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Water Resource Protection in Africa's Mining Sector: A Nigerian Perspective

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Abstract

Extractives from mining pollute water sources in mine communities, resulting in severe impacts on the health of people, animals, aquatic life and agricultural land. Mining operations can lead to competition for water resources between host communities and companies, resulting in social conflicts. This is the experience in Nigeria, where the economy depends strongly on the extractive industries. Currently, the mining industry is one of the sectors considered for economic development in Nigeria. Although benefits can be derived from the development of mineral resources in the country, it is necessary to consider the adverse impacts of the activity. This article examines the current state of water resource management in mining and highlights the effects of mining activities on water, as well as the challenges involved in Nigeria. It argues that mining has an adverse impact on water quality and poses a significant risk to the communities surrounding mines. It identifies and examines the relevant laws in the Nigerian mining industry, determining the extent to which they protect water during mining operations. Considering the challenges posed to water protection in Nigeria, the article finds that the government's response to the problems surrounding water use in mining is inadequate. It draws lessons from other countries and suggests that the government should strengthen national laws, monitor the use of water by industries, and ensure that they minimise their impact on water resources in Nigeria through sustainable mining practices.

Keywords

water, mining, mining impacts, mining industry, Nigeria

1. Introduction

Mineral resources are sources of wealth and are beneficial to countries, especially those endowed with them. The solid mineral industry in Nigeria is gradually becoming a significant contributor to the economy, both in terms of its prospects and its impact on economic growth. However, mining can be extremely harmful and destructive if not regulated effectively, as evidenced by abuses and disasters worldwide. Air and water

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pollution; the devastation of fertile lands; the loss of biodiversity, wildlife, farmlands and buildings; and the violation of the human rights of host communities such as their rights to life, food, water, culture, health and a healthy environment are outcomes of the poor regulation of mining operations. African governments, particularly the Nigerian government, must make efforts to mitigate these environmental impacts, especially with regard to water resources.

Mining is closely linked to water-related issues, including access to water and water quality.[1] These problems can occur where mines are located in areas that rely on the same source of water for drinking or agriculture.[2] Water resources can be categorised into two main types: surface water, which includes rivers, streams, and springs, and groundwater, which encompasses boreholes and wells. The use and management of water resources can be severely impacted in mining areas, resulting in reduced water supply and compromised quality. Mining is one of the most water-intensive industries.[3] Mines obtain water from the ground, streams, lakes, rivers or commercial water suppliers.[4] The mining industry utilises water for various purposes, including mining processes, dust suppression, extraction processes, and site maintenance.[5] Certain mining sites can also be located in areas where access to water is limited, which exacerbates the scarcity of water. Water scarcity poses a significant challenge to the mining industry, as the mining process relies on a consistent and long-term supply of water. Hence, water resources must be protected. The legal protection of water resources in the mining industry across Africa is an area of growing concern as the continent grapples with increasing mining activity, water scarcity and the need to protect vital ecosystems. The protection of water resources encompasses various activities that aim to safeguard and enhance the quality and quantity of these resources.[6]

This article examines the risks posed by mining activities to water resources and the degree to which they are protected, particularly in the Nigerian mining industry. It further examines the methods adopted by the mining industry globally to protect water resources and suggests ways to address the challenge of effective water resource management in the mining industry in Nigeria and Africa as a whole. The article examines the key laws in South Africa and Kenya to draw important lessons for Nigeria.

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1 Thomashausen, S, Maennling, N & Mebratu-Tsegaye, T 'A Comparative Overview of Legal Frameworks Governing Water Use and Water Discharge in the Mining Sector' (2018) 55 *Resources Policy* 143.

2 Ibid.

3 McNeill, D, Tang, M & Steel, A 'Water Scarcity is Greatest Risk to Metals and Mining' FitchRatings, 8 July 2020 <https://www.fitchratings.com/research/infrastructure-project-finance/water-scarcity-is-greatest-risk-to-metals-mining-08-07-2020> accessed 19 February 2022.

4 Christiansen, B '6 Ways to Improve Water Conservation in Mining Operations' 13 August 2021 <https://www.watertechonline.com/industry/article/14207319/6-ways-to-improve-water-conservation-in-mining-operations> accessed 19 February 2022.

5 Ibid.

6 United States Environmental Protection Agency 'Basic Information about Source Water Protection' <https://www.epa.gov/sourcewaterprotection/basic-information-about-source-water-protection> accessed 17 April 2022.

2. Mining developments in Nigeria

Nigeria has been a mono-product economy since the discovery of oil, depending solely on the income from crude oil exploration. The decline in the price of crude oil between 2014 and 2016 negatively impacted the country's earnings, leading to a recession.[7] With the recession, there was a push for diversification from the oil sector to the mining sector, an aspect of the country's economy that had been neglected since the discovery of crude oil. Before the recession, the federal government had taken steps to overhaul the solid mineral industry, aiming to make a significant contribution to the economy. In 2008, the Nigerian Minister of Solid Minerals Development (now Mines and Steel Development) initiated the development of seven mineral resources – coal, barytes, bitumen, gold, iron ore, lead/zinc and limestone – that were considered significant because the country has them in substantial quantities that can sustain mining for an extended period.[8] The development and exploration of these resources will provide potential opportunities for economic growth, contribute to the country's gross domestic product (GDP), and enhance infrastructural development.[9]

Currently, despite the country's vast resources, the mining sector makes a relatively insignificant contribution to the Nigerian economy. The Minister of Mines and Steel Development reported that the sector declined from 5.6 per cent in 1980 to about 0.33 per cent.[10] Challenges to the development of the sector, as identified by the Minister of Mines and Steel Development, include insufficient geodata and geological knowledge, weak governance, and poor capacity to implement and enforce mining regulations.[11]

3. The importance of water in mining operations and the impact of mining activities on water resources

Water is a key driver of economic and social development in many areas of Nigeria. Groundwater is a viable and critical source of water used for domestic purposes, livestock, irrigation, farming, and industrial purposes. Artisanal and small-scale mining, as well as

7 The World Bank 'Nigeria at a Glance – Overview' <https://www.worldbank.org/en/country/nigeria/overview> accessed 16 November 2024.

8 Federal Republic of Nigeria – Nigeria Extractive Industries Transparency Initiative (NEITI) 'Scoping Study on the Nigerian Mining Sector' October 2011 <https://documents1.worldbank.org/curated/en/647231468292929219/pdf/Nigeria0scopin0Draft0Report00510911.pdf> accessed 16 November 2024; Oladunjoye, O & Okonkwo, N 'The Mining Sector in Nigeria' 1 December 2015 <https://ia601009.us.archive.org/8/items/KWMTheMiningSectorInNigeria/KWM%20_%20The%20mining%20sector%20in%20Nigeria.pdf> accessed 3 January 2025.

9 Gbenga Biobaku & Co 'Mining in Nigeria – The Nigerian Minerals and Mining Act, 2007' 2 <https://www.gbc-law.com/assets/publications/Mining_in_Nigeria.pdf> accessed 16 November 2024.

10 Minister Olamilekan Adegbite said this at a workshop on 'Improving Fiscal Transparency in Nigeria's Mining Sector', organised by Global Rights in collaboration with the Nigeria Extractive Industries Transparency Initiative (NEITI) in Abuja. See Onyedinefu, G 'Mining Sector's Contribution to GDP Remains Low Despite Potentials – Minister' *Business Day*, 2 March 2022 <https://businessday.ng/news/article/mining-sectors-contribution-to-gdp-remains-low-despite-potentials-minister/> accessed 17 April 2022.

11 Onyedinefu ibid.

large-scale mining, have contributed to soil and water pollution. Surface water bodies in and around large urban areas in Nigeria are frequently of poor quality due to pollution. The surface waters in and around many cities are nearly toxic and cannot support an aquatic ecosystem.[12]

Water contamination implies that less water is available for consumption and environmental processes, and a huge amount of revenue would be required to clean up the contaminated water.[13] Mining projects significantly impact on water quality and the availability of water resources in the vicinity of the project. Pollution of air, water and land are outcomes of mineral development. The waste generated after the removal of minerals, which contain acid that generates heavy metals, is often left on the surface of the ground in piles and is a source of water pollution.[14] The bedrock walls from which minerals are excavated are also a source of metal pollution and are a consequence of mining.[15]

Acid mine drainage is another adverse effect of mining. It is regarded as a threat to water resources. This occurs when sulphides in rocks are excavated and exposed to water and air during mining, which produces sulphuric acid. The acid mine drainage may wash off the mine into streams and rivers, or leach into groundwater. It affects water quality and is harmful to aquatic life. Acid mine drainage also dissolves toxic metals, such as copper, aluminium, lead, and mercury, from surrounding rock. Such metals can be lethal to humans and animals. Acid mine drainage can be perpetually harmful because the damage it causes can persist long after a mine is closed. According to a study conducted in the Enugu metropolis, acid mine drainage pollution resulting from coal mining activities affects the quality of both surface and groundwater resources.[16] Streams flowing from mine tunnels move through exposed coal seams and bedrock and around waste dumps of mines into water surfaces and groundwater areas. Acid transported by rainwater or drainage is deposited into streams, lakes, rivers and groundwater. Acid mine drainage degrades water quality and impacts aquatic life, resulting in death. Water pollution can be caused by heavy metals such as arsenic, cobalt, copper, lead, silver, and zinc, which can be found in underground mines or rocks that are excavated and come into contact with water. These metals are transported downstream as water washes over the rock surface.[17] Acidic drainage laden with metal emitted from abandoned coal mines can have profound impacts on aquatic life, affecting the growth and reproduction of aquatic plants and animals

12 Federal Ministry of Water Resources 'National Water Resources Policy' July 2016 <https://policyvault.africa/policy/national-water-resources-policy-2/> accessed 15 November 2024.

13 Haggard, EL, Sheridan, CM & Harding, KG 'Quantification of Water Usage at a South African Platinum Processing Plant' (2014) 41(2) *Water SA* 279.

14 CL Mangdong et al 'The Impact of Mineral Development on Water Resources, Effects of Tin Mining on Water Quality: Focus on Some Parts of the Jos Plateau, Nigeria' (2015) 9(4) *Journal of Environmental Science, Toxicology and Food Technology* 61.

15 Ibid.

16 Obiadi, II et al 'Effects of Coal Mining on the Water Resources in the Communities Hosting the Iva Valley and Okpara Coal Mines in Enugu, Southeast Nigeria' (2016) 2 *Sustainable Water Resources Management* 212.

17 Safe Drinking Water Foundation (SDWF) 'Mining and Water Pollution' <https://www.safewater.org/fact-sheets-1/2017/1/23/miningandwaterpollution> accessed 26 February 2022.

and contaminating drinking water.[18] These impacts lead to environmental degradation, including the contamination of water resources, with significant health implications for the affected population.[19] The high level of water pollution is mostly and partly caused by poor control of mining resulting in heavy poisoning.

A study was done in Arufu, in Wukari local government area, Northeastern Nigeria, Taraba State to assess the level of pollution, ecological hazards and health risks related to the presence of metals in the water.[20] It indicated that the water was contaminated by heavy metals. The concentration of the metals in the water exceeded the standard of the World Health Organisation and Nigeria for quality drinking water. The water in the area was heavily polluted with heavy metal and posed great ecological and health risks to children and adults living in the area.

Furthermore, artisanal and small-scale mining, which are prevalent in regions like Niger State, Zamfara and Kebbi, often operate outside the regulatory framework. The activities of the informal sector can lead to unregulated water use and waste disposal, and contamination, which has an adverse impact on local water bodies and ecosystems.

4. Water use and its protection in the mining industries

This section examines the relevant laws regulating the mining industry and discusses the extent to which they address the use of water in the course of companies' operations.

4.1 The protection of water resources under the extant laws in Nigeria

Relevant laws considered include the 1999 Constitution ('CFRN'), the Water Resources Act[21] and the Nigerian Minerals and Mining Act ('NMMA') 20 of 2007.[22] In Nigeria, water resources are managed at both the federal and state levels. State governments have regulations and agencies responsible for managing water resources, though these are sometimes weakly coordinated with federal efforts. The government of the federation is vested with the right to use and control all surface and groundwater, and any watercourse that affects more than one state.[23] The purpose of this is to ensure the coordination of activities that will possibly affect the quality, quantity, distribution, use and management of water.[24] The NMMA is the primary legislation that regulates the mining industry.[25]

18 USGS 'Mining and Water Quality' Water Science School, 8 June 2018 <https://www.usgs.gov/special-topics/water-science-school/science/mining-and-water-quality> accessed 26 February 2022.

19 Obiadi et al (note 16) 212.

20 Adewumi, AJ & Laniyan, TA 'Contamination, Ecological, and Human Health Risks of Heavy Metals in Water from a Pb–Zn–F Mining Area, North Eastern Nigeria' (2023) 21(10) *Journal of Water and Health* 1470.

21 Cap W2, LFN 2004.

22 Cap N162, LFN 2004. Other statutes are the National Inland Waterways Act No. 47, LFN 2004; the River Basins Development Authority Act R9, LFN 2004; the Nigeria Hydrological Services Agency (Establishment) Act, Cap N110A, LFN 2004; the National Water Resources Institute Act, Cap N83, LFN 2004; the Land Use Act, Cap L5, LFN 2004; and the Nigeria Environmental Standards and Regulations Enforcement Agency Act, Cap N164, LFN 2004.

23 Section 1 of the Water Resources Act.

24 Section 1(a).

25 Nigerian Minerals and Mining Act 20 of 2007.

The Act was passed into law in March 2007 and repealed the Minerals and Mining Act of 1999.[26] The 2007 Act comprises six chapters and 165 sections covering matters relating to the ownership and control of minerals; prospecting, mining and quarrying; small-scale mining; possession and purchase of minerals; environmental considerations and the rights of host communities; offences and penalties; and miscellaneous provisions. The Nigerian Minerals and Mining Regulations, 2011 (the 'Regulations') were issued by the Minister of Mines and Steel Development in terms of section 21 of the NMMA. The Regulations define the rules and processes in respect of matters mentioned in the Act and give effect to the implementation of the provisions of the Act.[27] Under the NMMA, mineral resources in Nigeria are vested in the federal government and lands where mineral resources are found in commercial quantities and acquired by the government. According to the 1999 Constitution, mines and minerals are under the control of the federal government.[28] Therefore, the federal government controls all mineral resources in the country.

In Nigeria, the state is under an obligation to protect and improve the environment and safeguard the water, air and land, forest and wild life.[29] The objectives of the Water Resources Act include protecting, conserving and controlling water resources for equitable and sustainable social and economic development and to maintain environmental integrity.[30] The Water Resources Act ensures that water resources are allocated and distributed for all uses.[31] The Minister can grant licences for activities such as the diversion of water and impounding water for mining purposes, including the discharge of waste water into any watercourse.[32] Individuals are not allowed to exploit mineral resources, divert or impound water for mining purposes, except as provided for in the NMMA.[33] During mining operations, individuals cannot pollute or cause to be polluted any water or watercourse within the area leased for mining or beyond the area.[34] Persons who use water in any way connected to mining operations must ensure that such water does not contain injurious substances in quantities that will be adverse to animal or vegetable life where such water leaves the area of mining operations.[35] In addition, managers of mines are required to provide ample measures to safeguard people, especially the host community, from dangers related to the storage of tailings; to reduce the effect of air pollution; and to ensure that mine waste is properly treated prior to final disposal to prevent contamination, including air and water pollution.[36] Compensation must be paid by a licensee or lessee to the owner or occupier who suffers from the pollution of any source of water meant for domestic and other purposes caused by mining operations.[37]

26 Act 34 of 1999, Cap M12, LFN 2004.
27 Regulations 3 of Nigerian Minerals and Mining Regulations 2011.
28 Item 39, Exclusive Legislative List, Part I Second Schedule of the CFRN.
29 Section 20 of the CFRN.
30 Section 1(a) of the Water Resources Act.
31 Section 1(b) of the Water Resources Act.
32 Section 4(1)(f) of the Water Resources Act.
33 Section 2(1) of the NMMA.
34 Section 123 of the NMMA.
35 Section 124 of the NMMA.
36 Section 125(1)(b) and (e) of the NMMA.
37 Section 125(b) of the NMMA.

A mineral title holder must deposit the required quantity of tailings prescribed by regulations. The holder is not allowed, except with the permission of the Mines Inspectorate Department, to deposit a larger amount of tailings in any natural watercourse.[38] The Mines Inspectorate may authorise the deposit of larger quantities of tailings than those allowed by the regulations, subject to an application by the mineral title holder.[39] The mineral title holder is expected to ascertain concerns, such as the likelihood of conflict over resources such as water or sacred areas in neighbouring areas,[40] and to identify options to prevent and reduce conflict, and compensate affected people.[41] Mining companies in Nigeria are required to conduct environmental impact assessments (EIAs) for projects that may have a significant environmental impact. This includes assessing the potential effects of mining on water quality and availability, and ecosystems. The EIA process is critical for ensuring that water resources are considered in the planning and operation of mining projects.

Despite these provisions, water pollution still persists. Mining activities continue to have an adverse impact on the environment. This may be due to the poor enforcement of the laws, leading to their violation by mining companies. Mining operations, especially in water-scarce areas, can lead to conflicts over water resources among mining companies, local communities, and agricultural sectors. The growing demand for water resources exacerbates these conflicts. Additionally, climate variability, such as droughts or floods, can impact water availability and complicate water resource management in mining areas, particularly in regions where water scarcity is already a concern. The reduction of water for human consumption contributes to water scarcity, which affects the human population. More than 40 per cent of people are affected by water scarcity, which is likely to increase as temperatures rise.[42] It has been projected that, by 2050, one in four people will suffer recurrent water shortages.

5. Water use and its protection in the mining industries

At the global level, international organisations and laws promote sustainable mining. The International Council on Mining and Metals (ICMM) is an international organisation that promotes a 'safe, fair and sustainable mining and metals industry'. Members of the ICMM are expected to implement mining principles as a criterion of their membership. The mining principles provide environmental, social and governance requirements for the mining and metals industry. Some of these principles are particularly relevant to water stewardship: respect for human rights; implementing effective risk-management strategies to address potential mining impacts; adopting practices and methods that allow for continuous improvement in environmental performance issues like water stewardship, energy use and climate change; conserving biodiversity; and proactively engaging stakeholders on challenges related to sustainable development.

38 Section 126(2) of the NMMA.
39 Section 126(3) of the NMMA.
40 Regulation 182(2).
41 Regulation 182(3)(b).
42 <https://www.undp.org/sustainable-development-goals/clean-water-and-sanitation> accessed 15 November 2024.

In order to curb the challenges associated with water use by the mining industry, while certain ways are suggested to conserve water in the mining industry, this article focuses on ways of encouraging effective and sustainable water management in the mining industry. Due to the significant impact of mining activities on the quality and quantity of water resources, there is a need for transparency and disclosure on the management of water use.[43] The pressure to act more sustainably in the way mining industries use water is similar to the pressure to protect human rights. ICMM members have agreed to manage water resources in a manner that is fair and equitable through the implementation of certain commitments towards water.[44] In January 2017, the ICMM released its position statement setting out the approach of its members to water stewardship, the Water Stewardship Framework.[45] In the framework, water stewardship refers to using water 'in ways that are socially equitable, environmentally sustainable, and economically beneficial'.[46] Members of the ICMM commit to being transparent and accountable by reporting water risks, management activities and performance; managing water at operations effectively; and collaborating to achieve responsible and sustainable water use.

The African Union (AU) at the regional level has adopted several frameworks aimed at promoting sustainable development, including the Africa Mining Vision (AMV), which emphasises the need for the sustainable and equitable use of natural resources. The AMV encourages responsible water use, particularly in the mining sector, and calls for the enforcement of strict regulations to minimise environmental harm. The African Commission on Human and Peoples' Rights Resolution on Human Rights-Based Approach to Natural Resources Governance[47] states that parties must ensure that human rights are respected in matters such as the exploration of natural resources, the management of toxic waste, and the establishment of a legal framework for the sustainable development of natural resources and water. States must strengthen regional efforts to promote laws on natural resources that respect everyone's human rights and require transparent, maximum and effective community participation in decision-making about the benefits of any development on their land or other resources that affects them in any substantial way. Additionally, international standards such as the United Nations Guiding Principles on Business and Human Rights outline the responsibilities of businesses, including those in

43 International Council on Mining and Metals (ICMM) 'Implement Water Stewardship Practices' <https://www.icmm.com/en-gb/environmental-stewardship/water/implement-water-stewardship-practices> accessed 19 February 2022.

44 Ibid.

45 International Council on Mining and Metals (ICMM) 'Water Stewardship Framework' <https://www.icmm.com/website/publications/pdfs/environmental-stewardship/2014/guidance_water-stewardship-framework.pdf > accessed 19 February 2022.

46 International Council on Mining and Metals (ICMM) 'Water Stewardship: Position Statement' <https://www.icmm.com/en-gb/about-us/member-requirements/position-statements/water-stewardship> accessed 22 February 2022. See also Alliance for Water Stewardship 'The AWS International Water Stewardship Standard' <https://a4ws.org/the-aws-standard-2-0/> accessed 22 February 2022.

47 African Commission on Human and Peoples' Rights (African Commission), at its 51st Ordinary Session held from 18 April to 2 May 2012 in Banjul, The Gambia, ACHPR/Res.224 (LI) 2012 <http://www.achpr.org/sessions/51st/resolutions/224/> accessed 16 November 2024.

the mining sector, to respect human rights, which includes ensuring that local communities have access to clean water and that companies do not contribute to environmental harm.

South Africa and Kenya are considered, in order to draw lessons for Nigeria as regards the protection of water resources in the course of mining development. Mining is the bedrock of the economy of these countries, with South Africa having a long history of mining, and they encounter environmental challenges, including acid mine drainage, water scarcity, and pollution from mining activities. The countries have enacted laws and policies to safeguard water resources in the context of mining.

5.1 Legal protection of water resources in South Africa

The mining industry in South Africa is described as the bedrock of the country's economy.[48] Mining contributed 7.3 per cent to the GDP in 2018 and the industry exported R312 billion worth of commodities.[49] In 2018, mining contributed R93 billion to fixed investment,[50] and the sector employed 456 438 people.[51] In the 2017/2018 fiscal year, R7.6 billion was paid in royalties and the industry paid R22 billion in company taxes.[52] The mineral industry in South Africa, which constantly contributes to the country's economy, is largely supported by gold, diamond, coal and platinum production.[53] In 2023, the industry added around 202.05 billion South African rand (approximately 11.18 billion USD) to the country's GDP.[54] The industry contributed 7.53 per cent of the GDP and employed about half a million people directly.

The abundance of mineral resources has led to significant investment by large-scale mining companies. The Mineral and Petroleum Resources Development Act (MPRDA)[55] and the Constitution of South Africa, 1996 protect the environment against pollution. According to section 24(b) of the Constitution, the environment must be protected for the benefit of present and future generations through legislative measures that prevent pollution and environmental degradation, promote conservation, and ensure the sustainable development of natural resources while promoting economic and social development. One of the objects of the MPRDA is to give effect to section 24 of the Constitution to ensure that mineral resources are developed in an orderly and ecologically

48 South African Government 'Minerals and Mining Policy of South Africa: Green Paper' <https://www.gov.za/documents/minerals-and-mining-policy-south-africa-green-paper> accessed 16 November 2024.

49 Minerals Council South Africa 'Facts and Figures – Pocketbook 2018' 8 <https://www.mineralscouncil.org.za/industry-news/publications/facts-and-figures> accessed 16 November 2024.

50 Ibid.

51 Ibid 4.

52 Ibid 8.

53 Department of Minerals and Energy, Republic of South Africa 'South Africa's Mineral Industry 2001/2002' 19th edition (2002) 1.

54 Natalie Cowling Statista 'Value added by the mining industry to the Gross Domestic Product (GDP) in South Africa from 2016 to 2023' 25 June 2024 <https://www.statista.com/statistics/1121214/mining-sectors-value-added-to-gdp-in-south-africa/#:~:text=The%20mining%20sector%20forms%20an,percent%20from%20the%20previous%20year.> accessed 31 March 2025.

55 Act 28 of 2002.

sustainable manner.[56] The holder of a mining right can, subject to the National Water Act[57] (NWA), use water from natural springs, lakes, rivers or streams located on the land which is related to the mining right.[58]

The preamble of the NWA recognises that water resource management aims to achieve sustainable water use for the benefit of all water users. It further recognises the importance of the protection of water resources to realise the sustainability of the water resources in the interests of all water users. The NWA purports to ensure that the water resources in the country are protected, used and managed in ways that consider meeting the needs of future and present generations, promoting equitable access to water and the sustainable and beneficial use of water in the public interest, and preventing the pollution and degradation of water resources, including meeting international obligations.[59] Protection as regards water resource means

> [m]aintenance of the quality of the water resource to the extent that the water resource may be used in an ecologically sustainable way; prevention of the degradation of the water resource and rehabilitation of the water resource.[60]

The country's water resources must be protected, utilised, developed, conserved, managed, and controlled in accordance with the national water strategy.[61] The national government, through the Minister of Water Affairs and Forestry, is obligated to ensure the protection of water resources so that they are used, managed and controlled in a sustainable and equitable manner for the benefit of all.[62] The national government is charged with the overall responsibility for water resource management, and the NWA provides for a national water resource strategy, which is a framework for the use, development, management and control of water resources in the country.[63] The strategy is binding on all relevant authorities and institutions. It must be reviewed at intervals of not more than five years.[64] The contents of the national water strategy are prescribed in section 6 of the NWA.

Chapter 3 of the Act focuses on the protection of water resources. The chapter states that the protection of water resources is related to their use, development, conservation, management and control. It outlines necessary measures to protect water resources, which can be developed within the context of the national water resource strategy, as well as measures to prevent pollution and address its effects. Pollution is described as the 'direct or indirect alteration of the physical, chemical, or biological properties of a water resource,' which renders it less fit for any use, harmful to people, aquatic and non-aquatic life, and detrimental to water quality and property.[65] The owner, occupier, or user of the land where

56 Section 2(h) of the MPRDA.
57 36 of 1998.
58 Section 5(3)(d) of the MPRDA.
59 Section 2 of the NWA.
60 Section 1(1) (xvii) of the NWA.
61 Section 5(3) of the NWA.
62 Section 3(1) of the NWA.
63 Chapter 2 Part I of the NWA.
64 Section 4(b) of the NWA.
65 Section 1(xv) of the NWA.

any activity causes or is likely to cause pollution of water resources must take reasonable measures to prevent the occurrence or recurrence of such pollution.[66] The measures to be taken are listed in sub-section (2). Persons must also take reasonable measures to prevent, reduce and remedy the effects of any incident or accident where a substance pollutes or is likely to pollute a water resource. [67]

Water use is described in the NWA as taking and storing water, activities that reduce stream flow, the discharge and disposal of waste, activities that adversely impact water, altering a watercourse, extracting water from underground sources for specific purposes, and recreational activities.[68] Some activities carried out by mining companies are described under the general principles of water use in the NWA. These include collecting water from a watercourse; diverting the flow of water in a watercourse; discharging waste or waste water into a water resource through a pipe, canal or sewer; disposing waste in any manner that may impact negatively on water; and disposing water containing waste from any industry or power generation process in any manner[69] Water use must be licensed, except in circumstances mentioned in the NWA.[70] The use of water is subject to any condition provided by the relevant authority, limitation, restriction or prohibition in the NWA or any relevant law, and in matters concerning the disposal or discharge of waste or water containing waste, the person authorised to use water must comply with any applicable waste standards or management practices provided in the NWA, and may not waste that water.[71]

A Water Tribunal is set up to hear appeals against decisions made by the relevant authorities. The tribunal is an independent body with jurisdiction in all the provinces, and it can conduct hearings anywhere in the country.[72] Persons can bring appeals to a High Court over a decision of the tribunal on a question of law.[73] Tribunal members must be knowledgeable in the law, engineering, water resource management or related fields.[74] Disputes may be settled through mediation and negotiation.[75] The NWA makes provision for the court to determine compensation for harm or loss due to an offence under the NWA or for damage caused to water resources.[76] After such determination, the court may award damages for the loss or harm suffered, order the accused to pay the cost of any remedial procedures, and order that the remedial measures to be implemented are carried out by the accused or the relevant management institution.[77]

In relation to the protection, development, use, conservation, management, and control of water resources, the National Water Resource Strategy (NWRS) was developed

66 Section 19(1) of the NWA.
67 Section 20(4) and (1) of the NWA.
68 Chapter 4 of the NWA.
69 Section 21 of the NWA.
70 Section 22(1) of the NWA.
71 Section 22(2)(a)–(d) of the NWA.
72 Section 146(1) and (2) of the NWA.
73 Section 149 of the NWA.
74 Section 146(4) of the NWA.
75 Section 150(1) of the NWA.
76 Section 152 of the NWA.
77 Section 153 of the NWA.

to achieve these goals sustainably. The second edition builds on the first edition published in 2004. South Africa is facing water scarcity and challenges relating to environmental degradation, security of supply, resource pollution, and inefficient water use.[78] The NWRS is a legal instrument for implementing the NWA and it is binding on all relevant authorities and institutions implementing the Act. The NWA requires that the strategy be reviewed every five years. The NWA recognises that the role of water conservation and water demand management (WCWDM) is vital in water resource management so that all user sectors have equitable access to the desired quantity, quality and reliability of water.[79] The strategy states that integrating and implementing WCWDM into operations and creating a water-wise business culture should be prioritised in the mining industrial sectors.[80] This will contribute to the sustainable use of water. Other plans include South Africa's vision for 2030, which demands sufficient water resources.

5.2 Legal protection of water resources in Kenya

The mining sector in Kenya has the potential to make a significant contribution to Kenya's GDP. In the first half of 2021, mining and quarrying added KSh 45.4 billion (approximately USD 402 million) to Kenya's GDP.[81] The annual value added by the sector in 2020 was KSh 77.5 billion (about USD 686 million). However, despite the country's potential natural resource wealth, there are challenges, such as negative mining impacts on local communities. A specific challenge is the degradation of water resources, one of the causes of which is poorly managed waste discharge from industries and sewage channels.[82] To address these challenges, certain steps were taken and laws and policies were implemented. Some relevant laws and policies will be examined to determine the extent to which they protect the country's water resources.

Water resources are described generally as part of natural resources in the Constitution of Kenya. The Constitution describes natural resources as

> the physical non-human factors and components, whether renewable or non-renewable, including–
>
> (a) sunlight;
>
> (b) surface and groundwater;
>
> (c) forests, biodiversity and genetic resources; and
>
> (d) rocks, minerals, fossil fuels and other sources of energy.[83]

78 Department of Water Affairs, Republic of South Africa 'National Water Resource Strategy – Water for an Equitable and Sustainable Future' 2 ed (June 2013).

79 WCWDM is the foremost reconciliation strategy to balance water supply and demand.

80 Department of Water Affairs, Republic of South Africa (note 80) 55.

81 Statista 'Value added by the mining and quarrying sector to the Gross Domestic Product (GDP) in Kenya from 2018 to 2022' <https://www.statista.com/statistics/1167552/value-added-by-mining-and-quarrying-to-the-gdp-at-current-prices-in-kenya> accessed 16 November 2024.

82 Ministry of Water and Irrigation 'The National Water Resources Management Strategy First Edition (NWRMS) 2006–2008' 2.

83 Article 260 of the Constitution of Kenya, 2010.

Water resources also include any lake, pond, swamp, marsh, stream, watercourse, estuary, aquifer, artesian basin or other body of flowing or standing water, whether above or below ground.[84] Natural resources include water resources, both surface and groundwater. In addition, land is defined to include any body of water on or under the surface, as well as natural resources.[85] The Constitution guarantees the effective use and management of these resources. The state is under an obligation to ensure that the environment and natural resources are exploited, used and managed sustainably, and that the accruing benefits are shared equitably.[86] This implies that water resources must be managed and used sustainably. The state is also required to ensure that the natural resources, which include water resources, are used for the benefit of Kenyans.[87] Every person must cooperate with the state's organs and other individuals to ensure that natural resources are developed and utilized sustainably.[88] Furthermore, the Constitution guarantees the protection of the right to clean and safe water in adequate quantities.[89] It is recognised as part of the economic and social rights in the Constitution. Article 42 of the Constitution, which spells out the right to a clean and healthy environment, seems to consider the obligations in article 69.

The Mining Act[90] is applicable to the development of mineral resources in the country.[91] The Cabinet Secretary who is charged with the responsibility of mining, the Principal Secretary, and any other person who administers the Act must be guided by the principles contained in the Constitution, such as the national values and principles of governance;[92] the enactment of legislation by Parliament that ensures the investment values and principles of public service;[93] the principles of public finance; [94] and the values and principles of public service.[95] Under the Mining Act, the holder of a licence or permit is expected to use land according to the terms of the permit or licence and must ensure that 'the seepage of toxic waste into streams, rivers, lakes and wetlands is avoided and that disposal of any toxic waste is done in the approved areas only'.[96] The right or entitlement conferred under a mineral right will not exempt a person from complying with the Water Act[97] provisions that relate to the right to use water from any water resource.[98]

According to the Water Act, every water resource is vested in the state[99] and the minister has the power of control over every water resource in accordance with the Act.[100]

84 Section 2(1) of the Water Act.
85 Article 260. See also article 62(1)(i) of the Constitution of Kenya, 2010.
86 Article 69(1)(a) of the Constitution of Kenya, 2010.
87 Article 69(1)(h) of the Constitution of Kenya, 2010.
88 Article 69(2) of the Constitution of Kenya, 2010.
89 Article 43(1)(d) of the Constitution of Kenya, 2010.
90 12 of 2016.
91 Section 2(1) of the Mining Act.
92 Article 10 of the Constitution of Kenya, 2010.
93 Article 66(2) of the Constitution of Kenya, 2010.
94 Article 201(c) and (d) of the Constitution of Kenya, 2010.
95 Article 232 of the Constitution of Kenya, 2010.
96 Section 179(b) of the Mining Act.
97 Act 8 of 2002.
98 Section 177 of the Mining Act.
99 Section 3 of the Water Act.
100 Section 4 of the Water Act.

The right to use water from any water resource is also vested in the minister.[101] The Act establishes the Water Resources Management Authority,[102] and one of its functions is to regulate and protect the quality of water resources from adverse impacts.[103] A national water resources management strategy (NWRMS) must be formulated to be published in the *Gazette* in line with the manner in which water resources would be used, conserved, managed and protected,[104] and to be periodically reviewed by the Minister.[105] The NWRMS prescribes the principles, objectives, procedures, and institutional arrangements for the management, protection, use, development, conservation, and control of Kenya's water resources.[106] The minister and relevant bodies must consider and implement the strategy as they exercise their powers or perform their functions.[107]

The NWRMS was developed to address the challenges encountered in Kenya.[108] The strategy is enshrined in the Water Act of 2002 and focuses on the management of water resources in the country. Principles adopted in the formulation of the strategy include achieving equitable access to water, promoting the sustainable use of water, and ensuring the efficient and effective use of water for optimal social and economic benefits. The strategy considers the 'user pays' and 'polluter pays' principles. Apart from implementing mechanisms that promote equal access to water for all Kenyans, other objectives include enhancing the availability of good-quality and sufficient water resources, developing policies and mechanisms for disaster management, and promoting the integration of sectoral and regional water policies.

With regard to implementing mechanisms for an integrated approach to land and water resources management, approaches to preventing pollution were considered.[109] This involves minimising pollution, and recycling waste to minimise present and future risks posed by toxic substances to people's health and to the environment. Those responsible for any pollution must take the necessary actions to reduce pollution and start recycling in their production systems.[110] Precautionary measures will also need to be implemented to prevent hazardous substances from contaminating water.

Kenya continues to make changes to its strategy plans to ensure that water resources are protected. This is evident in the enactment of a new Water Act (in 2016) and the development of another Water Resources Authority Strategic Plan[111] by the Water Resources

101 Section 5 of the Water Act.
102 Section 7 of the Water Act.
103 Section 8(1)(e) of the Water Act.
104 Section 11(1) of the Water Act.
105 Section 11(2) of the Water Act.
106 Section 11(3) of the Water Act.
107 Section 11(4) of the Water Act.
108 Ministry of Water and Irrigation (note XX) 11.
109 Ibid.
110 Ibid.
111 The Water Resources Authority (WRA) is a corporation under the Ministry of Water and Sanitation established under the Water Act of 2016; it was previously the Water Resources Management Authority (WRMA) under the former Water Act of 2002. The first Strategic Plan was for 2012-2017.

Authority.[112] The current plan is the Strategic Plan 2018–2022, which introduced legal and institutional changes at the national level and reforms at the county level.

6. Conclusion

Although benefits can be derived from the development of mineral resources in Nigeria, these are not without adverse effects. A significant adverse impact of the extractive industries is the challenge posed by mining operations to local communities' water resources, in addition to the challenges of accessing clean water in Nigeria. Mining industries have a negative impact on the environment by contaminating drinking water and disrupting the growth and life of plants and animals. Although the extractive industry contributes to economic growth, it is crucial to consider the effective management of both surface and groundwater resources. The mining industry in Nigeria needs to consider alternative sources to reduce their water use and waste. One important lesson drawn from examining the relevant laws of South Africa and Kenya is the importance accorded to the sustainable use of water. These countries ensure the protection of water resources and the use and management of these resources must meet the needs of present and future generations. Relevant policies promote equitable access to water and the sustainable and beneficial use of water. In South Africa, protection means preventing the degradation of the resources and ensuring their rehabilitation. Likewise, in Kenya, natural resources must be used and managed sustainably. Additionally, a tribunal has been set up to hear appeals against decisions made by the relevant authorities. Compensation can also be determined in a court of justice.

Therefore, sustainable practices should be encouraged in the mining industry in Nigeria to protect water resources, in line with Sustainable Development Goal 6 on clean water and sanitation. This will contribute to achieving universal and equitable access to safe and affordable drinking water by 2030.[113] Taking steps towards pollution reduction, preventing dumping, and minimising the release of hazardous chemicals improves water quality, a target for 2030. In promoting sustainable mining practices, mining companies should be required to adopt recognised best practices for water management, such as implementing proper waste management systems to prevent the contamination of water resources. Monitoring systems should be established, including community-based forums, to enable stakeholders to voice their concerns and provide feedback on water management practices, thereby ensuring that local needs are effectively addressed. The government should strengthen conflict resolution mechanisms to mediate disputes and ensure that mining activities do not harm local water resources. To address water scarcity, companies should be encouraged to invest in community water projects and infrastructure, ensuring the availability of clean water for local populations, particularly in areas affected by water scarcity.

112 Others include Vision 2030, the National Water Master Plan 2030, the Kenya National Adaptation Plan 2015-2030, and the Sustainable Development Goals (SDGs).

113 United Nations Development Programme (UNDP) 'Goal 6 Clean Water and Sanitation' <https://www.undp.org/sustainable-development-goals/clean-water-and-sanitation> accessed 15 November 2024.

At this point, it is important to push the discussion beyond countries in Africa, particularly at the regional level. The matter then becomes a collective responsibility involving countries, civil societies, mining companies and relevant stakeholders for the effective protection of water resources. The legal framework and institutions of the regional government for addressing the risks posed by mining companies to water resources can be examined and discussed, as well as the way forward.

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