

RESEARCH ARTICLE

MANGANESE AND SUSTAINABLE DEVELOPMENT IN THE DEMOCRATIC REPUBLIC OF CONGO: KONGO CENTRAL AT THE CROSSROADS OF GEOECONOMIC AND ENVIRONMENTAL ISSUES

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ABSTRACT

The global energy transition is driving growing demand for critical minerals, especially manganese, important for both storing energy and making steel. Within the DRC, the new discovery of minerals in the Luozi territory (part of Kongo Central province) exposes the country to big international economic worries and raises concerns about environmental damage, sharing mine income with the community and ensuring proper governance. This study investigates what is needed for the responsible, open and fair use of the Luozi deposit. It looks at the chance to use this resource thoughtfully, in light of history filled with over-harvesting by large corporations. Three areas were indicated to prevent similar errors, including: (1) making regulations and contracts clearer with the EITI (Extractive Industries Transparency Initiative); (2) ensuring ESG (environmental, social and governance) guidelines are followed in mining; and (3) forming a lasting partnership with different local and national stakeholders. For the DRC, the Luozi deposit is an important chance, but it also puts the country's mining management practices to the test. It can succeed only if this resource becomes a driver of sustainable development, equality and national financial independence, using a responsible model of mining that benefits everyone.

KEYWORDS

Sustainable development; Mining governance; ESG criteria; Energy transition; Critical minerals

1. INTRODUCTION

Since countries are moving towards cleaner energy and supply chains, there is a rapid increase in demand for critical minerals (Le Billon and Kristoffersen, 2020; Nordt et al., 2024; Wang and Zhang, 2025). Manganese, particularly, is rising in importance due to its strength in steel and its role in the next wave of electric car batteries (Clarke and Upson, 2017, Sun et al., 2020 and Zhu et al., 2024). As a result, countries with exploitable oil supplies are under stronger pressure and this is reshaping the balance of trade around the world (Fang, 2024; Mufungizi, 2024a). The discovery of manganese in the Kongo Central province of DRC signals a new challenge for mining, especially because this country is generally famous for cobalt, copper and coltan production (Gulley, 2023; Soufi, 2020; Doseco, 2025). Because of its position at the entrance to the Atlantic and near the country's important infrastructure, this part of the country could help change the mining sector. Since institutional governance is not yet secure and resource conflicts have continued and starting to exploit this deposit raises several issues about its viability in society, environment and politics (Hanai, 2021; Prause, 2020),

Following the division of the nation's former provinces, Kongo Central is one of the provinces with a sizable area. It is bounded to the south by Angola, to the east by the province of Kwango and the national capital Kinshasa, to the west by the Atlantic Ocean and the Cabinda Enclave, and to the north by the Republic of Congo. It contains a wide variety of natural resources, transboundary hydrographic resources (rivers and streams), exceptional fauna and flora with an astounding diversity of ecosystems,

and a high caliber of human capital known for its industrious and hospitable nature (Ngoma, 2023; Masunda et al., 2019). Kongo Central is the nation's top producer of energy resources due to its hydroelectric potential, which is spread across the different sites identified. Inga alone accounts for 69% of the potential, followed by the Mpioka site, with the remaining portion dispersed throughout the province (Kalonda, 2021; Gnassou, 2019; AZES, 2024).

This article explores what opportunities and problems may come from the development of the manganese sector in Kongo Central, in terms of economics, the environment and politics. An interdisciplinary method is applied to find solutions to a key issue: balancing the growth of one resource with the requirements of sustainability, inclusion and safety in nearby areas. The aim is to suggest specific solutions that maximize good outcomes for people and the economy and reduce the risks of problems.

2. MANGANESE EXPLOITATION AND ITS IMPORTANCE IN INDUSTRY

Manganese mining globally is advancing faster because the need for strategic mineral resources is rising (Clarke and Upson, 2017; Sun et al., 2020). It is mostly found in South Africa, Australia, Brazil and Gabon (USGS, 2024) and is extracted in oxide or carbonate from sedimentary or metamorphic deposits (dos Santos et al., 2021; Öztürk et al., 2019; Pharoe et al., 2020; Zhu et al., 2024). Because Sub-Saharan Africa has a key role in mining worldwide, it plays a significant part in global supply (Keskinen et al., 2019; Ahmed et al., 2021; Westfall et al., 2016). Yet, the problems involved in mining include unpredictable markets, continued extractive

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stronger as well as develop social and environmental infrastructure. It is very clear that spinoffs will likely be positive. This action joins efforts like updating the morgue and getting an ambulance which reflects the country's progress in Luozi recently. When this Japanese company established itself locally as the 7th largest in manganese exploration, the territory began a new economic era.

Paying close attention to manganese, the DRC is attempting to diversify its mining sector, mainly made up of copper and cobalt. Because it's necessary in specialty steel and battery production, this metal is becoming more important in worldwide energy shifts. World Bank numbers show that market demand for manganese is set to increase by almost 9% a year, mainly due to the automotive industry's needs (World Bank, 2023). Thanks to this project, there will be direct local development in an area that hasn't received much mining attention. This also allows us to assess the effects of decentralizing extractive activity which should lead to people sharing the benefits more evenly. Adding other Asian partners to key roles in peripheral provinces means giving less importance to the previous Chinese-led strategy in Haut-Katanga and Lualaba.

4. TOWARDS RESPONSIBLE EXPLOITATION: RECOMMENDATIONS

There is substantial potential in the Luozi manganese deposit to drive development at both national and local levels across the DRC. Nonetheless, weak or exclusive government can easily lead to predatory conduct, disputes in the community and damage to the environment (Kabulo et al., 2023). The future of Kongo Central depends on an approach that integrates efforts from all stakeholders, public, private and community. The government should update the Mining Code to strengthen its sustainability aspects, make all regulations easy to understand, implement the Extractive Industries Transparency Initiative (EITI) for contract and license transparency and include both communities and the administration of provinces in mining discussions. It is also essential to support local growth through: a Local Development Fund funded by mining company profits, for social infrastructure like roads, schools, hospitals and water for all; giving preference to local jobs, particularly in geology, mechanics, mining logistics and environmental management; and encouraging the use of local companies to help small and medium-sized enterprises (SMEs) form in the mining sector.

Before any mining begins, do a thorough Environmental and Social Impact Assessment (ESIA) and publish the results. After mining, prepare a restoration plan to include reforestation, restoring soil and managing waste and oversee the effects on the water and wildlife found in the region around Kongo Central and among nearby farmers and forests. Create manganese-processing units locally, for instance through local smelters, to enhance local value and control big exports; join the government and the private sector to encourage investment in improving DRC's roads, railways and Matadi port which would favor local business and aid export of manganese.

Strengthen the mine site safety: Secure the area, trying to avoid the use of armed forces, with a mining police trained in upholding human rights; tackle illegal mining and uncontrolled takeovers by drawing attention to the problems and showing young people other work possibilities. Encourage different groups of investors to share the costs while still promoting fairness through regional agreements and trade deals.

Reinforcement of the regulatory and transparency conditions is how one ensures that the governance is responsible, the amounts of corruption are minimized and the mining revenues really are to serve the country and its local community, as in Chile (e. g., Codelco) where indeed they do so, since the state plays an effective role as the entity called to govern and to make the mining's fiscal revenues to fit into the national budget, to finance all the services rendered in the public area and to be the topic of the parliamentary debate beyond which instant question we light in this case introduce the principles as they are known with the acronym ESG (Environment, Social, Governance), that permit to manage the negative impacts of the mining and on contrary to promote the positive impacts in terms of social and economic support, case of the management of Ghana literature highlighting sound governance and long term vision of the country can also benefit from the diamond revenue by investing the revenues in the public sector and Canada where systematic ESG integration into mining projects, in particular related to the rights of the indigenous communities participate in dialogue with the various parties concerned: NGOs, universities, communities, and donors to ensure the governance is inclusive, increase the oversight of mining stakeholders and build a monitoring system that encourages innovation and benefits local people, for example, Mongolia (Oyu Tolgoi) established a team of stakeholders to watch the copper project which regularly issues public updates and includes universities in environmental monitoring and in Ghana (gold) NGOs such as WACAM observe mining effects and connect

companies and communities (Anyidoho and Crawford et al 2014; Hira and Busumtwi-Sam et al 2021; Schueler et al 2011; Fontaine et al., 2022; Yichong et al., 2021; Faúndez- Ugalde et al., 2024; Fu et al., 2024; Park et al., 2023; Boiral et al., 2025; Mufungizi, et al 2024; Kojo et al 2010; Honde et al 2024; Nehring and Knights et al 2024; Litvinenko et al., 2022; Fikru et al., 2024).

For the DRC, manganese mining in Luozi offers a strategic advantage. However, it needs to be directed by open governance, a strict ESG strategy, and the active involvement of all stakeholders in order to really support sustainable development. Clear political will, a strong institutional foundation, and group mobilization around a common goal are all necessary for success.

5. CONCLUSION

The discovery of manganese at Luozi, in Kongo Central, raises the choice for the DRC between a new beginning and the risk of repeating its extractive past. Because mining governance in the country has often been unstable. For this project to benefit the community in the long term, a structured and communal method should be adopted. We must ensure that rules in the sector are firm and understandable by strengthening organizations like the EITI and allowing citizens to access mining contracts. As a result, trust will grow back, corruption will be defeated and there will be fairer allocation of resources for local people.

Also, adopting ESG principles systemically is both the right thing to do and important for long-term stability. Protecting Kongo Central's natural habitats, developing manganese honestly with the locals and ensuring fair access to benefits should always be part of operators' plans. Multi-stakeholder discussion is very useful for preventing disputes and abuse. The DRC's Government should build a sustainable consultation framework that joins NGOs, universities, traditional leaders, donors and businesses, based on transparency, accountability and creating solutions together. Making manganese a unifying factor instead of a source of friction is only possible if everyone participates. Considering the Luozi deposit just as a resource source overlooks the opportunity to assess Congolese mining regulations. Kongo Central will only then represent a new model of extractive development founded on justice, independence, and sustainability.

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