environmental Monitoring Committee.

Source: Field Survey, 2018

7. ENVIRONMENTAL CONCERNS AND POTENTIAL USE OF REHABILITATION BONDS

Uncertainties and risks are a permanent feature of extractive processes, especially of the magnitude and nature of the Base Titanium operations in Kwale. While the company is deriving huge titanium minerals from the area, with a reported realization

of Rutile design target of 97% translating to over 80,000 tonnes per annum in 2016, 87,00 tonnes per annum in 2017 and a high of 92,000 tonnes per annum in 2017⁹⁵; over 100% design targets being constantly reached for Ilmenite at above 470,000 tonnes per year⁹⁶; with Zircon production growing from 34,977 tonnes per annum in 2016⁹⁷, to 35,292 tonnes per annum in 2017⁹⁸, well over the 78% design target rate, it is clear that the ongoing mining operation is profitable beyond expectations.⁹⁹

Global literature on the management of such mines indicates that the huge profits that are being derived now should be utilized sustainably, and that all efforts should be used to protect the environment, by setting aside enough resources for rehabilitation and restoration of the project site area. The decision by Base Titanium to provide environmental performance deposit bonds of USD 527,000 to the government of Kenya should be lauded. However, the resources may not be adequate to deal with environmental rehabilitation, especially if the major environmental concerns are considered. The cost of reclamation, rehabilitation and restoration are normally very high, and they are to be provided by the government, sometimes long after the mining operations have ended.¹⁰⁰ There are some eight fundamental regulatory complexities that may hinder effective use of the performance deposit bonds in the management of mining impacts from this project, as summarized below: the legal scope of the bonds and whether the bonds are to be promoted as mandatory tools or good practice measures¹⁰¹; ambiguities on how to set appropriate bond amounts¹⁰², and whether the deposited bonds are to be in hard currency (cash) or utilize other non-cash financial assurance tools¹⁰³. The other questions relate to

⁹⁵ Geoffrey Omedo, "Key Informant Interviews, July 2018."

⁹⁶ "Base Titanium, Environmental Audit Report, 2017."

⁹⁷ Ibid

⁹⁸ Ibid

⁹⁹ Geoffrey Omedo, "Key Informant Interviews Kwale Environmental Officer (Performance Bonds 2018)."

¹⁰⁰ Ibid

¹⁰¹ "Financial Surety on EPDBs."

¹⁰² Judson Boomhower. "Drilling Like There's No Tomorrow: Bankruptcy, Insurance and Environmental Risk." (2019) 109 (2) American Economic Review 391-426. <https://doi.org/10.1257/aer.20160346>.

¹⁰³ Republic of Kenya, "Section 2, EMCA No 25 of 2015."

the role and place of public participation in the administration of the deposit bonds, especially if deposited bonds can be utilized to remedy social impacts¹⁰⁴. Other regulatory complexities are on the terms of payment of the bonds, and whether they are required upfront at the official licensing stage or whether subsequent incremental deposits of the bonds can be availed during the development process¹⁰⁵. It is also not clear whether the bond amounts can be reviewed upwards or downwards, as a result of the observed environmental impacts of upstream mining, and whether this would effectively incentivize internalization of externalities, and whether the requisite capacity within the regulatory bodies would effectively discharge this function. The greatest grey area in the deposit bond regulation is the question of liability period, especially after the closure of the development process¹⁰⁶. How long would the deposit bonds be held after mine closure before the funds are released back to the investor remains as a key gap in Kenya's regulatory sphere. If left unclarified in the law, it implies that deposit bonds can be held by the regulatory bodies in perpetuity, weakening the role and place of the environmental deposit bonds as economic incentives, aimed to encourage the adoption of good environmental practices through price signals, and not just the punitive command and control.

Even as the regulatory gaps above remain to be resolved, the reality is that Base Titanium is moving fast to complete mining in the current blocks by the 2023 deadline.

¹⁰⁴ Sara Aghakazemjourabbaf, Margaret Insley. "Leaving Your Tailings behind: Environmental Bonds, Bankruptcy and Waste Cleanup" (2021) 65 Resource and Energy Economics <https://doi.org/10.1016/j.reseneeco.2021.101246>.

¹⁰⁵ L. W. Davis, "Policy Monitor: Bonding Requirements for US Natural Gas Producers" (2015) 9 (1) Review on Environmental Economic Policy 128–44.

¹⁰⁶ J. Zhou, "Beyond Liability: An Analysis of Financial Responsibility and Care Decisions in Hazardous Waste Management Facilities" (University of Maryland, Department of Agricultural and Resource Economics, 2014)

The company has commenced progressive reclamation of the mined areas, especially the tailings facility¹⁰⁷. The company attempted to initiate release of a part of the USD 512,000 USD deposited as reclamation bonds¹⁰⁸, but due to the regulatory uncertainty caused by the long awaited gazettelement of the Draft Environmental Management Coordination (Performance Deposit Bonds) Regulations 2014¹⁰⁹, it remains unclear how and when the funds will be released. Meanwhile, the table below shows some of the major long-term concerns associated with such mining activity, which require significant financial resources for proper environmental management.¹¹⁰

Table 6: Major Environmental Concerns for Mining Projects

Major Environmental Concerns for Mining Projects	Concerns	Base Titanium Management Approach
Large Tailing Storage facilities management	Such tailing dams are permanent in nature, and have very high failure rate and release long-term	Tailing Storage Facility being reinforced with grasses and shrubs
Challenges associated with damming water courses for mine actions	Diversion of water courses, reduced water or flooding challenges for downstream communities	The Mukurumudzi Dam allows for over-flow of excess water downstream
Challenge of permanent ecosystem change and biodiversity loss	Loss of biodiversity	The Kwale Mine Restoration Programme Indigenous tree Nursery with over 100,000 trees clustered as Critically Endangered; Endangered; Vulnerable; Potentially Threatened; near Threatened; Least concern (See Picture 3 & 4)
Seepage of toxic chemicals and hazardous wastes into water streams and into the soil	Pollution of water sources, with significant impact on health of flora and fauna	Assertion that no-chemical is used in the entire mining cycle at the Kwale Mineral Sands project

Source: Field Survey, 2018

¹⁰⁷ Geoffrey Omedo, "Interview with Dr. Georgina Jones, Base Titanium," 2018.

¹⁰⁸ Geoffrey Omedo, "Interview with Mr. Zephaniah Ouma on Environmental Impact Assessments."

¹⁰⁹ Republic of Kenya, "Section 2, of the Draft Environmental Management and Coordination (Deposit Bonds) Regulations, Defines Environmental Performance Deposit Bonds as Economic Instruments Where Advance Payments Are Made to the Respective Regulating Authority before a Potentially Environmentally Damaging Activity Is Undertaken, Mostly during the Official Licensing Procedures."

¹¹⁰ Ibid

8. BASE TITANIUM: VOLUNTARY PERFORMANCE DEPOSIT BOND PAYMENTS?

A deeper investigation into the decision by Base Titanium to voluntarily make deposits to a tune of USD 527,000 to the regulator (NEMA) reveals an interesting message¹¹¹. For now, before the regulatory framework governing the management of environmental performance deposit bonds comes in place, the requirement for performance deposit bonds as encapsulated under EMCA Section 25 and 28 has not been brought into effect. This means that Base Titanium is way ahead of the regulation, and therefore their deposit to the regulator can be deemed to be voluntary in nature.¹¹² In fact, the regulator even waived the continued payment of deposits by Base Titanium, to “*..await the formal finalization of the EMC (Deposit Bonds) Regulations*”.¹¹³

However, there is a hidden element to this compliance that is not entirely voluntary. Base Titanium is a local subsidiary of Base Resources, a mining company registered in Australia.¹¹⁴ There is a growing body of evidence, especially in the extractives industry where companies are expected to comply with all the laws of their countries of origin, even when they operate overseas. In this regard, lack of local laws and regulations would not be sufficient excuse for such companies to shirk on their responsibilities on environmental management. These are codified in numerous international environmental governance instruments and included in the spirit and letter of the environmental management principles enacted in Principle 10 of the 1992 Rio Declaration on Environmental Development (precautionary principle, sustainable development, intra and intergenerational equity, polluter pays, common heritage,

¹¹¹ Geoffrey Omedo, “Focus Group Discussion in Kwale,.”

¹¹² NEMA, Kenya, “Letter from NEMA to Base Titanium Waiving the Continued Disbursement of Performance Deposit Bonds by the Company, Awaiting Finalization of the EMC (Deposit Bonds) Regulations.”

¹¹³ “The Environmental Management and Coordination Act (Deposit Bonds) Regulation.”

¹¹⁴ Base Titanium, “Overview (Basetitanium.Com).”

etc.).¹¹⁵ Therefore, Base Titanium is complying to the laws and regulations of their mother company domiciled in Australia, a country with a rich and robust legal and regulatory framework governing the use of environmental performance deposit bonds.

The second reason why Base Titanium's decision to make these deposits to the Kenyan regulator is attributable to the strict requirements by Base Titanium's financiers.¹¹⁶ To undertake the mining operation to the scale that Base Titanium has undertaken, there is a requirement of significant financial resources. Therefore, Base Titanium went to the capital market to attract the financing that was required to lay down the entire infrastructure, as well as obtain the requisite licenses and permits to commence operations. Much of the resources were also required for payment of resettlement to the communities that were living in the area where active mining is ongoing.¹¹⁷ It is encouraging to note that the large financiers to the project made is a prerequisite for lending to Base that they comply fully to the global best practices on mine closure, which specifically included the need to make reclamation deposits as a surety of their interest to restore the environment to its natural status at the lapse of the mining activity. Base Titanium reports that it “....adheres to international best practice, including the Equator Principles, the International Finance Corporation (IFC) Performance Standards and the World Bank Environmental, health and safety Guidelines...”¹¹⁸

Therefore, this is a clear indication that influencing lending institutions to integrate environmental protection in their lending instruments is a major boost to promoting environmental sustainability, as evidenced in the Base Titanium case. It is therefore clear that the key motivator for the firm in making these ‘voluntary’ financial deposits was complying to their financiers demands, as well as the laws in Australia, where the mother-company that wholly-owns Base Titanium is domiciled.

¹¹⁵ “Rio Declaration on Environment and Development UN Doc. A/CONF.151/26 , 31- ILM 874.”

¹¹⁶ Geoffrey Omedo, “Interview with Dr. Georgina Jones, Base Titanium,” 2018.

¹¹⁷ Ibid

¹¹⁸ Geoffrey Omedo, “Interview with Dr. Georgina Jones, Base Titanium,” 2018.

9. RECOMMENDATIONS ON THE EPDBS REGULATION AND APPLICATION IN KENYA

While we have a robust body of environmental laws that espouse strong command-and-control approaches, we still have growing environmental challenges especially within the mining sector. This requires the proactive use of economic incentives, alongside other legal instruments to ensure realization of sustainable mining¹¹⁹ A key recommendation is to urgently establish a functional deposit bond regulatory scheme, by revising the Draft Environmental Management and Coordination (Performance Deposit Bonds) Regulations of 2014 to resolve the eight key complexities identified in this article, and enacting them to guide the use of the bonds for managing environmental risks in the development processes. Thereafter, to harvest the dividends from a well-regulated Environmental Performance Deposit Bonds scheme, all mining companies should be required to make financial provisions for environmental reclamation, remediation, rehabilitation, and restoration before commencement during official licensing. Finally, the operating environment for EPDBs requires a well sensitized public. Many stakeholders are not aware of the performance deposit bonds existence, and how these funds are likely to be utilized for environmental management within the extractive sector. To realize the benefits of EPDBs, then significant stakeholder engagements is required.

10. CONCLUSION AND POLICY IMPLICATIONS

Environmental Performance Deposit Bond are important economic incentive instruments designed to ensure mining companies or would-be-polluters offer the much-needed financial guarantees for sound environmental practices. They offer resources that can be utilized by governments to undertake proper reclamation, rehabilitation, and restoration of their

¹¹⁹ P.F. Katina, Keating, C.B., Bobo, J.A. and Toland, T.S. “A Governance Perspective for System-of-Systems” (2019) 7 (4) Systems754.

mining sites at closure as well as management of the post closure period. However, for bonds to work effectively, a grounded legal and institutional framework guided by global best practice is critical. For Kenya's case, the operating environment for the effective institutionalization of EPDBs in Kenya is weakened for a variety of factors. First, the main legal instrument for environmental deposit bond (the Draft Environmental Management and Coordination (Deposit Bond) Regulations 2014) has been in draft from 2014 to date. The National Treasury has not yet formally approved the regulations, due in part to the sustained pressure from private sector players in Kenya who have been agitating for reduction of unnecessary costs which were hindering business by making the business environment in Kenya overly expensive.

Secondly, a weakening Polluter-Pays regime continues to complicate the operating environment for effective institutionalization of EPDBs. A clear evidence of this is the pressure by the private sector that led to the un-procedural waiver of the EIA fees, even without making the necessary amendments to the EIA Regulations 2003.¹²⁰ Thirdly, the waiving of EIA fees by the Government has resulted in a drastic fall in the number of EIA reports that are filed by industry players. This implies that, without a monetary incentive or disincentive (charge), many companies are altogether shirking on their legal requirement to file the EIA reports, and by extension maintain high standards of Environmental management in their operations.

Fourthly, for the country to harvest the dividends from a well-regulated Environmental Performance Deposit Bonds scheme within the extractive sector, all companies should be required to make financial commitments for environmental reclamation, remediation and restoration of the intrinsic ecological ingredients vital for a thriving ecosystem. Finally, the operating environment for EPDBs requires a well sensitized public. However, many stakeholders are not aware of the performance

¹²⁰ G. Omedo, Muigua, K., & Mulwa, R. "Financing Environmental Management in Kenya's Extractive Industry: The Place of the Polluter Pays Principle (2020) 16 (1) Law Env't & Dev. J.

deposit bonds existence, and how these funds are likely to be utilized for environmental management within the extractive sector.