

# RESEARCHREPORT

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## Supporting Sustainable Mining Practices and Pathways in the Congo Region

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## **Executive Summary**

Achieving sustainability in natural resource mining is a persisting challenge. On global and local scales, a wide-scale shift across the mining industry and interconnected governing bodies towards sustainability is required. For emerging nations, such as the Democratic Republic of the Congo (DRC) and the Central African regions in general that historically lacked effective governance in the mining sector, industrial mining actors and agencies should bear responsibility. In particular, they should be urged to employ best practices that limit the exacerbation of pre-existing environmental and socio-economic issues and support building community resilience as well as nature resilience. For mining industries operating in a host country, there is importance in implementing global mining standards voluntarily and efficiently (e.g., health and safety standards, water quality guidelines, and stakeholder involvement). This is particularly important in settings like the Congo region, where complex social, political, and cultural dynamics exist. The need for standardized best practices remains critical to protecting the natural resources and ensuring the water, food, and income security of the region. Reports of conflicts between the mining actors and the local communities regularly exist in emerging nations where these Standard Operating Procedures (SOPS) are poorly defined and/or enforced. Establishing effective governing bodies can help the mining industry act as a catalyst for positive change if they exercise transparency and their environmental and socio-economic responsibility.

In support of the above argument, we have underlined a set of best practices anchored to four “Fields of Actions” (FoA) (i.e., designing integrated approaches, facilitating multi-stakeholder collaboration, instituting regulatory norms, and putting in place protocols for planning, monitoring, and evaluation). The suggested strategy encompasses the adoption of landscape perspectives while integrating community participation and capacity building, as well as efforts to foster continuous collaboration between the mining industry and the scientific community. In addition, the framework strongly requires transparency and contingency planning for mining failures. Altogether, the action-oriented framework outlines dimensions that can contribute to developing a sustainable mining sector in the region and benefit stakeholders.

Reviewing the context at the national level, in 2018 the DRC adopted a revised mining code and improved mining-related regulatory norms to integrate the social and environmental implications of both large-scale and small-scale mining, calling for a promising shift toward responsible mining pathways. The emphasis on regulated stakeholder involvement (i.e., local communities), planning at the pre-mining stage, and prescribed environmental monitoring guidelines are vital ingredients. We suggest the option of independent scientific advisory boards to facilitate the organization of effective stakeholder involvement by the large-scale mining companies in the region to integrate unbiased technical expertise in planning and policy. Additionally, strong collaborative processes with the different levels of governance in the DRC (national, provincial, local) and transparent knowledge-sharing will be needed to positively influence the industry.

Measures like sensitizing the global community that utilizes commodities mined in the DRC, such as cobalt in electronic devices and electric vehicle batteries, can play a significant role in demanding that product origins are socially and environmentally sustainable. In addition, mining companies can positively impact operational transparency by creating and maintaining easy-to-navigate open-access platforms for easy dissemination of information about mining activities. Although resource extraction activities like mining are inherently unsustainable due to finite resource availability, it is anticipated that operations conducted with globally developed standards could contribute to increasing the welfare of states, communities, and regions that are either directly involved or indirectly impacted. Together, we envision rigorous social and environmental diligence toward ensuring the sector’s sustainability.

## **Vision**

The paradigm in the use and extraction of natural resources is shifting. Higher standards must be set for climate, water resources, biodiversity, human rights, the supply chain and raw materials, leading towards a nature-positive value chain. We define a set of best practices anchored to four “Fields of Actions” (FoA) (i.e., designing integrated approaches, facilitating multi-stakeholder collaboration, instituting regulatory norms, and putting in place protocols for planning, monitoring, and evaluation). Our vision, with its key focus areas, pushes strategic actions forward. It is crucial, especially in a world where issues are increasingly interlinked. Altogether, the action-oriented framework outlines dimensions that can contribute to developing a sustainable mining sector in the region and benefit stakeholders.

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## 1. Context and Background

Mining has the potential to play a vital role in the sustainable development of future societies, stimulating industrial and economic growth, management of urban migration by providing employment and facilitating local infrastructure advances. This industry remains a critical target for global reform to sustainably provide essential resources for the production value chains, particularly for the growing demands from the digital world (Hentschel 2003; Verbrugge and Geenen 2019). Resource extraction is inherently unsustainable, but the resource needs of the ever-increasing world's population require the mining practices to implement sustainable standards of practices, accountability toward host states and communities, and transparency in reporting. International agencies such as the United Nations Development Program (UNDP) and United Nations Department of Economic and Social Affairs (UNDESA) recognized mining as integral to developing sustainable future societies as mining operations directly and/or indirectly intersect with each of the 17 Sustainable Development Goals (SDGs) (UNDESA 2017; UNDP 2017). Mining activities can generate resources in places with few short-term alternatives, which – in turn – can be employed in capacity-building and infrastructure development, thus opening possibilities to diversify economic activities in the future. However, along with economic benefits, there are inherent impacts associated with mining activities, including different degrees of disruption to the natural environment, particularly water resources, or in some regions, associated with conflicts with local communities (Conde and Le Billon 2017; Schoderer and Ott 2022). While economic benefits from mining are often captured by national and international elites, people who live in the direct vicinity or downstream from the mining operations fall victim to its detrimental effects (Schoderer et al. 2020; 2021; Özkaynak and Rodriguez-Labajos 2017). In particular, in countries with fragile governance frameworks, this is a critical issue that adds to conflict episodes between mining corporations and local communities.

When mining practices follow sustainability guidelines and mining revenues substantially increase the source country's welfare, the label that industry triggers a “resource curse” for resource-rich countries can be managed. Image transformations can lead to positive economic activity, even in the face of rising global mining exploration spurred by the booming need of the green transition (no or low fossil fuel scenarios and net zero transitions) (Andrews et al. 2017). Large-scale mining operations, particularly those operated and owned by foreign companies in developing host countries, tend to cause tensions and conflicts between the social and political sectors, which can be interpreted as a clear reflection of when the communities and local populations are least benefited.

Significant efforts are required to mitigate mining activity impacts on the quality of life for local populations. Local communities should have socio-economic gains as well as the means to participate in or co-determine decisions regarding regulatory norms of resource extraction, benefit sharing, and/or community development strategies that align with local and traditional knowledge. This should be inclusive of the land's traditional use, restoration, and preservation approaches (Bravo 1997; De Sa 2019; Petavratzi et al. 2022). Global advances such as the 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, stimulated the member states involved in various natural resource harvesting sectors to reform their practices to be in line with sustainability guidelines (e.g., United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) adopted in 2007). However, for such an agenda to become a reality, a wide-reaching shift is required to address environmental and social impacts, particularly in developing nations where global and local oversight in a mining operation is relatively limited.

The DRC is among the most resource-rich countries with significant deposits of gold, diamonds, tantalum, copper, and cobalt (World Bank 2010). However, with extreme inequality and particularly low gross domestic product (GDP) per capita, the DRC ranks low on the Human Development Index (Baumann 2021). While the existing structures of resource governance in the DRC are assessed as poor or failing with an overall low rating for resource governance (Natural Resource Governance Institute 2017), with >1000 types of minerals and precious metals and mining as a critical source of income for the country (Otamonga and Poté 2020), the conflict settings are quite inevitable.

At the regional scale, mining operations across sub-Saharan Africa are vast. In 2019, an estimated 10 million people were involved in the sector (World Bank 2019). The mining value chains led by foreign corporations have historically inadequately considered how and from whom value is transferred when industrial mines interact with small-scale mining economies, argues Radley and Geenen (2021) when examining the gold value chain in the DRC. This reflects a broader problem, also observed in

other places and other industries, that the complexity of value chains makes it more challenging to hold the leading companies accountable for the impact caused by economic activities along the value chain on people and ecosystems (Lizarazo Rodriguez 2021). Radley and Geenen (2021) also point out that a coalition between transnational capital and the Congolese state has marginalized locally-led processes of capital accumulation and mining mechanization. Among the detrimental consequences of this development is the displacement or marginalization of vulnerable people (Church and Crawford 2020). Thus, industrial-scale operations, artisanal and small-scale mining, and mining legacies, which have not been rehabilitated, continue to present complex socio-economic and environmental challenges to the Congolese people, in line with a long history of the extractive industry in the DRC. The severe social and environmental impacts of mining to the environment relate in particular to water resources owed largely to the significant production of vast amounts of waste material production, such as tailings and waste rock, to water requirements and land deforestation.

Socio-economic issues in the DRC are complex, particularly with the role of conflict minerals (cassiterite for tin, wolframite for tungsten, coltan for tantalum, and gold ore, otherwise known as 3TG). The dynamics around these resources have historically sustained armed violence in the Eastern DRC, as noted by the project intervention “The Enough Project” ([enoughproject.org](https://enoughproject.org)) that acknowledged how, in the Congo region and in the DRC, the vast natural mineral resources have attracted foreign mining interventions, and how the expansion of the mining industry increasingly plays a role in influencing social, economic, and geopolitical boundaries. Due to a lack of effective governance, the need for mining companies to voluntarily apply best practices is critical. Currently, hardly any external authorities are ensuring compliance with human rights provisions or preventing damage to nature and communities’ resources like lakes, wetlands, forests, etc.

While the mining industry generally holds the responsibility, experience, and resources to incorporate such best practices voluntarily to limit the fury of challenging issues and, at best, act as a catalyst for more widespread change, an inclusive strategy is currently not applied widely or effectively. This is particularly the case for foreign-owned mining entities operating in a host country, including in the DRC, as often these corporations are reported to be directly or indirectly involved in social and environmental conflicts. Haslam et al. (2019) emphasize that best practices (which can be viewed as an overarching framework) must be adapted to a local context. They cannot be a blueprint exported from one setting to another without attention to local circumstances.

In this report, we assess the current state of mining in the Congo region, mainly in the DRC, as a model of a developing nation, rich in natural resources and heavily exposed to mining activities. To explain our narrative, we outlined four “Fields of Action” (FoA) frameworks. With that approach, we highlight the need for systemic inclusion of perspectives of multiple actors (scientific, industry, and community), experts, and collaborators across all aspects of the mining cycle. This report does not propose a new set of international standards for responsible mining for industry and policymakers but instead utilizes and expands on previously developed concepts (e.g., Initiative for Responsible Mining Assurance (IRMA) and Extractive Industries Transparency Initiative (EITI)) with the overarching goal to present a candid examination of the mining sector in the region and in the DRC. The objective is to provide an overview of how the state and stakeholders in the mining value chains are incorporating socio-economic and environmental sustainability principles in their practice. The focus is on hard rock/metal mining, noting that petroleum operations (also likely to have significant impacts) fall beyond the scope of this report. Finally, the synthesis provides recommendations for progress toward the vision of an efficient, science-based, transparent mining industry that can help catalyze positive social and environmental change in the DRC.

A team of international and multidisciplinary scientists representing a diverse set of thematic (natural sciences, political, and social sciences) and geographic experiences (i.e., Brazil, Canada, Chile, DRC, France, and Germany) collaborated to outline the FoA framework toward the mandate of ensuring sustainability for the mining sector in the region. Researchers from the DRC formed an essential component of this group as an internal check for appropriateness to the local context while outlining the proposed framework. The data resources acquired for this report included a desktop review consisting of primary literature, published environmental reports, regulatory documentation, and available media resources.





Photo: Hassan Partow/UN Environment



## 2. Mining in the Democratic Republic of the Congo (DRC)

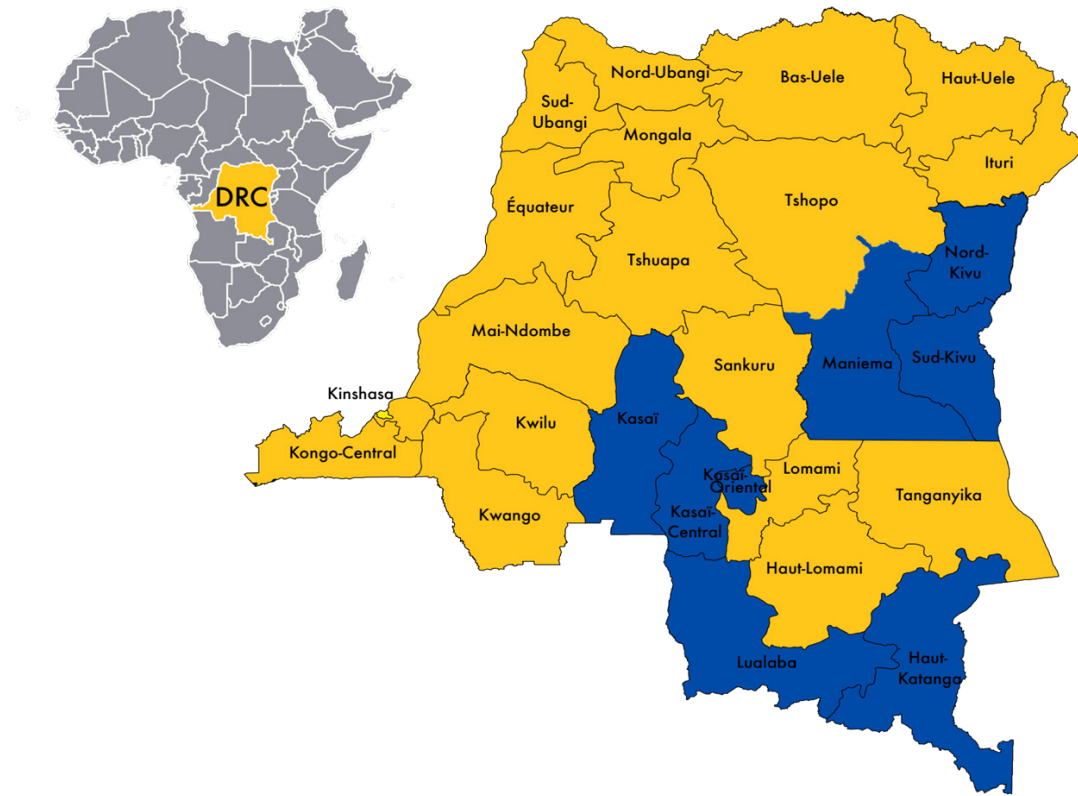
### 2.1 Historical Overview

Mining in the DRC dates back to the 1400s when it was practiced by colonial entities, beginning with Portuguese exploitation. From 1885 to 1908, the “Congo Free State”, personal property of Leopold II, King of the Belgians, was a harsh colonial setup based on the extraction of natural resources, the first of which was rubber. Atrocities such as slavery, mass killings, and mutilations of the local people were widely committed, which led to the demise of the king and the transfer of the Congo as a colony of the Belgian State. Throughout the first half of the 20th century, large-scale mining operations were developed by the Belgian colonial administration (Geenen and Radley 2014), including the establishment of the Union Minière du Haut Katanga (UMHK) (Saquet 2001). With the independence from Belgium in 1960, these operations were discontinued, and state-owned mining was transferred from the UMHK to the Générale Congolaise des Minerais (Gécomin), and in 1971 renamed as Générale des Carrières et des Mines (Gécamines). From the 1970s, industrial production declined and, by the mid-1990s, reduced to negligible operations due to “economic mismanagement, deteriorating infrastructure, and external shocks, including the two Shaba wars, closure of export routes, and price fluctuations on the world market” (e.g., Geenen and Radley, 2014 and references therein). In numbers, from 1988 to 1994, the output of the Gécamines dropped from 429,000 to 29,000 metric tons of copper, 54,000 to 600 metric tons of nickel, and 8,000 tons to 3,000 tons of cobalt (Mommen 1996).

Significantly, the International Monetary Fund (IMF) and World Bank-implemented structural adjustment programs negatively impacted the state monopoly and created a complex, privatized, and highly commodified environment. In the early 1980s, artisanal and small-scale mining (ASM) emerged as a largely unregulated form of income that was encouraged by the then-national government. This form of extraction became prevalent in local rural communities, with few health and safety precautions, frequent instances of child labor, and noted operations in protected areas. Unstructured approaches in the ASM sector allowed for the exploitation of workers and complicated matters during the two Congo wars from 1996 to 2003, when armed militias seized control of mining deposits as an economic source to further their interests and financial needs (Geenen and Radley 2014). To attract foreign investors, the first DRC mining code was established in 2002 with the financial support of the World Bank, and foreign mining companies became significant mining players in the country in the subsequent years. After the Dodd-Frank Act was signed in law, including its Section 1502 on Conflict Minerals from Central Africa, then president Joseph Kabila implemented a ban on ASM in North Kivu, South Kivu, and Maniema provinces in 2010, which impacted communities severely as the decision did not integrate and address the multiple dimensions of the sectoral challenges (Spittaels and Hilgert 2009).

In the DRC, both ASM and large-scale mining co-exist on a wide scale (see Figure 1) to form complex mining value chains, spurring risks of conflicts (Katz-Lavigne 2020; Deberdt 2022). This is the case for the Copperbelt region, which is one of the most important mining regions in the DRC. The provinces of Haut-Katanga, Lualaba, and, to a lesser extent, Tanganyika, accounted for 5 and 47.5 % of copper and cobalt world production in 2013, respectively (Pourret et al. 2016). Industrial-scale mining activities have been going on since 1911 (Birchard 1940). The region and state face multiple challenges to ensure the sector is on track with sustainability principles. For instance, the challenge related to the management of tailings (large amounts of fine-grained materials left over after the process of separating the valuable fraction from the uneconomic fraction of an ore in the rock). Nearly two decades earlier, in 2002 and 2003, SNC Lavalin consultants (a Canadian company providing engineering, procurement, and construction services to the mining industry), among others, found precarious and old-fashioned tailing arrangements with untreated wastewater flowing into surrounding areas at many sites in the DRC, mainly south Katanga (Nordbrand and Bolme (SwedWatch) 2007). The samples of surface water, groundwater, and soil collected at sites in the Provinces of Katanga, Kasai Oriental, and Kasai Occidental, showed elevated concentrations of silver, arsenic, copper, molybdenum, chromium, zinc, manganese, mercury, potassium, sulfur, nitrites, nitrates, and suspended organic matter (Gasana 2018).

Amnesty International (2016) reported communities’ complaints of mining effluent water released into the local water resources from the Luiswishi mine in DRC. The evidence reflected that some waste was discharged into the Kafubu River and surrounding fields. The Congolese organization Action Contre l’Impunité pour les Droits Humains (ACIDH), a local NGO, reported air pollution caused by mining activities in the districts of Katanga; at times, the ores containing radioactive uranium. Associated risks



**Figure 1.** Map of the Democratic Republic of Congo (DRC), in Africa.

The provinces mentioned in this report where mining operations dominate are depicted in blue color.

have not been thoroughly investigated in the Copperbelt, wherein (Nordbrand and Bolme (SwedWatch) 2007) reported that monitoring projects were discussed but never realized.

To address the above-stated challenges, the revised mining code in 2018 established guidelines to improve tax regulations and facilitate transparency, and to increase the redistribution of mining wealth from foreign-owned large-scale mining operations for the people in the region (DRC Government 2018). The revised code requires stakeholder consultations before mining operations commence, contains stricter environmental regulations, and intends to allocate mining royalties to local communities: 40 % of the mining royalty is intended exclusively for the construction of infrastructures of community interests. In the subsequent years, the Kabila government released a list of strategic minerals, which includes cobalt, germanium, and coltan (DRC Government 2018). Based on this ministerial decree, increased tax levies are 10 %, up from 3.5 %.

The DRC mining code also requires a transformation of the raw minerals in the DRC, as further refining and significant value-addition of extracted minerals is currently undertaken in other countries, e.g., for cobalt refinement in China (Gulley et al. 2019). This means that economic value to the mining output is largely added outside of the DRC, as the state does not have the infrastructure to process and refine ore completely (although significant efforts are underway to start further refining in the country by Glencore, for instance). The DRC maintains an economic dependency on overseas investment in the mining sector and the country remains among the poorest worldwide, despite its rich reservoir of natural resources. For a sense of scale, in 2019, 40 % of the world's coltan was produced in the DRC (The Economist 2021), and 50 % of the world's known cobalt resources are present in this country. To the present day, the environmental and social implications that are interconnected with the impacts of mining remain largely unaddressed but are attracting increasing global awareness with several significant reporting efforts such as "A State Affair" (The Carter Centre 2017) and "This is what we die for" (Amnesty International 2016). Additionally, NGOs and multilateral governing bodies, such as the Organization for Economic Cooperation and Development (OECD 2016), have begun to address this issue and produced guidance on minerals originating from conflict-affected and high-



risk areas (referred to as CAHRAs) and published in-depth studies of the state of mining in the country (OECD 2019). While the DRC remains outside of the 75 countries it currently supports in development policy, the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), a multilateral governing body, has published recent reports on aspects of mining in the DRC (i.e., IGF 2017).

## 2.2 Mining-Related Conflicts

In the region, mining of various natural resources (cobalt, copper, tantalum, tin, gold, diamonds and, in recent times, lithium) through large foreign/multinational company-owned industrial-scale operations are ongoing. In tandem, the ASM-level mining operations are also expanding. In the DRC alone, ASM remains the prevalent form of income for an estimated 2 million people (World Bank 2010). However, the establishment of large-scale mining companies in the DRC resulted in the exclusion of artisanal miners from areas they previously had access. These forced evictions led to violent protests against local authorities charged with imposing restrictions (Tsurukawa, Prakash, and Manhart 2011; Katz-Lavigne 2019). Almost half of the DRC Eastern province mining towns are controlled by armed men, composed primarily of the national Congolese army, not rebel groups (Spittaels and Hilgert 2009). During the two wars in the Congo region between 1996-2003, occupying mining sites and ASM operations provided financial means for armed rebel groups through the trade of extracted “conflict minerals” (Samset 2009).

As a reference, the first international response to the issue of conflict financing through minerals’ sales was Section 1502 of the Dodd-Frank Act enacted in 2010 in the United States (Sarfaty 2015). The law aimed at regulating downstream users of these minerals and publicly traded companies to address the risk in their supply chains. The implementation of the requirements, based on the OECD Guidance, outlined innovative strategies, including real-time (mobile application) SMS-based incident reporting. The approach sounded promising for the future provision of responsibly mined minerals. This led other countries within the European Union (EU Regulation 2017/821, implemented 1 January 2022) to organize and stipulate similar industry regulations.



Photo: Pactworld

The international efforts to better regulate the trade of these conflict minerals (Young 2018) is an ongoing process that includes the development of the OECD guideline in 2010 stating “due diligence guidance for responsible supply chains of minerals from conflict-affected and high-risk areas”, the Extractive Industries Transparency Initiative (EITI), as well as corporate social responsibility (CSR) initiatives such as the “Engage locally. Africa” by the United Nations Global Compact (UNGC) ([unglobalcompact.org](http://unglobalcompact.org)). Placing the responsibility on importers, the mineral importing countries endorsed regulations to enhance responsible mining, for example, the EU regulation on conflict minerals (enforced 1 January 2021 across the EU). The Conflict Minerals Regulation aims to reduce the risks of the trade bolstering armed conflicts, also linked with the financing of armed conflict or mining using forced labor in four minerals (tin, tantalum, tungsten, and gold). However, tracking the origin of mineral resources is difficult. In the DRC, which is organized in provinces and where part of the regulating powers for mining are devolved to provincial governments, conflict-mineral policy varies among provinces, being more advanced in regions such as the Copperbelt, and less in conflict-ridden areas such as the Kivu and Ituri provinces (Cuvelier et al. 2013).

### 2.3 Social-Environmental Impacts

Several socio-environmental impacts of the industry are either discussed insufficiently or are neglected altogether. The long history of mining across the Congo region and mainly in the DRC has led to a chemical contamination legacy from abandoned mine sites, adversely impacting water and food systems for local communities. Banza et al. (2009) conducted a biomonitoring study finding high exposure to cobalt and other metals in people residing near active mining areas. At ASM sites, lack of support for tunnel collapses is frequent and commonly results in severe injury or death of workers (Amnesty International 2016). The possibility of large-scale mining operations failures (i.e., tailings dam collapses and large-scale effluent spills) on industrial sites poses a serious risk for local communities, including bad health outcomes. In similar settings in other parts of the world where mining operations are rampant, recent disasters such as the ruptures of two iron ore dams in Brazil in 2015 (city of Mariana) and in 2019 (city of Brumadinho, Primo et al. 2021) highlight the inherent risk that these types of large-scale mining operations represent, and reiterate that rigorous due diligence remains pertinent for risk mitigation.

In addition to large-scale industrial operations, ASM mining is causing severe environmental impacts in the DRC. Rigorous environmental monitoring is fundamental to reducing risks in the mining processes and to the ecosystem services during and after mining operations. Mining at large and small scales has significant negative impacts on the environment, including river and groundwater diversion for mining operations, impacts on water quality through discharge of untreated water and tailings, disruption to wilderness areas, and world heritage/protected areas (UNEP 2017). Recent tailings dam breaches in Brazil and Canada (Primo et al. 2021) and their catastrophic forest clearing for mining operations led to the degradation of ecosystems, erosion, and silting of water bodies with detrimental effects on wildlife and downstream water users. For instance, approximately 15 tons of mercury are used annually in the DRC’s artisanal gold mining operations, making it the second-largest source of mercury emissions in Africa (UNEP 2017), with negative implications for both air and water quality. Many environmental issues are related to the degradation of freshwater resources, contamination of water bodies, soil and sediments, and biodiversity by heavy metals. Considering that the DRC accounts for 52 % of Africa’s surface water reserves and 23 % of its overall water resources (IMF 2015), potential contamination becomes even more relevant and deserving of priority attention.

Evidence for potential links between abandoned mines and surrounding environmental contamination is discussed by Atibu et al. (2013, 2016, 2018), pointing to high contamination and spatial distribution of metals such as cobalt, copper, and lead, as well as rare-earth elements such as praseodymium, and cerium, among others. These harmful contaminants appeared in the soil, water, and sediment of the Dilala, Musonoie, Luilu, and Mpingiri Rivers of the DRC and are, therefore, potentially present in different consumables. Populations and aquatic ecosystems surrounding the copper and cobalt mining sites in the province of Haut-Katanga (Kimpulande and Mura Rivers) and the gold mining site in the Maniema province (River Ulindi) are at risk due to contamination with heavy metals and natural radioactive elements (Banze et al. 2022; Atibu et al. 2022). Analysis of the river’s water showed high concentrations of nickel, copper, zinc, cadmium, and mercury, with the last three metals exceeding the limits set by the DRC legislation. In a comparative study in the DRC, including drinking water and uncooked food items, Cheyns et al. (2014) assessed cobalt contamination in urban and rural communities close to metal mining and/or refining plants. In the Katanga villages near a lake receiving effluents from metal refining plants, concentrations of cobalt in the urine of local residents were 4.5-fold (adults) and 6.6-fold (children) higher in zones impacted by metal refining plants compared to a rural location without industrial activities. The authors postulate that in the mine-impacted areas, consumption of legumes was the most



significant contributor to cobalt intake in adults, and dust ingestion appeared as the primary contributor in children. According to the United Nations Environment Program, most mining operations in the Katanga region take place as open-pit mining, causing extensive land and landscape degradation (UNEP 2011). The study demonstrated that surface water contamination close to tailing and waste sources is extensive, with cobalt and copper as the primary concern elements, as they may accumulate along riverbanks as salts and be washed/leached during monsoons. In addition, Pourret et al. (2016) reported high concentrations of zinc and lead in soil from the mining sites. A significant need for increased environmental education outreach in mining regions is highlighted (Ingram et al. 2011), stating that more than 50 % of interviewed miners noted that gold and diamonds are infinite resources, and 67 % believe that mining had no adverse environmental impacts.

## **2.4 Social-Economic Impacts**

Poor administration of the DRC's extractive sector has resulted in revenues being channeled away from investment into the country's sustainable development and leaving rural communities vulnerable to bear the negative environmental and health burdens of local operations (The Carter Center). Child labor has been the focus of recent reports (Amnesty International 2016), and major mining companies have responded to allegations stating that these instances are largely associated with unregulated ASM and a lack of formal operational structures and guidelines. The connections between impoverishment and child labor are documented by experts (Naeem et al. 2011) who call for national and foreign mining industries to reorganize their operational strategies and play an active role in defining sustainable measures toward improving basic living conditions for communities and people involved in the sector.

Health and safety risks to workers associated with mining are significant when not mitigated and managed effectively and include but are not limited to ground failure and rock falls due to earth instability, exposure to chemicals through dust inhalation or dermal exposure, heavy equipment accidents and falls from heights (Tsurukawa, Prakash, and Manhart 2011). Best practice across the mining industry includes constant identification of risks, elimination, or mitigation of risks (i.e., through personal protective equipment and proper training), and continual refinement of health and safety practices. The DRC has outlined legislation guiding these formal operations in the mining value chains as well as training for regulated artisanal miners. However, this does not extend to effective oversight of unregulated ASM mining practices. Tsurukawa et al. (2011) examined social impacts specifically in artisanal cobalt mining in Katanga and found *“annual death rates reaching 0.4 to 0.5 % of the workforce in some mines and poor sanitary conditions in miners' camps, epidemics, and a higher prevalence of HIV due to promiscuity, prostitution and the presence of armed/security”*.

## **2.5 Mining Regulations and Environmental and Social Challenges**

In 2002, the DRC instituted the first mining code, but environmental and social aspects were only considered in minor ways. To improve some of these aspects, along with improving resource transparency, in 2018, the government put forth a new mining code, with regulations extended considerably in both the social and environmental aspects, with more emphasis on the latter. Several environmental compliance obligations were determined, and the companies holding an exploration permit were made responsible for submitting a mitigation and rehabilitation plan as part of the approval process, outlining measures to limit and remedy environmental damage caused by the mining activities. Such environmental compliance obligations exist at every stage of a mining project. There is an environmental review and permitting process for mining projects whereby exploitation permits are subject to prior approval of an environmental and social impact assessment and an environmental management plan (EMP). This means that any application for an exploitation permit requires submission of an environmental impact study and an EMP to the Ministry of the Environment. This document must contain a description of the “greenfield” ecosystem and of the measures to limit and remedy degradation caused to the environment throughout the mining operation lifespan. The main governance body that regulates the mining code and the mining regulation is the Department for the Protection of the Mining Environment (DPEM). According to the revised mining code from 2018, stakeholder consultation is now an explicit provision, recognized as a legal obligation in many parts of the world. Exploration operations are subjected to the prior approval of a mitigation and rehabilitation plan (MRP). Prospecting and small-scale exploitation permits are only subjected to codes of conduct (de Schoutheete et al. 2021). The closure and remediation process for a mining project is addressed as part of the EMP, whereby the holder of a research or exploitation right must provide for the measures of remediation and environmental rehabilitation after closure, the costs of which need to be entirely supported by a financial guarantee, obtained beforehand. This is important, as, in the DRC,

like in many other countries, direct environmental impacts from mining continue to occur both from legacy and current mining practices. Notably, the holder of mining rights is deemed liable without external entities having to demonstrate fault for damage caused to people, communities, assets, and the environment as a result of operations. There is no statute of limitation for claims based on damage caused by mining activities to human and natural capital. As part of the regulations fully implemented in the DRC in 2018, mining companies must put forth a five-year plan for local social development. These guidelines, called “Cahier de Charge”, are prepared in consultation with local communities and stakeholders. Ongoing monitoring of that plan is required (Mining Weekly 2021). Geenen and Marysee (2016) noted that implementation, monitoring, and good governance remained at that time a significant challenge. The authors of this report propose that this remains true despite the creation of the new mining code (2018) and, in particular, it remains to be seen how effectively the governing bodies across the DRC will enforce it.

### Mining Regulations for Artisanal Mining (ASM)

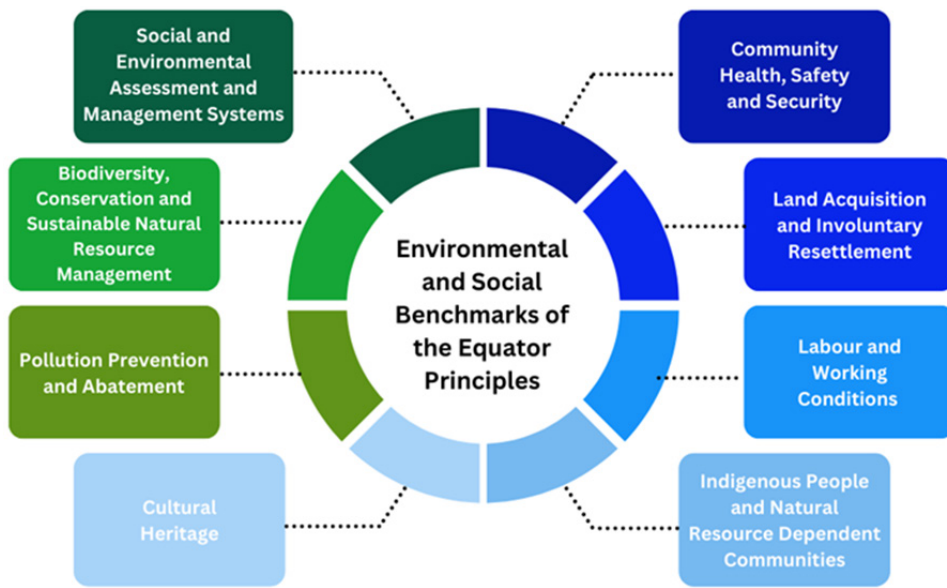
Within the regulations, there is an explicit recognition of ASM as the Minister of Mines may determine “artisanal exploitation zones” (AEZ) in areas where “*the technological and economic factors are not suited for the site to be industrially exploited*” (Geenen and Marysee 2016). Still, the government seems not to have created enough AEZs, especially in the southern mining belt. This gap has contributed to the escalation of illegal mining activities. A “code of conduct for the artisanal miner” currently exists within the regulations stipulating miners comply with security, hygiene, water use, and environmental protections (Geenen and Marysee 2016). The lack of clarity on translating the mining regulation norms at the local scale remains challenging. The new regulations provide provisions to prevent risks related to safety and hygiene by organizing artisanal miners: (1) promoting technical training on compliance with the environmental code of conduct, safety, and hygiene; and (2) conducting training courses on ASM techniques during which safety and environmental protection measures are demonstrated. Successful completion of these training courses allows for the acquisition of the mining operator card. However, these provisions only apply to artisanal miners registered in a mining cooperative. A large number of illegal artisanal miners do not benefit from such capacity-boosting provisions.

### 2.6 External and Voluntary Initiatives to Improve the Mine Industry’s Transparency in the DRC

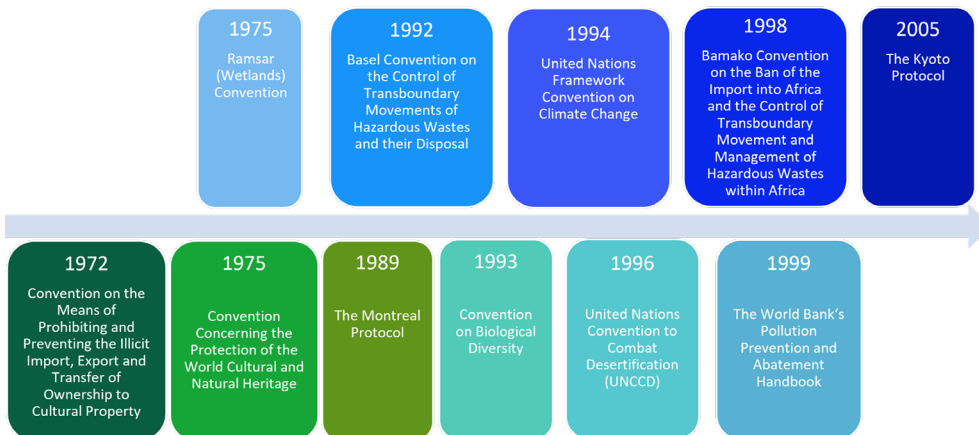
Transnational standards and voluntary measures are of increasing importance in the mining sector. In the DRC, international companies operate according to the national law of the DRC as the host country, but increasingly, they are expected to uphold the legal and best practice standards of their origin countries as well. In settings where states have difficulty ensuring the implementation of international human rights or environmental protection legislation, voluntary compliance by companies becomes essential (Schoderer et al. 2020). Recent efforts by the non-governmental sector toward transforming the mining industry to become a sustainable and transparent sector are notable, through interventions such as the EITI (Extractive Industry Transparency Initiative, [eiti.org](http://eiti.org)), which examines transparency concerning finances. In addition, the United Nations Global Compact is among other programs instituted recently at the global and regional scales. Many NGOs and civil society organizations are active in the country, including the Service d’Assistance et d’Encadrement du Small-Scale Mining (SAESSCAM). The Carter Center and its partners, including the Plateforme des Organisations de la société civile intervenant dans le secteur Minier (POM), support the EITI process in the DRC. Under the United Nations Global Compact, companies agree to operate under UN principles of transparency and responsible business. Currently, the local office in Kinshasa has forty-six companies, but there is currently no evidence of any significant participation from the mining industry.

At the global scale, The Equator Principles ([equator-principles.com](http://equator-principles.com)) represent a set of environmental and social benchmarks, developed by private sector banks, for managing environmental and social issues. They are aligned with the requirements of the International Finance Corporation (IFC, [www.ifc.org](http://www.ifc.org)), which is a major player in financing mining operations in developing countries, and their Performance Standards, which govern environmental considerations of project financing based on dimensions outlined in Figure 2. Furthermore, the IFC’s Environmental, Health, and Safety (EHS) guidelines ([www.ifc.org/ehsguidelines](http://www.ifc.org/ehsguidelines)) are technical references with general and industry-specific examples of good international industry practice. At the national scale, the DRC has approved international conventions and protocols concerning environmental impacts relevant to mining operations (Figure 3). These obligations may not be explicitly linked to mining; however, the mandate of these global environmental governance tools applies to maintaining the integrity of environmental and social landscapes and, thus, are relevant to the sustainable use of natural resources.

Further, the DRC is a member of the International Conference on the Great Lakes Region (ICGLR) and in 2010, the Regional Initiative against the Illegal Exploitation of Natural Resources (RINR) was approved. In 2014, DRC became the second ICGLR Member State to issue certificates through the Regional Certification Mechanism, a compulsory regional standard that certifies tin, tantalum, tungsten, and gold sourced is conflict-free.



**Figure 2.** Environmental and social benchmarks of The Equator Principles ([equator-principles.com](http://equator-principles.com)). Principles are adopted by financial institutions to provide a minimum standard of due diligence and monitoring.



**Figure 3.** International conventions and protocols concerning environmental impacts relevant to mining operations in the DRC.



### 3. Four Fields of Action Assessment Framework

The assessment of practices towards sustainable mining in the DRC is presented based on a review of the literature and technical mining reports, database search, and consultation with Congolese mining and science community members. The findings and resulting key points are explained according to a four “Fields of Action” framework (Figure 4).



**Figure 4.** Four “Fields of Action” (FoA) framework for assessing practices to further sustainable mining practices.

**Source:** Campos, J. A. et al. A New Vision of Sustainable Management in Mining and Post-mining Landscapes. Editors: Cortesão Barnsley Scheuenstuhl, M., Kirsch, S., Nissen, J., Steinicke, H., Viera, V. Deutsche Akademie der Naturforscher Leopoldina, Academia Brasileira de Ciências, Universität Duisburg-Essen Zentrum für Wasser- und Umweltforschung, Deutsche Akademie der Naturforscher Leopoldina e.V. - Nationale Akademie der Wissenschaften. ISBN: 380474026X, 9783804740266

#### 3.1 Field of Action 1: Integrated Landscape and Water Approach

Adoption of a landscape-scale and water management perspective with an emphasis on stakeholder participation and capacity-building initiatives

This first “Field of Action” focuses on developing concepts for integrated and adaptive landscape management during all mining stages, as well as on building up effective governance networks and local communities’ capacities and capabilities to ensure an ongoing process of self-sufficiency.

We suggest developing an integrative and comprehensive procedure of landscape management to ensure the preservation of social, economic, and ecological integrity. This approach addresses the issues of fragmentation in land use and degradation of land and environment and fosters sustainable development of natural resources.

Firstly, and as Ros-Tonen and Derkyi (2018) point out, for successful landscape management, people in governing positions at multiple levels (i.e., local authorities) need sufficient capacities, autonomy, and decision-making power to be able to execute regulatory and controlling responsibilities. Secondly, communities need to be involved in decision-making processes as a means of public involvement, to create within those a means for conflict resolutions and build capacities to encourage local autonomy that can endure into the mining era (Kemp 2010; Pahl-Wostl et al., 2020; Que et al., 2018).







Mining operations that fail to integrate local communities into the decision-making framework tend to escalate in the level of conflicts over social and environmental aspects, translating into heightened business costs (Franks et al., 2014) and risks to their social license to operate. Building local capacities and skills encourages an ongoing process of self-sufficiency that can contribute to safeguarding income and livelihood options in the mining value chains as well as in other production sectors. Integrated and adaptive landscape management guidelines include extensive and ongoing input by all actors affected by mining operations, as well as rigorous monitoring, assessment, and appropriate responses for environmental and social impacts. Such an approach must be adopted during the pre-mining planning. An in-depth analysis of the current state of these factors in complex regions, such as the DRC, is crucial to inform how adaptive landscape-scale and water management perspectives can be incorporated into mining operations for this region and the country. Currently, such efforts are inhibited by limited data and access to information as infrastructure to share and publicize data is absent, as is the regulatory pressure to create it.

The authors of this report found limited examples in the DRC where the adoption of the above best practices is currently employed in the pre-mining stages but with a few promising advances.

Until the enactment of the revised mining code, federal legislation in the DRC had been lacking enforceable guidelines on environment and water management and largely relied on “voluntary compliance” from the mining industry. This resulted in what could be considered relatively low rigor of compliance in many aspects when compared to international guidelines, including but not limited to monitoring and transparency of discharged water quality into local watersheds. The 2018 mining code possesses marked improvements, particularly with provisions requiring stakeholder consultations before mining operations commence, stricter environmental regulations, and allocation of mining royalties specifically being directed for local community interests (i.e., 40 % of the mining royalty is intended exclusively for the construction of infrastructures of community interests). These particular dimensions of the new code hold promise for future and long-term benefits for local communities during mining operations and, more importantly, during post-mining phases. Initiatives to support the community's local autonomy (i.e., skill training, educational opportunities, and sound infrastructure building) from the mining industry are crucial as this allows the communities to obtain economic benefits for sustainable development into a post-mining era.

Environmental and social impact assessments (ESIAs) have been conducted by large-scale mining companies in the DRC as part of their due diligence for mining projects, but often these are developed by the mine owners/managers with little consultation from the local community (Mining Weekly 2021). Accessing ESIAs readily across the mining sector in the DRC remains difficult, signifying that there has been a varied level of rigor for the implementation of the new mining code. ESIAs conducted before the adoption of the new mining code (e.g. the ESIA for the Tenke Fungurume Mining S.A.R.L. 2007) included some language and effort around these issues reflecting a growing awareness for issues such as investment in local infrastructure, educational opportunities, diversification in local economies, water resources and water quality impacts. These could also reflect the company's experience operating in countries such as Canada, where sustainable mining practices are better ingrained in company culture and form part of their legal obligations. However, little evidence was available to support that trend on a broader scale before the new mining code was implemented.

Amnesty International (2016) also noted several complaints stating that mining companies are not doing enough to build capacities or involve local communities as shareholders while creating value chains. The social conflicts include complaints about the impoverishment of local communities despite large-scale mining operations, particularly in post-mining landscapes. In 2007, China and the DRC signed the Sicomines Protocol (Landry 2018), considered as the most significant Chinese investment project in the DRC. The DRC has flagged the need for funding for infrastructure projects such as roads, railways, and hospitals (Proparco Groupe AFD 2021). The deal between the mining giant and the DRC was anticipated to be mutually beneficial and expected to positively impact “DRC's economic growth, with agreed columns of mineral production contributing to higher levels of exports, taxes, and inflows of US dollars and the creation of mining and construction jobs”, in return for providing access to the DRC's mineral resources to China (Maiza-Larrarte and Claudio-Quiroga 2019). Marysse and Geenen (2009) suggest that this deal was skewed from the beginning as the mineral resources' valuation was significantly higher than the infrastructure project cost. A recent review following the first decade of its implementation points to the fact that the deal has unfortunately not resulted in the socio-economic benefits it sought, with examples such as “deficient roads and poor equipment” (Maiza-Larrarte and Claudio-Quiroga 2019). A recent article in Mining Weekly (2021) reported that the first Cahier de Charge (i.e., a social term sheet) in the DRC was approved in March 2021, where a large mining company, enlisting the services of a local consulting firm (SRK

Consulting), effectively incorporated community and stakeholder participation in mining plans. This is a promising example of a sustainable mining pathway for the region/state.

The impoverishment of local communities in the mining value chains has led to unregulated ASM, where child labor and health and safety concerns are prevalent. There have been contrasting views on the potential validity of ASM mining as a sustainable income source for local communities if governed properly (Nkulu et al. 2018; Tschakert 2009; Banchirigah 2008). Recent efforts in the DRC support that, given the proper framework, ASM has an opportunity to be a viable bottom-up approach to support livelihood and income generation. Supporting this argument, a pilot project focusing on capacity building for responsible minerals trade (CBRMT) funded by the United States Agency for International Development (US AID) (2017-2018) explained best practices and bottom-up approaches that allow for sustainable extraction of gold through ASM. Additionally, with financial support from the European Partnership for Responsible Minerals, Belgian researchers at the International Peace Information Service (IPIS) developed an SMS-based web application (app) Kufatilia (meaning “to report”) to allow artisanal gold miners in the Eastern DRC to report incidents such as mine accidents, fraud, and illegal taxation, child labor, environmental damage and interference from armed groups. Reports of incidents can be observed in real time (Figure 5). Such pioneering efforts point to the kind of activities that could address mining-related challenges for communities in vulnerable settings commonly noted in the region, including in the DRC. The authors of this study observed that these types of efforts are hugely underfunded and are not widely scaled up. We suggest that national and foreign large-scale mining operators should have a stronger role in facilitating these types of projects through financial and technical support and contribute positively to Congolese communities.

While the new mining code (2018) contains marked improvements in many environmental aspects, it remains to be seen how effective they will be at moving the mining industry in the DRC forward and toward a sustainable path. Our analysis of available literature, media reports and documentation from the NGO sector, and communications with local stakeholders suggest that while a landscape-scale and water management perspective with a clear emphasis on stakeholder participation and capacity-building initiatives is yet to be adopted on a national scale in the DRC and in the Central African region, the recent advances in the regulations and pilot programs nonetheless provide evidence for potential future realization.

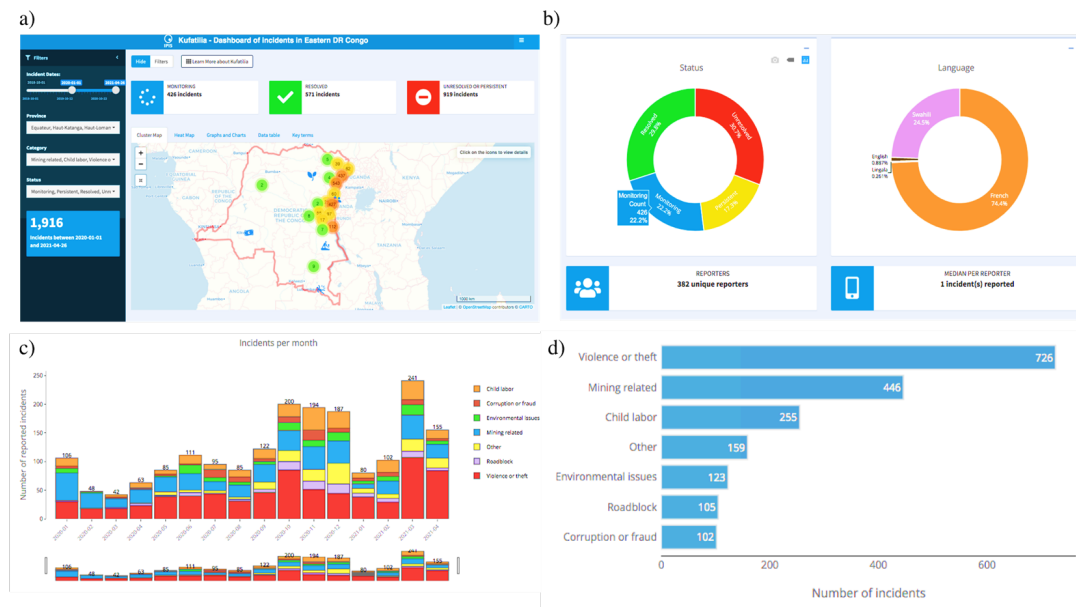
### **Key points for Field of Action 1**

1. The previous and current integration of local communities into the decision-making framework to address social and environmental conflict issues is limited in the DRC.
2. Recent revisions in the DRC mining code and further enforceable legislation show marked improvements that specifically address community involvement, i.e., stakeholder and capacity-building initiatives.
3. Pilot programs (still in their infancy) are revealing that artisanal and large-scale mining in the DRC have the potential to become aligned with global sustainability best practices. However, significantly enhanced collaborative efforts on behalf of all stakeholders (mining companies, governing bodies, local communities, NGOs, etc.) will be required.

### **3.2 Field of Action 2: Multistakeholder Collaboration**

Fostering active collaboration between scientists and mining companies to support landscape sustainability, research innovation, and incorporating state-of-the-art technologies into mining operations calls for novel and sustainable technologies and the creation of long-term collaborations with independent research institutions.

Collective action setting and collaboration of multi-disciplinary scientists with the mining industry can help to progress towards sustainable mining operations. Scientists (both from academia or working within the private sector) can facilitate accurate delineation of baseline conditions resulting from mining operations both at the environmental and community level in phases: pre-mining landscapes, during and post-mining. This kind of baseline data can assist decision-makers and communities with



**Figure 5.** Real-time monitoring and addressing of mining-related incidents based on SMS reporting (Data retrieved April 26, 2021, a) Map of incidents; b) Status and language of incident report; c) Incidents per month and category (child labor, corruption or fraud, environmental issues, mining-related, other, roadblock, violence or death); d) Total incidents per category to date  
**Source:** International Peace Information Service (IPIS, [https://ipisresearch-dashboard.shinyapps.io/kufatilia\\_app/](https://ipisresearch-dashboard.shinyapps.io/kufatilia_app/)).

the information required to determine and mitigate negative impacts. When scientists (social, political, and natural sciences) and other stakeholders are actively engaged throughout all phases of mining operation, specific challenges can be identified and addressed through consensus, and the development of strategies to address complex social conflicts can be negotiated in a timely manner. The promotion of mechanisms to monitor water quality impacts from mining operations and incentives to support efficient utilization/recycling of water in mining operations can immensely benefit from collaborating with scientists and well-timed adoption of sustainable practices. As an added benefit, scientists can help elucidate different use priorities for natural resources as well as different understandings and forms of knowledge related to resources. Besides, multi-stakeholder collaboration can help identify needs for education and knowledge outreach and help create accessible training content in formats suitable for local communities as well as large companies to ensure mining is a sustainable enterprise not just in terms of economic operation but brings co-benefits for nature and people/communities.

Furthermore, engaging the industry in scientific involvement is possible through various means such as primary research (i.e., by primarily academic researchers), publicly available environmental/social assessments (i.e., by industry mine personnel or consulting companies), public education initiatives, and scientific advisory boards. In the case of the DRC, this can be deployed via conducting primary research studies for the mining industry that undergo rigorous peer review by unbiased external parties before publication, which adds transparency and rigor to ongoing monitoring and management efforts. The peer-review process is especially critical as it lends trustworthiness to research data to either support or counter accounts given directly from the mining sector that may be viewed with skepticism due to a conflict of interest. When independent assessments of the quality of the information provided are missing, it is unlikely to build or improve relationships of trust between companies and communities. Overall, this practice provides a series of positive effects, such as improving transparency, minimizing bias, and allowing for data availability (if results are made publicly available and translated into understandable formats) for local stakeholders in the community, government, industry, and the global scientific community.

In terms of existing information, published studies delineating impacts from large-scale industrial mining in the DRC are scarce, likely due to mine site access. Compilation of the available literature (Atibu et al. 2018; Manda et al. 2010; Mulambi et al. 2013; Mees et al. 2013), including peer-reviewed research studies on the environmental impacts of mining, reveal that such investigations are limited. Belgium IPIS conducted on-the-ground research on ASM activity in the Eastern DRC (Weyns et al.



2016), while Atibu et al. (2013; 2016; 2018), Mees et al. (2013), and (Mulambi et al. 2013) organized primary research studies in the Katanga region. These experts noted significant environmental impacts of mining operations, such as significantly elevated concentrations of metals and rare earth elements and a multitude of risks to ecological and human receptors (Cheyns et al. 2014; Nkulu et al. 2009; Squadrone et al. 2016). It is important to note that researchers collected samples from sites not owned by mining companies, most likely due to a lack of granted access.

A review by Otamonga and Poté (2020) put forth that environmental research investigations primarily focus on either abandoned mine sites and/or ASM mining areas, likely due to lack of access to on-site operations by external researchers. There is a parallel small body of literature that investigates the social side of mining in the DRC (Cuvelier 2011; Hayes and Perks 2012; Tsurukawa et al. 2011). Beyond the studies mentioned above, a few additional initiatives assessed the impact of mining in the DRC, including The Carter Center, which created online interactive maps of mining activities across the DRC and provided a repository for mining industry documents relevant to operations ([cartercenter.org](http://cartercenter.org)). As part of this initiative, “A State Affair” was released as an extensive research document outlining and examining the financial activities of state-owned Gecamines with evidence from interviews with numerous relevant actors/stakeholders. Whether local or international scientists of any discipline were included in the report preparation remains unclear.

To value the significance of a proper peer review process, we refer to a recent environmental and social impact assessment for a proposed mining project in the DRC (Africo Resources LTA 2008). The report contained a crucial error in arsenic concentration guidelines proposed by the World Health Organization on drinking water that reported the concentration to be an entire order of magnitude higher (i.e., ten parts per million rather than ten parts per billion). These kinds of errors potentially allow assessors to unintentionally, and inaccurately, delineate baseline conditions in the pre-mining stage, which can have a significant impact on people and biodiversity/ecosystems. Within the social impact assessment, there was a section (“Issues and Responses”) with comments from the local community which contained only one or two sentences given in response to the comment on the significant and complex issue of involuntary resettlement. The use of vague statements is common to both environmental and social assessments and the corresponding environmental management plans. For example, a recent environmental assessment report from a large-scale mine proposal states that “*the discharge of significant mine drainage water, from surface runoff during the rainy season, to the Kisankala Stream is likely to occur. In the event of this occurring, the discharge will be carefully managed to minimize the effect of water surges on downstream infrastructure*”. The vagueness of “carefully managed” points to the question of actual management plans in the event of effluent release. This type of vague language is quite common - perhaps on purpose - in the environmental and social impact assessments in the DRC, and that issue is certainly not isolated to this nation.

## Key points for Field of Action 2

1. The need for better collaboration between local and international scientists and mining companies to engage in research-based operations is apparent.
2. The focus on the generation of baseline data studies by certified labs and in accordance with unified standards for analytical measurements are crucial for future mine planning.
3. An online repository of environmental assessments should be organized in a way that data can be critically assessed and then utilized for baseline information. Further, scientific advisory boards should be established, with regular meetings to address priority issues.

## 3.3 Field of Action 3: Smart and Scalable Regulatory Norms

Establishment of national and international standards, knowledge management and transparent operational systems

Transparency is a cross-cutting term when applied to the mining sector that concerns all components in the value chain, including data collected during the environmental impact assessment, in the environmental monitoring before, during, and

after the operation, as well as on company financial records, permits approval, mineral source tracking, and health and safety incidents. The status of transparency in the mining sector of the DRC is quite segregated. There have been various reports and complaints of significant issues, including the permitting process, environmental monitoring for mitigation of adverse effects across all the value chain of active foreign and state-owned companies, ASM practices, particularly related to child labor, gender insensitive approaches and lack of up-to-date health and safety standards.

Explained using three aspects of transparency across mining operations in the DRC (economic, conflict minerals, and environmental monitoring), we highlight the gaps and needs for transparent and sustainable mining operations in the region in the following paragraphs.

### Transparency in the Economics of Large-Scale Mining Operations

Acknowledging that good governance relies in part on enforceable legislation, several important shifts have been noted in the DRC with the introduction of the mining code in 2002 and its revision in 2018. As mentioned previously, the latter aims to significantly improve the transparency of mining operations, particularly in the financial and permit approval aspects, mainly towards halting corruptive practices at different levels. In 2005, the DRC voluntarily joined the Extractive Industries Transparency Initiative (EITI), developed by the UK Department for International Development and the World Bank, committing itself to apply a set of principles that include publication and verification of company payments and government revenues from mining. The EITI is an "umbrella organization", facilitating members of civil society to promote public debates and events and providing protection against attacks by the government itself, as it officially supports the EITI. Some criticisms have been brought forward against the EITI (Bourgouin and Haarstad 2013). Nevertheless, the EITI validations claim to provide an impartial assessment of whether the implementation complies with a framework that promotes a culture of transparency in the DRC, mainly concerning the dissemination of data from the extractive industries, the improvement of data collection and reporting, and the establishment of channels for civil society participation in decision-making.

The DRC was accepted as an EITI candidate in 2008 and, after two validations, was declared compatible in 2014. In 2017, there was a period of lack of confidence among stakeholders due to an internal crisis in governance, which led to the suspension of the national coordinator and the removal of one of the civil society representatives. The internal crisis was caused by allegations of poor financial management ratified by an external audit firm. The 2007 to 2014 financial dealings of the state-owned Gecamines and investment partners were investigated and documented in the report "A State Affair" by the Carter Institute (2017) based on at least 1000 corporate documents, 200 interviews, a review of over 100 mining contracts, and data from the EITI, reflecting significant mismanagement and precarious financial records. Although the EITI process resumed, its internal governance in the DRC remains uncertain; the lack of transparency in the nomination of people and indecision in financial management are noted as critical concerns. The last EITI validation and evaluation was in 2018. It concluded that the DRC had made satisfactory progress in engaging government, mining companies, and civil society in following up recommendations, including outcomes and impact of implementation. However, the current transparency of financial dealings and permit approvals involving both national/foreign mining companies and governing bodies remain unwarranted.

### Transparency in the Case of Conflict Minerals

Consumers' demand for sustainable and fairly mined and traded ore is rising. If the Congo region and constituting states like the DRC, where mining operations are many and diverse, manage to adjust their production to these needs, they can profit from the building demand. Consumers accept higher prices if social and environmental standards adherence is communicated clearly. In 2003, the DRC became a member of the Kimberley Process (2003) which seeks to restrict the marketing of diamonds whose revenues could finance armed conflict. Currently, consumers can't track the origin of their products' components. Some major industrial mining companies have made public announcements to improve transparency in the supply chain. For instance, Huayou Cobalt (the main supplier of the cobalt used in batteries for the electric vehicle industry, including LG Chem of South Korea and Germany's Volkswagen) announced its intention to improve transparency in its supply chain to allow for better tracing of the origins of the mineral (Financial Times 2020) to regulate mining operation employing child labor and/or those operations that support revenues for armed groups in the country. The Just Gold project was launched in 2015. It is funded by Global Affairs Canada as part of IMPACT's Building Responsible Supply Chains for Development in Africa's Great Lakes Region program, with



additional funding previously provided by USAID through their Capacity Building for Responsible Minerals Trade (CBRMT) project, and the International Organization for Migration as well as from Apple and Humanity United.

While some of such efforts are ongoing, transparency in the supply chain still needs to be improved and requires a wide-scale shift. For reference, see Box 1, which illustrates best practices in relation to ASM in other regions of the world.

### Box 1: Best-practice Examples of ASM Cooperation in the South American Region with Cross-scaling Potential

Numerous certification methods that aim at “responsibly mined” metals and minerals exist (Schoderer et al. 2020) and are adopted by states engaged in mining operations. Among these are the Initiative for Responsible Mining Assurance (IRMA), Chain of Custody Certification by the Responsible Jewellery Council, Conflict-free Gold Standard by the World Gold Council, and Fairmined Standard certification by the Alliance for Responsible Mining. Some best-practice examples exist for cooperatives/associations that support ASM miners, mainly in organizational, technical, environmental, and commercial aspects. For instance, the global Alliance for Responsible Mining helps ASM communities create action plans based on diagnostics. The aim is to achieve all requirements of the Fairmined Standard certification for the gold produced by ASM mining organizations that have existed for ten years. In 2009 and 2010, the Alliance for Responsible Mining started with pilots for the standard in Bolivia, Colombia, Peru, and Ecuador, which caught the attention of some organizations to work towards certification (Pinto Martinez and Villa 2014). In Peru, a significant effort by the mining companies to improve their relationships with the local communities has led to the development of social responsibility programs and even made economic contributions. One example is the Antemina Mining Fund (AMF), which received 3.75 % of the company's profits from 2006 to 2011 to implement several programs to reduce child malnutrition, improve the quality of schools, provide community access to basic health services, and help the local government to improve infrastructure in Ancash (de la Flor 2014). Since then, the Alliance for Responsible Mining has supported many ASM in South America (Patrick Schein's - Gold is even more precious when it is fair, [patrickschein.com](http://patrickschein.com)), e.g., in Puno, Peru (Fondation Ensemble 2020).





## Transparency in Environmental Monitoring and Reclamation

This is key both for ASM and large-scale operations. However, formalized environmental monitoring during ASM is either restricted or non-existent in the DRC. Peer-reviewed studies that examine the legacy impacts of historical mining (i.e., abandoned mine sites) are limited (Otamonga and Pote, 2020). UNEP (2017) states that a lack of controls in ASM has led to land degradation and pollution, and the role of environmental regulation in these value chains is lacking, with the role of the local community in environmental monitoring being severely underrepresented. National and foreign mining agencies in the DRC have relatively high environmental footprints, but they are also well-positioned to make and steer significant developments in sustainable mining operations as they allocate financial resources and have technical experience in applying global environmental standards/best practices in mining value chains. In addition, they are operating under international pressure for the “social license to operate.” Generally, information can be accessed via environmental impact assessments (EIAs) generated by large-scale companies, as documents are usually published online. However, as mentioned in FoA 2, these are often carried out by third-party consulting firms, and their technical quality and scientific rigor vary widely. Moreover, access to environmental monitoring data, particularly in areas that are identified as at risk in the EIA (e.g., risk of effluent release into watersheds) is significantly more difficult to track, and language often uses cryptic terminology or technical jargon, making transparency limited for local communities (more details in FoA 4). This trend is not unique to the DRC but is prevalent in Africa and other continents carrying out mining operations.

Managing complex information from multiple sources, ensuring interoperability between them in a single place, and allowing easy access to the various actors is a huge challenge for the mining industry and the stakeholders. However, regular reporting structures where companies share information with communities are considered important pillars of a transparent stakeholder engagement process. International best practices can be adopted (see Boxes 1 and 2). Even more significant is the challenge of disseminating this information to the population in a country of great territorial expanse and extremely diverse socio-economic and socio-cultural settings, with precarious infrastructure of transmission and a population with a low human development index. In such settings, it is essential to translate technical and scientific information into a language easily digestible by regular



citizens and not use these challenges as an excuse for inaction.

Another example of transparency in environmental risk assessment is the interactive online map, developed in the research project OekoRess (Rechlin et al. 2022), which demonstrates the potential environmental hazards of the world's most relevant 100 iron, copper, and bauxite mining sites. For the DRC, the Kamoto, Mutanda, and Tenke Fungurume copper mines were evaluated and factsheets were produced.

## Box 2: Best-practice Examples of Good Mining Impact Monitoring Policies in the Region

Good examples of environmental monitoring of mining operations are noted in several countries, including Kenya, Peru, and Mozambique. In these, community-based and collaborative monitoring of environmental and human rights issues around mines was conducted. The activities aimed at strengthening participation in decision-making and training communities on the technical aspects of monitoring water, air, and noise around mining sites. Also, local communities and authorities were trained on human rights impact assessments via on-site training, manuals, equipment, and training of trainer's models. In Kenya, a capacity development program for artisanal miners was set up covering legislative requirements for ASM, mine devolution, occupational safety and health, and human rights. FoA 2 discussed pilot projects in the DRC, directing capacity development for responsible minerals trade (CBRMT) and showing how IPIS is adopting bottom-up approaches to improve incident monitoring and instituting sustainable mining. An intervention, "Detoxifying water streams from mining effluents in Musoshi" (funded through the SDG Actions awards; initiated a comprehensive environmental review on pollution levels in the soil and water along the Musoshi River using a mixed method tool (sampling, remote sensing, and land-use suitability mapping). The project focused on the remediation and detoxification of community rivers that were contaminated as a result of local and legacy mining and on the assessment of health impacts on communities living in this watershed. A report was undertaken to inform the community of potential soil and water contamination risks and to enhance the capacity of local and provincial governments to enforce their policies for remediation interventions. A citizen science element was developed to train farmers, community members, and students in the community to participate in sampling and conduct surveys to document the risk of water pollution and river contamination.

The evaluation, according to the OekoRess method, is a hazard potential-based assessment, which does not assess actual hazards, risks or impacts, but serves to identify environmental aspects that require attention. The standardized evaluation method includes hazards related to geology and technology (mine type, waste, remediation), which are in parts medium to high for the Congolese mines; site hazards (accident hazard, water stress, protected areas), rated relatively low in the DRC; and governance (state and international agreements) as well as corporate social responsibility standards, which were largely not ratified in the evaluated Congolese mines.

For risks related to the mining value chains in the DRC, it remains to be seen if these are assessed accurately and addressed appropriately. Therefore, developing a coordinated Knowledge Management Platform to improve transparency is essential. The mining code of the DRC requires companies to publish a variety of information, including signed contracts, as well as their beneficiaries, revenues, and payments, production and sales statistics, taxes, royalties, and rights paid to the state. Although the code explicitly points to the fact that some of this information must be published in the Official State Journal and on the website of the Ministry of Mines, no more specific guidelines on disclosure of the other types of information is cited. We call for the creation of a coordinated Knowledge Management Platform for collecting, storing, managing, analyzing, and sharing data among all stakeholders, especially the local, most affected, and most neglected communities, in a way that is understandable to such communities. In a country where a vast majority of the population does not have access to the internet, such a platform must go far beyond a simple website but must be present in a variety of other media, including a community bulletin board, booklets, broadcasting on local radio stations, as well as organizing frequent meetings with community leaders. It should also not function only as a data repository but should enable and promote information and knowledge exchange, produce syntheses, and support decisions.



### Key points for Field of Action 3

1. More international awareness about the efforts of local organizations that advocate for greater transparency in the management of natural resources should be raised.
2. Production chains must be disclosed to highlight that the raw materials for most worldwide used electronic products originate from the DRC, demonstrating the co-responsibility for the problem. This way, producing companies will realize the high demand for the raw materials extracted in accordance with processes that promote environmental integrity, social justice, and local development, as is the case of the Kimberley Process (2003).
3. Mining companies, in collaboration with the state, should create and maintain open-access platforms (Knowledge Management Systems (KMS)) to ensure easy dissemination of information about mining activities to all stakeholders, unifying information scattered over different sites. The platforms should be constructed according to the information needs of their end-users (e.g., local populations) to serve as an information portal to them.

### 3.4 Field of Action 4: Contingency Plans and Failure Mitigation Measures

#### Proactive development of environmental and social assessments in mining operations with rigorous planning, monitoring, and evaluation

For sustainable mining operations, procedures and protocols for mitigation, environmental preservation, monitoring, and risk prevention remain fundamental to environmentally and socially safe mining. Mitigation commences at the pre-mining stage to preserve ecologically resilient landscapes that can absorb and recover from environmental disturbances. Robust environmental monitoring is required to successfully preserve and restore the landscape during and after mining operations. The monitoring activities must be integrative and effective, flexible and adaptive, and plugged appropriately in the mining life cycle and throughout the operational and reclamation phases. Processes include - but are not limited to - monitoring of discharge water quality, the structural integrity of tailings dams, underground mine workings, management of altered waterscapes (for example, monitoring landscape changes over time using GIS as well as Remote Sensing tools and techniques), and ecotoxicological assessments. Along with risk assessment, contingency plans integrating socio-economic and environmental aspects should be instituted to address emergencies. In case of significant failure or accidents, immediate action plans and follow-up activities outlined in strategic operational documents should be on hand, so that public review investigations can be initiated immediately after an incident. As part of the sustainable mining strategy, alongside restoration objectives for watersheds and landscapes, implementing integrated, nature-based, and economically and ecologically sustainable interventions should be considered. For instance, nature-based solutions like Africa's Great Green Wall initiative, ongoing since 2007, offer the potential to provide climate resilience and biodiversity recovery alongside economic and livelihood opportunities for local communities (Conflict and Environment Observatory 2020). Such large-scale programs hold potential for collaboration and for jointly designing action programs. Another example of nature-based solutions is the reclamation of mine spoiled land using native vegetation, considering soil characteristics and involving local workers in a Zinc mine in India (Dhyani et al. 2018).

#### State of Mitigation and Contingency Planning in the DRC

Mining is among those industries where accidents and environmental incidents occur most often. ASM, commonly carried out without health and safety practices, results in even higher numbers of incidents (Annex Table 1). In the DRC, many people die annually in accidents in largely unregulated artisanal mines, and many such cases go unreported (FoA1 for programs addressing this challenge). From 2012 until 2020, a total of 200 deaths and 400 injuries were reported from mining-related accidents (Annex Table 1). The accidents resulted from pit and tunnel collapses caused by rain events and landslides, as well as from underground fires in mines in various mines and regions throughout the DRC. These examples likely represent only a fraction of the actual incidents.

Another crucial aspect of this FoA is the risk of tailings dam failure – a global issue for the mining industry. Numerous environmental and social tragedies have been reported worldwide (Lyu et al. 2019) with catastrophic consequences, including loss of human life and environmental devastations as those experienced recently in Canada and Brazil. Lyu et al. (2019) identified that “keeping the tailings pond safe and stable is the most challenging task in the entire mining process” and presumably most, if not all, large-scale operations in the DRC contain a tailings storage facility and/or pond. While no reports could be found of tailings dam failure in the DRC, the lack of transparency, as discussed in FoA 3, raises significant concern around the monitoring of constructed dams, particularly about the effectiveness of mitigation to risk prevention. The ESIA for the Africo Resources Limited’s (ARL) copper and cobalt mine on the Kalukundi Concession in the Katanga Province (2008) expressed concerns of high risk to “public safety impact due to tailings storage facility (TSF) failure” and risk was listed as high even after mitigation efforts commenced. For building tailings or waste dams, a Portuguese law firm (Vieira de Almeida (Vda) 2019) states that regulations require the submission of an emergency plan to the relevant authorities, which must also be made available to the neighboring communities and should be regularly inspected by authorities.

The new mining code in the DRC addresses these dimensions and outlines a contingency plan (Kabila 2018); nevertheless, its wide-scale implementation is yet to be seen. The Mining Association of Canada’s program (2019) - Towards Sustainable Mining - (TSM®) states that “each tailings facility is unique, reflecting site-specific environmental and physical characteristics that contribute to shaping the most appropriate approach to performance and risk management for that facility”. A tailings management framework proposed by the TSM (The Mining Association of Canada 2019), as shown in Figure 7, is an example of best practices for the phases of a tailings facility life cycle that includes a planning phase, implementing tailings management framework, performance evaluation, and management review for continual improvement. We recommend that a similar framework be adopted on a wide scale for the region, including for the DRC, taking note of local specific context, socio-economic complexity, and socio-political systems.

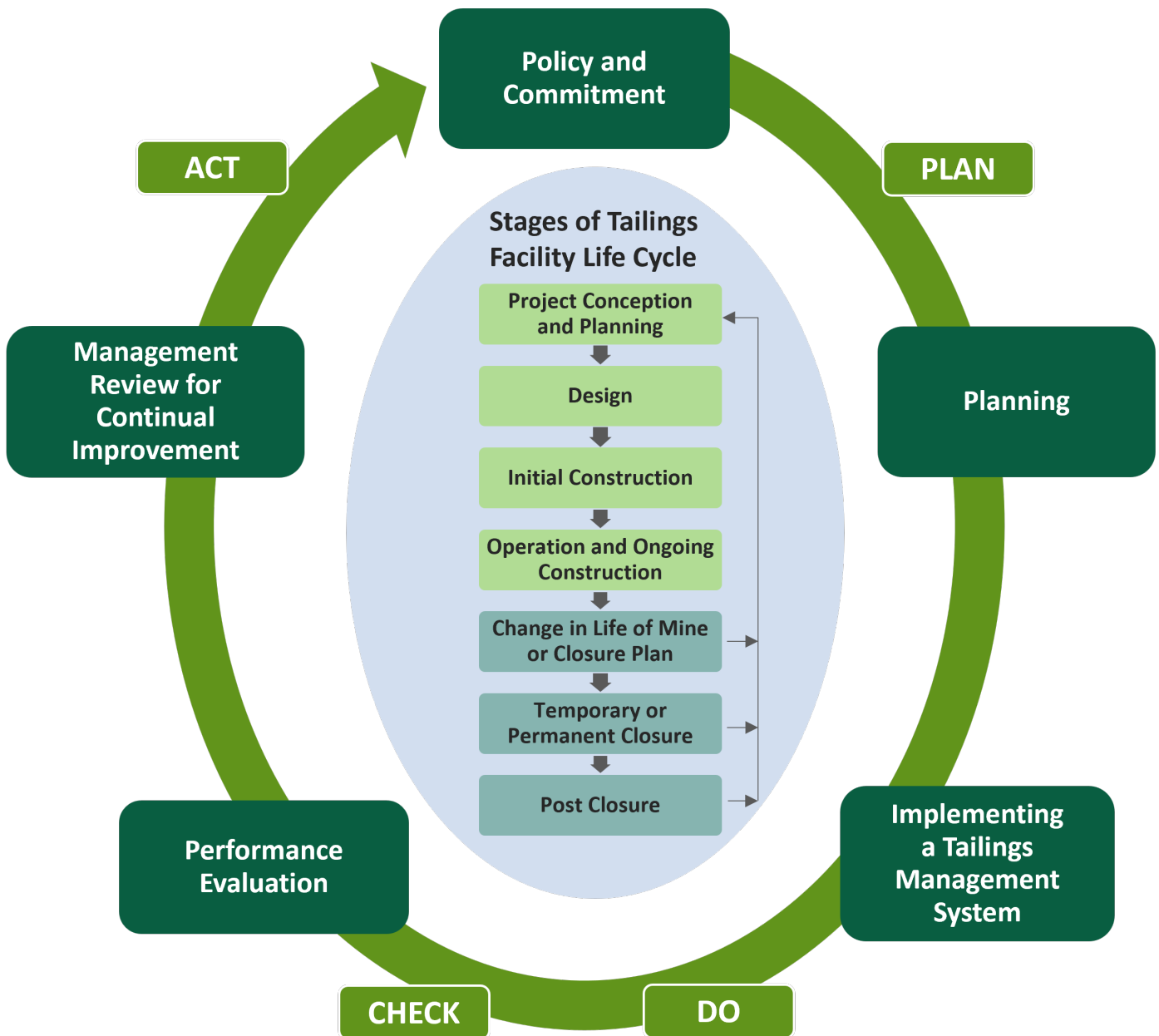
#### **Key points for Field of Action 4**

1. Rigorous environmental and social impact assessment must be implemented in the pre-mining phase and contain plans for tailings management. The reformed mining code in the DRC reflects improved measures to address ESIA’s that could allow for better contingency planning, but evidence of wide-scale implementation is yet to be accomplished.
2. Community-based and collaborative monitoring needs to include the transparent identification of human and environmental risks of large-scale mining operations, including timely reporting of minor and major failure events and the observance of compliance with environmental and social management (ESM) plans.
3. For the ASM sector, cooperatives/associations can offer support to address environmental and social challenges. Taking note of best practice examples with bottom-up approaches from this region or elsewhere in the world can help a country outline a comprehensive and inclusive sustainable mining strategy.

#### **Gender Blind Spots in the Mining Value Chains in the Congo Region**

In addition to these four FoAs, we highlight an additional aspect that appears as a persistent gap in the existing regulatory norms of the mining sector.

In Sub-Saharan Africa, ASM engages more than 10 million, of whom at least half are women (Hinton et al. 2003). In the mining sector in the DRC, for instance, women undertake a variety of positions and responsibilities across the supply chain, particularly ground jobs such as gathering, sorting, and washing minerals, or/and providing services to the mining community such as cooking, running a small business, and engaging in the sex trade (Hayes 2008; Hayes and Perks 2012; Lahiri-Dutt 2008). Mining operations in the region, particularly small/subsistence and unorganized ones, often report conflict episodes. Noted from the region of South Kivu (among them Walungu and Kalehe in the DRC), rural women actively migrate to seek employment in



**Figure 6.** A tailings management system, developed site-specifically and implemented throughout the life cycle through iterative Plan-Do-Check-Act cycles, is an essential tool to achieve performance objectives, manage risk, manage change, and drive continual improvement. A effective tailings management system provides a mechanism to integrate and coordinate the activities, people, and resources related to tailings management. Ultimately, a tailings management system is a tool to manage the people involved in tailings management and the ways in which they interact, communicate, and make decisions regarding tailings.

**Source:** Mining Association of Canada



mining areas to counter dire conditions in their villages, which include but are not limited to violent situations resulting from sociopolitical volatility, lack of livelihood or opportunities for income generation. Besides the lack of safety and sanitary working conditions faced by the majority of ASM workers, women also suffer from physical and psychological abuse, sexual and economic exploitation, lack of social cohesion, and restricted or no access to justice systems. There are accounts of women being excluded from the workforce or threatened if they refuse to perform such favors (Kelly et al. 2014). Additionally, violence against women is often used as a method of warfare in provinces of the DRC during conflict situations. In the case of conflict minerals, a common perception is that women experience abuse and sexual violence, mainly by armed men. However, events of violence and abuse are also reported from miners, company or state-employed security (Hill et al. 2016, Castañeda Carney et al. 2020), and other civilians. The sex trade in mining towns is widespread and sex work, sexual violence, rape, risk of HIV/aids, and other sexually transmitted diseases are prevalent (Kelly et al. 2014).

Currently, the DRC supports programs either focusing on treating victims of war and rape via isolated medical and social support or helping women leave the mining industry with their harsh working conditions, e.g., by offering alternative skills training and microcredits. However, most of these women are largely uneducated, making it hard to fulfill employment criteria in many sectors. The mining-value chains needs to be gender-sensitive and include a more significant focus on mitigating the health and wellbeing-related impacts argues Lahiri-Dutt (2011), highlighting the urgent need for health services (reproductive health services, psychosocial counseling, and medical care), safe and fair working conditions, education about the mining code and existing rights, support to organize women-led associations and cooperatives, and realization of their rights through local and state governments policy support systems.

A study that involved interviews with workers and communities associated with mining in South Kivu Province noted that none of the respondents (women) had aspirations of achieving high-earning roles in the mining industry, showing their widespread misconception and ignorance of norms and policies regulation/laws on the rights of women in the sector (Kelly et al. 2014). Women are generally engaged in jobs at the bottom of the value chain, such as working in bars or as cooks, and rarely participate in the physical act of mining on either large-scale industry or ASM. This renders their lack of representation in mining decision-making bodies. ASM and the large-scale operations often led by foreign companies hold the potential to develop, publish, and implement company-level gender policies, and these commitments should be reflected across the company standards, guidelines, and processes. Hill et al. (2016) state the need to develop gender-integrated mining policies and call for gender impact assessments to be an integral part of social and environmental impact assessments. Some recent efforts to close the gender gap in the DRC include the establishment of the national “Women in Mining” association (RENAFEM, [internationalwim.org](http://internationalwim.org)) initiated by the Congolese Government supported by the World Bank and the European Union (International Women in Mining (IWIM)). Further, in March 2017, the Artisanal Mining Women’s Empowerment Credit and Savings (AFECCOR) project was launched in the Democratic Republic of Congo’s North-Eastern Ituri Province.

However, it remains to be seen how effective and widespread such progressive pathways will be toward addressing the array of gender-related challenges in the mining industry of this region.

## **4. Summary and Recommendations**

### **4.1 Looking Forward to Establish Sustainable Mining Practices in DRC**

A key challenge of modern society is to choose wisely how to produce mineral commodities that will serve sustainable societies (Giurco and Cooper 2012). The DRC’s new mining code was adopted in 2018 and, while it reflects a positive move, the clarity on enforceable social and environmental regulations implementation strategy is limited. This new legislation has caused enormous tensions between companies and the government due to significant changes to the financial framework with increased taxes, which companies have argued make operations not financially viable. Media stories report that the President of the DRC instructed the government to open consultations between different stakeholders, however, these statements have largely gone unaddressed (Mining Review Africa 2020). Rapidly expanding global and regional markets for digital products continue to build pressures on mining for coltan (The McGill International Review 2021). In the DRC, the mining policy is moving forward to an array of transparency aspects, from financial records to permit approval, environmental monitoring to mineral source

tracking, and health and safety incidents. However, there is still a long way for improvements/reforms to be implemented and put into practice by the state. Transparency initiatives should utilize the most widely used media channels in the DRC, from traditional to social media, as civil society groups often use social media tools to organize and share information. It is anticipated that supporting and scaling best practices will result in better revenue chains from the mining sector and significant contributions to improving the well-being of the population and communities in the wider Congo region. It remains unclear how widespread internal rigorous environmental monitoring occurs, and unbiased peer-review research studies at industrial sites are limited. As long as communication on this front with local communities is limited, companies will continue to experience conflict perpetuating accusations of environmental misconduct (i.e., “This is what we die for”, Amnesty International 2016). The revised mining code of the DRC (2018) points to more directed legislation on environmental monitoring, however, the call for coordinated prescribed measures for sustainable mining practices in line with international standards is urgent. This includes incorporating state-of-the-art scientific advances to reform and transform this industry. Further, acceptable and transparent environmental sustainability guidelines should be followed, and consensus with large-scale mining companies should be built to steer sustainability-focused advancement.

In the context of ASM, Salo et al. (2016) reflect critically on formalizing the sector, instead suggesting bottom-up processes for governing and managing ASM impacts via mesoscale collaborative approaches. Based on their work in Peru, they report the following recommended actions: appointment of a regional mediator with a strong mandate, establishment of a mobile formal office, and the implementation of a series of coordinated but independent impact management activities through an impact management plan. Furthermore, Carvalho (2017) provides examples of mining projects that have been able to achieve positive agreements with the community, while contributing to social and environmental aspects. Among them, the author refers to settings where some degree of ASM is allowed, and cases in which the recycling of scrap from the mine is encouraged, or even situations in which the local community was paid to work in reforestation programs. A critical overview of challenges and limitations concerning the certification of ASM by Bodenheimer (2014) highlights the potential of the approach in making significant contributions to development and poverty reduction.

Collaborative efforts between the local or international scientific community and the mining industry are not currently well developed, and there is a limited amount of peer-reviewed literature to provide an overview of social and environmental impacts. In the absence of primary research literature, a baseline and/or overview of current conditions obtained from recent assessments (environmental and social impact reports) conducted by the mining industry in the DRC may serve a purpose. Sometimes they are made available publicly but not peer-reviewed; they are difficult to locate, or not presented in an easily usable format to external parties. Considering the limited information in the DRC to assess environmental and social impacts, these resources may serve a value to understanding baseline conditions before mining as well as to delineate all relevant stakeholders and key issues and risks. However, they may vary in scientific rigor depending on the authors and do not always include an external peer-review process.

Currently, there is little evidence of a partnership between mining companies operating in the region and the scientific community (local or international) researching political, social, or environmental aspects of mining. Some pilot programs (albeit in their infancy) are underway in the DRC’s Copperbelt, demonstrating the potential benefits of bottom-up mining industry. Continued forward progress will need to include the generation of baseline data studies, including both social and environmental data, with quality assurance and control measures established to accurately assess mining-related impacts as well as online repositories of assessments that can be critically assessed by stakeholders. While some information is already accessible through the DRC Mining Registry (Cadastre Minier), further transparency is required, as the lack of such raises serious concerns over the mitigation and contingency planning efforts in the event of large-scale failures such as tailings dam collapses, as in other heavily mined countries such as Brazil and Canada.



## 4.2 Concluding Remarks

### Mining Sustainability

- Mining operations directly and/or indirectly intersect with each of the 17 SDGs. Sustainability-oriented practices in the mining sector can, therefore, support the implementation of these global goals and targets.
- By limiting negative socio-environmental impacts and promoting equitable benefit sharing and a role in decision-making processes, the mining industry can be a catalyst for positive change.
- Transformation of mining into a more efficient, science-based, and transparent sector with opportunities can be a catalyst for positive socio-economic impacts. With a reduced environmental footprint, it can also support the implementation of SDGs (income, livelihood, trade, economic growth, sustainable production, etc.). However, such a shift can only be realized by collaborative action from policymakers, mining companies, and communities with local input to adapt it to local priorities.
- Interdisciplinary collaboration between social, natural, and political scientists ensures that the social-cultural dimensions of environmental impacts can be assessed and addressed accordingly.
- The environmental and social assessments should include rigorous contingency plans and mitigation measures to be deployed in case of unforeseen incidents, conflicts, and similar needs like tailing management. Immediate and significant improvements need to be adopted to tailings management, as huge volumes of tailings pose a real threat to local communities near large-scale mining operations.
- Transparency in the mineral production chains in the region is a significant cross-cutting issue that – when addressed appropriately – can promote the maintenance of environmental integrity, labor regulatory norms, and local/community development.
- Gender-sensitive planning is critical for mining operations to become more gender inclusive. For that, the mining value chains need to be adequately recognized and various roles and attributes that gender groups have been fulfilling in the production cycles should be carefully considered in drafting and deploying mining plans and policies.

### Mining in the DRC

- Despite improved legislation, there remains a severe lack of control, implementation, transparency, and public environmental and social impact assessments in the DRC.
- Concerning mining operations, inequitable distribution of resources, particularly of water resources, calls for an urgent need to examine how social and environmental impacts are being addressed in the regions and the state (DRC), especially in light of interlinked issues such as poverty, (gender) inequality, and labor norms.

This synthesis highlights the need for more on-the-ground, peer-reviewed research to be carried out across the mining landscape in the region and in the DRC. With this document, we hope to catalyze discussion and action in the DRC concerning the adoption of sustainable practices throughout mining value chains.







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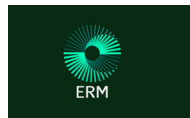
## Annex

Reported mining-related accidents, including environmental incidents from mining operations in the DRC collected from various sources.

Year	Region	Deaths	Injured	Source
2012-2013	Lubumbashi, Katanga Province		392	Elenge et al.2013
2014	Kasulo	15		Amnesty International (2016)
2014	Kawama area of Kolwezi	16		Amnesty International (2016)
2014	Mashambo near Kolwezi	9		Amnesty International (2016)
2015	Mabaya, a province in the DRC	13		Amnesty International (2016)
2015	Mabaya, a province in the DRC	17		Amnesty International (2016)
2015	Kasulo	5	13	Amnesty International (2016)
2015	Kasumbalesa	7		Amnesty International (2016)
2016	Kolwezi, in the southeast of the DRC	7		Reuters 2019
2019	Kampene (province of Maniema, Eastern DRC	21		BBC 2019
2019	Kolwezi, in the southeast of the DRC	40		Business & Human Rights Resource Centre 2019
2020	Kamituga town, South Kivu region, DRC	50		Deutsche Welle 2020
<b>TOTAL</b>		<b>197 +</b>	<b>405 +</b>	



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