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Abbreviations and Acronyms

Acronym	Description
ADF	Allied Democratic Forces
AfCFTA	African Continental Free Trade Area
AFD	French Development Agency
AHK	Southern African German Chamber of Commerce and Industry
ARISE IIP	ARISE Integrate Industrial Platform
ASM	Artisanal and small-scale mining
B2B	Business to business
BCC	Central Bank of Congo
BGR	German Federal Institute for Geosciences and Natural Resources
C4D	Cobalt for Development
CAEB	African Centre of Excellence in Battery Manufacturing
CAMI	Mining Cadastre Office
CDF	Congolese franc
CEEC	National Certification Agency for Exports
CEPGL	Economic Community of the Great Lakes Countries
CIF	Value for duty
CMOC	China Molybdenum Corporation
CNMC	China Nonferrous Metal Mining Group
COMESA	Common Market for Eastern and Southern Africa
CPS	Provincial Monitoring Committee
CTC	Certified trading chains
CTCPM	Technical Coordination and Mining Planning Unit
DBA	Disc-Based Association
DG-ECHO	European Commission's humanitarian aid and civil protection department
DPEM	Mining Environmental Agency
DRC	Democratic Republic of Congo
ECCAS	Economic Community of Central African States

ECRM	Extended critical raw materials (as defined for AfricaMaVal project)
EDF	European Development Fund
EIB	European Investment Bank
EITI	Extractive Industries Transparency Initiative
EPRM	European Partnership for Responsible Minerals
ERG	Eurasian Resources Group
ESG	Environmental, social and governance
ESIA	Environmental and social impact Assessment
EU	European Union
EV	Electric vehicle
FARDC	Armed Forces of the Democratic Republic of the Congo
FCA	Fair Cobalt Alliance
FDI	Foreign direct investment
FEC	Congolese Federation of Enterprises
FMO	Dutch Finance Agency for Developing Countries
FOMIN	Mining Fund for Future Generations
FX	Foreign exchange
GDP	Gross domestic product
GIZ	German International Cooperation
ICGLR	International Conference on the Great Lakes Region
IDAK	Provincial Monitoring Committee of the former Katanga region
IDAKI	Provincial Monitoring Committee of the Kivu region
IMF	International Monetary Fund
IPIS	International Peace Information Service
IRMA	Initiative for Responsible Mining Assurance
iTSCi	Tin Supply Chain Initiative
JV	Joint venture
KfW	German Credit Institute for Reconstruction
LSM	Large-scale mining
LSUs	Lithostratigraphic units

MONUSCO	United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
OHADA	Organisation for the Harmonisation of Business Law in Africa
PPP	Private-Public-Partnership
RMI	Responsible Mining Initiative
SADC	Southern African Development Community
SAEMAPE	Assistance and Support Service for Artisanal and Small-Scale Mining (formerly SAESSCAM)
SDG	Sustainable Development Goals
SEZ	Special Economic Zone
SGN-C	Geological Survey of the Congo
Sicomines	Chinese-Congolese Company of Mines
SMB	Bisunzu Mining Company
SME	Small and medium enterprises
SMI	Small and medium industries
SNCC	National Railway Company of Congo
SNEL	National Electricity Society of Congo
RF	Random Forest
UAE	United Arab Emirates
UCNDK	University of Nature Conservation and Development
UN	United Nations
UNIGOM	University of Goma
UNIKIN	University of Kinshasa
UNIKIS	University of Kisangani
UNIKOL	University of Kolwezi
UNILU	University of Lubumbashi
UNIMBA	University of Mbandaka
UOB	Official University of Bukavu

UOR-Butembo	Official University of Ruwenzori
VAT	Value-added Tax
WHT	Withholding tax
WP	Work package
ZEA	Artisanal mining zone

Wording

Mineral prospectivity: “Mineral potential mapping is concerned with quantifying and mapping the likelihood that mineral deposits are present in a study area. It is synonymous to mineral prospectivity mapping, which is concerned with quantifying and mapping the likelihood that mineral deposits may be found by exploration in a study area.”

Keywords

ECRM, Mineral potential, Ore processing, Refining capacities, Value chain, Primary raw material, Secondary raw material, Bottlenecks, Finance, Investment, Sustainability, ESG, Land-use, Taxation, Mining regulation, Mining policies, Responsible sourcing, DRC, Pan-African

Executive Summary

This report provides the reader with an overview of the key aspects regarding mineral resources, supporting regulations and institutions, as well as any related provisions in the prospecting of Critical Raw Materials (CRMs) in Democratic Republic of Congo (DRC). The report is an integral part of the larger AfricaMaVal project and, in that context, provides this country overview specifically aimed at European Union (EU) investors and decision-makers.

The DRC is characterised by an enormous mineral wealth and has a very long mining tradition. As of 2022, the country is the world's largest producer of cobalt and the second-largest producer of copper, together with Peru. The country is also significantly endowed in diamonds, gold and uranium relating to vast historic (no recent uranium production) and recent production. AfricaMaVal is focusing on the minerals and metals present in the fourth list of CRMs for the EU as well as on copper (Cu), nickel (Ni), tin (Sn) and manganese (Mn) that are particularly pertinent considering Africa's geological potential and their critical status in the digital and energy twin transitions. Within this context, the DRC has significant resources in copper, cobalt, manganese, lithium, tin, tungsten, tantalum (the "3Ts"), and niobium (mostly associated with tantalum) as well as germanium and gallium as possible by-products of zinc mining.

This report gives an overview of the geological setting and Extended CRM (ECRM) endowment of the DRC. It shows the value chain and potential investment opportunities in this value chain, as at present the majority of raw materials is only mined, concentrated and exported afterwards. We will also present insights into the regulations for financing, including taxation and royalties and give an overview about the macroeconomic context of the DRC. Besides these financial issues we will also present an assessment of the social, environmental and governance challenges of the DRC, which includes mining practices vs. environmental, social and governance (ESG) goals.

This also relates to the lack of implementation of certain legal and regulatory provisions in terms of transparency. There are a number of international industrial mining standards as well as due diligence initiatives, which address a broad range of ESG aspects and a few of them (focusing on artisanal mining and due diligence) have been specifically designed based on the situation in the DRC. The revision of the legal framework for the mining sector in 2018 and the new mining sector strategy of 2023, however, show that the state is committed to ensuring that the country's natural resources benefit its people.

Artisanal and small-scale (ASM) mining holds an important place in the mining sector of the DRC, with at least 0.5 million and up to one million artisanal miners, most of whom are working in the gold sector. Artisanal mineral commodities include cobalt and copper, the 3Ts as well as non-ECRMs such as gold, diamonds and gemstones (tourmaline). A number of mine sites in the DRC



show variable degrees of mechanisation and may hence be classified as semi-industrial in practice, even though this is not a formal legal definition.

There are a number of measures in place to formalise the ASM sector, including the establishment of the state service SAEMAPE. This service is responsible for ASM monitoring, the legal obligation to work in cooperatives, the registration of miners and traders and the establishment of artisanal mining zones ("ZEA"). However, the implementation of these measures is always a challenge. Currently, investment in the ASM mine infrastructure is very low. However, the DRC's artisanal 3T sub-sector could be a straightforward investment target to increase the country's artisanal ECRM production. Several mine sites appear to have sufficient production potential to justify semi-mechanisation. However, apart from the geological and economic uncertainties, it should be noted that there may be conflicts and tensions with local cooperatives, as semi-mechanisation is associated with the loss of jobs for unskilled labour.

DRC is a well-known mining jurisdiction with a modern mining law, a good geological database and increasing efforts to enforce environmental regulations and improve working conditions, especially in the ASM sector. On the other hand, there are some bottlenecks in the DRC, in particular the inadequate road and railway network, the frequent power outages and electricity supply shortages, as well as the ongoing conflicts in eastern Congo.

1. Extended Critical Raw Materials supply potential of the DRC

1.1. Inventory of the ECRM

1.1.1 Geological setting

Due to its high endowment with a range of raw materials, both ECRM and precious commodities such as gold and diamonds, the DRC is sometimes described as a ‘geological scandal’. The following geological description focuses on the main metallogenic provinces where critical raw materials occur. The major geological units are displayed in Figure 1:

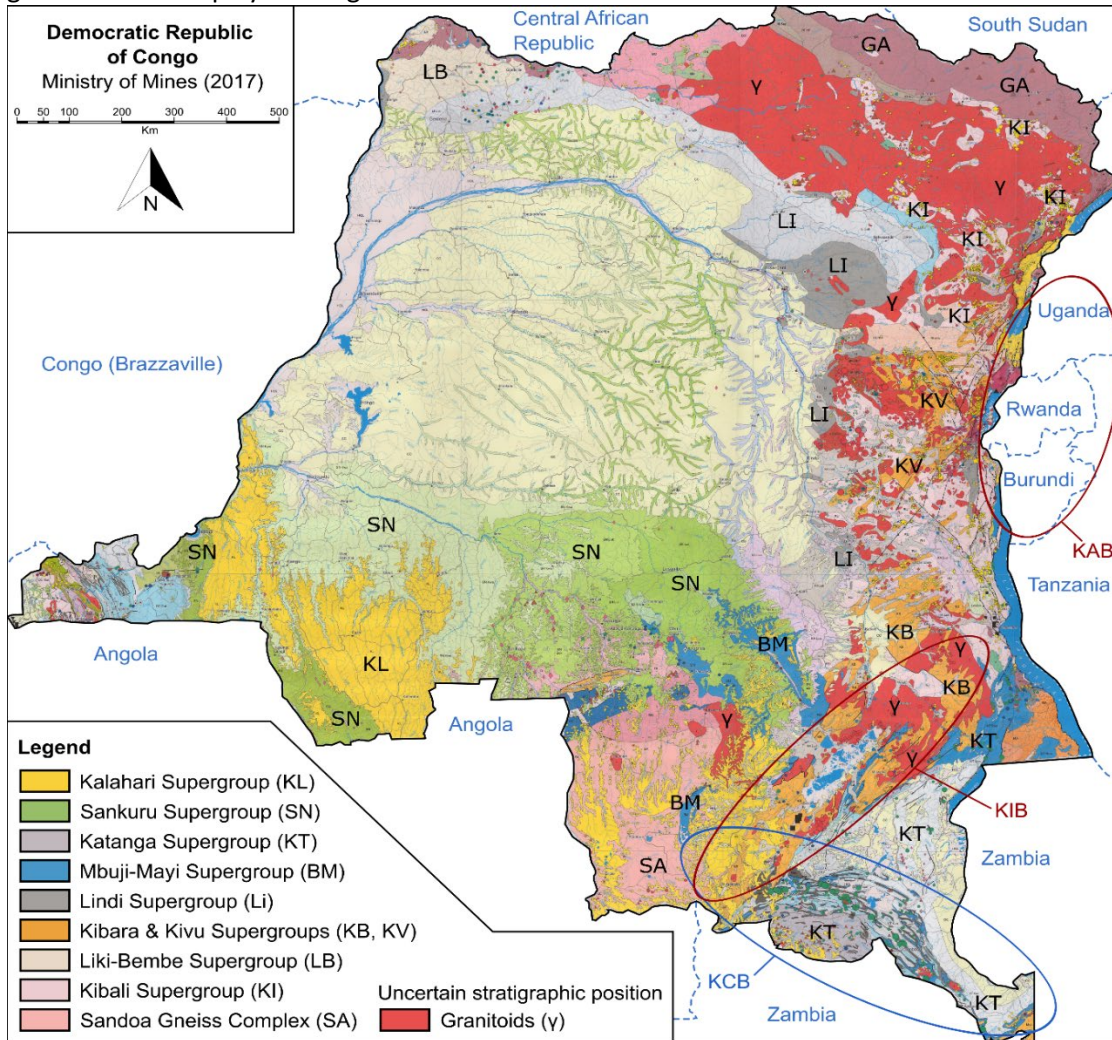


Figure 1: Geological map of the DRC¹

Katanga Copperbelt: The Neoproterozoic Central African Copperbelt stretches on both sides of the border between Zambia and Democratic Republic of Congo (Figure 1). In the DRC, it is

¹ . Modified from the DRC Ministry of Mines (2017) focusing on the major critical raw materials-bearing lithological units. Locations of the Katanga Copperbelt (KCB) and Kibara belt (KIB) and the Karagwe-Ankole belt (KAB) are also shown.

referred to as Katanga Copperbelt. It hosts one of the world's greatest concentration of stratiform Cu-Co deposits, including world-class deposits, such as Kamoto, Mutanda and Tenke-Fungurume. The USGS (2023) lists DRC-hosted reserves of 31 million tons of copper and 4 million tons of cobalt – this corresponds to 3.5% of the world's copper and 48% of the world's cobalt reserves, respectively. Current combined reserves and resources as registered in S&P Capital IQ (S&P 2023a) for individual DRC exploration and mining projects comprise 135 million tons of copper and 13 million tons of cobalt. The Copperbelt refers to the Katanga supracrustal sedimentary succession (Katanga Supergroup; Figure 1), which is 5-10 km thick and commonly sub-divided into three major lithostratigraphic units, namely the Roan, Nguba and Kundelungu Groups (François 1974; 1995). The stratiform Copperbelt Cu-Co orebodies occur in the Roan Group (i.e., in the Mines and Mwashya Subgroups; Cailteux et al. 2005). The Mines Subgroup (Congolese side) within the Roan Group represents a transgressive succession deposited in a reducing evaporitic environment comprising dolomitic shales and dolomites (Cailteux 1994). The Cu-Co orebodies occur in the lower part of these successions and the stratiform mineralisation was deposited before the Lufilian compressional tectonics affected the orebodies (Cailteux and Kampunzu 1995). Due to lithostratigraphic and regional tectonic controls, there is a trend from the rather Cu-rich, Co-poor Zambia-type deposits in the south to the more Co- and less Cu-enriched deposits of the Congo-type in the north of the Copperbelt (Oosterbosch 1962; François 1973, 1974; Cailteux 1994 and references therein).

Besides the primary sulphide deposits, oxidised cobalt minerals, i.e. heterogenite, are concentrated as “cobalt caps” along the top of silicified dolomite inselbergs (e.g., Kawama, Kasompi, Luiswishi). The supergene cobalt enrichment process is part of a regional process of residual ore formation that also forms world-class “manganese cap” deposits in western Katanga (southern part of the Kasai Craton).

Kasai Craton (Related provinces: Sankuru, Kasai-Central, Kasai-Oriental, Lomami, Lualaba): The Kasai Craton is located in the central south of the DRC (Figure 1). It is composed of Archean gabbros and charnockites in the south as well as Neoproterozoic carbonate formations in the north (Cahen et al. 1984). The craton is host to several mineral commodities: (i) The Mbuji-Mayi District (Figure 1) hosts significant diamond deposits, which have been a major source of gem-quality as well as industrial diamonds for many years; these have been worked as artisanal, semi-mechanised and industrial mines. The diamonds are hosted by kimberlite pipes, which intruded the crystalline basement (granites, gneisses, schists). Due to weathering of the kimberlite pipes, the sedimentary cover may contain secondary diamond deposits (de Wit and Jelsma 2015). (ii) The Lutshatsha and Nkonko mafic and ultramafic complexes comprise serpentinite, derived from dunite and harzburgite and yield significant potential for nickel and chromium mineralisation of laterite style (Philippe et al. 2018). The economic potential of these areas is currently unclear since the Kasai province has not been well explored, except for diamonds. (iii) The Kisenge-

Kamata Basin in the southern part of the Kasai Craton is host to Paleoproterozoic sedimentary manganese mineralisation. These sediments are also significantly enriched in Cu, Co, Ni, Zn and other accessory metals (V, Mo, Ga; De Putter et al. 2018). Similar processes which led to the formation of “cobalt caps” in the Copperbelt, also formed the manganese “black earths” (world-class manganese oxide caps) of Kisenge-Kamata that are exploited by both industrial and artisanal mining (Decrée et al. 2010).

Kibali Gold Belt (related provinces: North Kivu, Ituri): The Kibali Gold Belt is located in the north-eastern part of the DRC extending throughout the Kilo-Moto regions (Ituri province) (Figure 1). The Moto and Kilo areas have initially been mined at the Moto placer deposits in the Kibali River and the Kilo placer deposits east of the river. The Belt is composed of over two billion years old greenstone belts, which were intruded by granitoids. Both lithologies are spatially and genetically associated with quartz vein- and shear zone-hosted gold mineralisation. With the Kibali gold mine, the belt hosts the largest gold deposit in Africa outside of South Africa (Tack et al. 2010; Bird 2016). The province is also host to diamonds, niobium and tantalum occurrences.

Kibara belt: The north-northeast-south-southwest trending Mesoproterozoic Kibara Belt is located in the eastern part of the Democratic Republic of Congo and extends across the provinces of North and South Kivu, Maniema and the former Katanga province (Figure 1), as well as the neighbouring countries of Burundi, Rwanda, western Tanzania and western Uganda (e.g., Pohl et al. 2013). The Kibara belt represents one of the largest Ta-Nb(-Sn-W) provinces in the world. Deposits in this region have been mined since Belgian colonial times. Due to the somewhat erratic, small size of many deposits, which are usually developed as artisanal and small-scale mining sites, tantalum(-niobium) reserves and resources are rarely defined (Schütte & Näher 2020). It is thus not possible to provide a robust estimate for the DRC’s tantalum resources, but the metallogenic potential is underlined by the fact that the country has been the major global tantalum mine producer for the past 20 years.

The Kibara belt primarily consists of Palaeo- to Mesoproterozoic (1,780 to 1,375 Ma) clastic sedimentary rocks that are intruded by multiple generations of igneous rocks, namely granitoids, mafic rocks and layered mafic-ultramafic complexes and the so-called “tin granites” (Tack et al. 2010; Melcher et al. 2017). Only the tin granites are associated with Ta-Sn-W (Li-Be-P) mineralisation, which ranges in age from ~1,020 to ~930 Ma (Dewaele et al. 2011; Melcher et al., 2015) and which is hosted by variably zoned pegmatites of variable size (Hulsbosch et al. 2014). The most fractionated (i.e., Li-Ta-rich) pegmatites are rather distal to the tin granite outcrops. Many pegmatite ore bodies have small tonnages but often contain tantalum, niobium and tin in economic concentrations to allow artisanal and small-scale mining activities. The strong weathering and associated alluvial or eluvial enrichment supports these mining activities but at the same time makes these deposits less attractive lithium targets. At the southern end of the Kibara belt, the Manono deposit (e.g., Dewaele et al. 2016) is exceptional in size, with unusually

thick pegmatite dykes and a present total ore tonnage of 412 million tons (S&P 2023b), the largest undeveloped pegmatite deposit in the world. While Manono has historically been mined as a tin deposit, it is now considered a lithium deposit (with low tin and tantalum) and total reserves and resources of 6.7 million tons of contained Li_2O .

In addition to the aforementioned metallogenic provinces, the DRC government has designated other zones of particular relevance for future exploration in its strategic planning.

Equateur Region: The Equateur Region comprises the provinces Bas-Uélé, North-Ubangi and South-Ubangi. Neoproterozoic migmatites, dolerites, quartzites and carbonates of the Lindi and Liki-Bembe Supergroups (Figure 1) are hosts to different kinds of mineralisation, including gold, diamonds, rare earths, tin, tantalum and tungsten.

Kwango et Congo-Central Region: This region is located in the west of the DRC and comprises the provinces of Kwango, Kinshasa and Congo-Central (Figure 1). Gneisses, sandstones, carbonates, quartzites, schists and sediments of the East Congo and Sankuru Supergroups (Figure 1) are hosts to gold mineralisation, diamonds (e.g. of the Bas-Congo kimberlite field) (De Wit and Jelsma 2015), limestone for concrete as well as phosphate, aluminium, copper and vanadium mineralisation.

1.1.2 Known Ore deposits and occurrences

As of 2022, the country is the world's largest producer of cobalt and the second-largest producer of copper, together with Peru (USGS 2023). The DRC has significant resources in copper, cobalt, diamonds, gold, uranium, zinc (with possible by-products germanium and gallium), manganese, lithium, tin, tungsten, tantalum (the "3Ts"), and niobium (mostly associated with tantalum). Artisanal and small-scale mining (ASM) holds an important place in the mining sector of the DRC, with at least 0.5 million and up to one million artisanal miners, most of whom are working in the gold sector; older estimates of two million artisanal miners in the DRC continue being cited in the literature but are no longer up to date, as they reflected a boom in diamond mining about 15-20 years ago that is no longer in place as such. Artisanal mineral commodities include cobalt and copper, the 3Ts as well as non-ECRM such as gold, diamonds and gemstones (tourmaline). Industrial mining focuses on the copper-cobalt sector but also comprises few gold mines and a tin mine. A number of mine sites in the DRC show variable degrees of mechanisation and may hence be classified as semi-industrial in practice, even though this is not a formal legal definition.

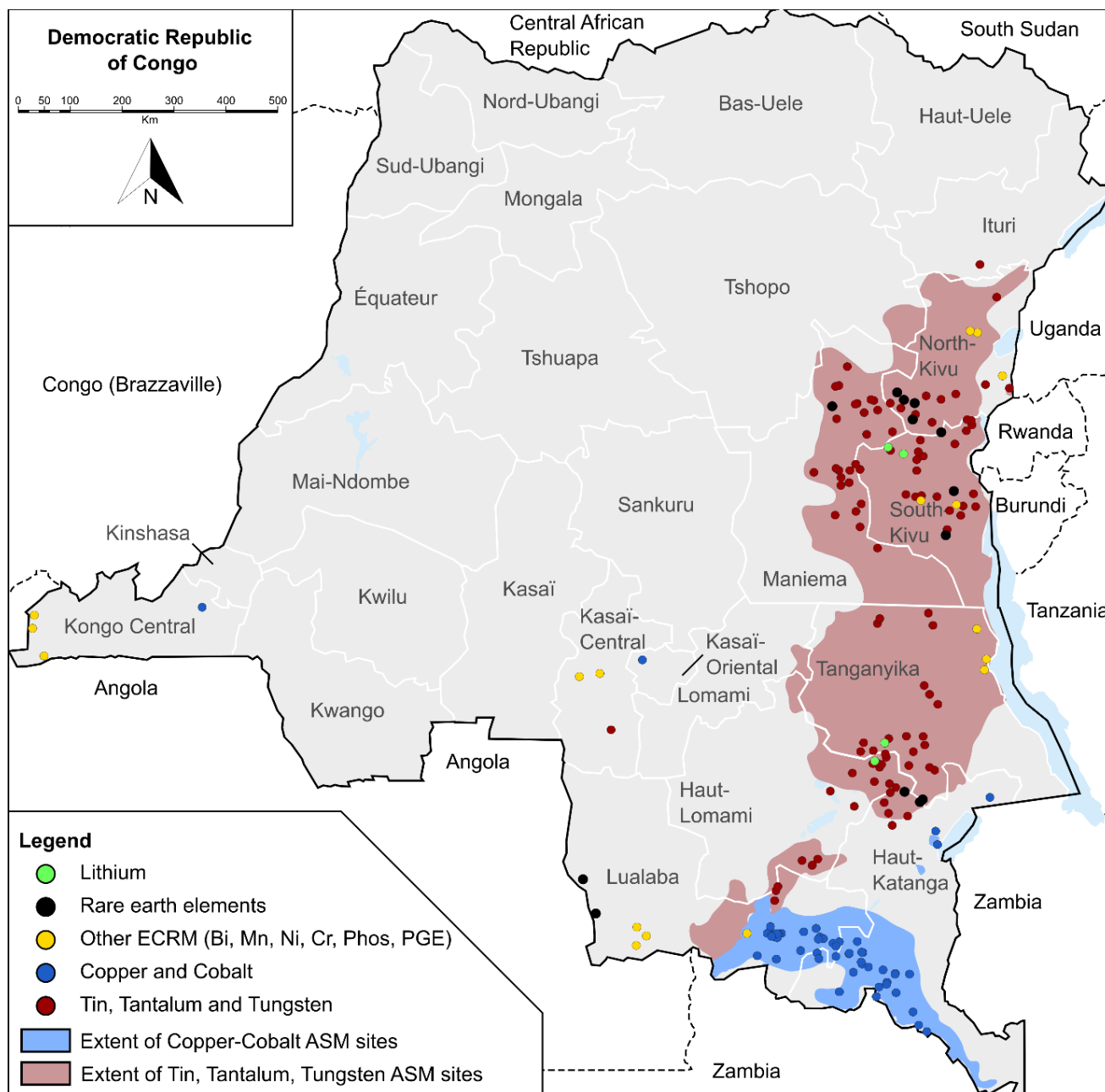


Figure 2: Map of the ECRM mineral occurrences. Major ECRM ore deposits and minor occurrences are displayed as big dots (indiscriminated). Bi = bismuth, Mn = manganese, Ni = nickel, Cr = chromium, Phos = phosphorus, PGE = platinum group elements².

The complete inventory of known ore deposits and occurrences is displayed in Figure 2. These only comprise ECRMs as main commodity or co-/by-product. The data have two major sources: (1) The AfricaMaVal dataset include major ore deposits as well as mineral occurrences (Figure 2), as known from field campaigns etc. (247 data points). (2) The second dataset (2798 data points) originates from open data provided by the International Peace Information Service (IPIS; IPIS

² Data provided by AfricaMaVal (WP1), IPIS (2023) and BGR (2022).

2023) and is represented by the extents of copper-cobalt (Katanga-Lualaba area) and tin-tantalum and tungsten (eastern DRC) ASM sites, respectively, in Figure 2. These mine sites have been visited by IPIS, BGR and others since 2009. Given the past or present artisanal exploitation of these sites, each of them is indicative of the geological occurrence of the mined commodity.

1.2. Prospectivity and mineral high potential mapping

This task was carried out by BRGM. The geological framework developed for the predictive approach is based on the geological map by Fernandez-Alonso et al. (2015). The lithostratigraphic units (LSUs) model has been modified and adapted to take into account the diversity of granitoid-type terrains that were previously undifferentiated on the GIS database, among which the Mesoproterozoic Kibaran and Archean Uélé granitoids. 112 LSUs were used to carry out the predictive analysis, spread across 17 domains, reflecting the complexity of DRC geological history, which have led to the deposition of specific mineral resources. Details of the LSUs distributed across the different domains are shown in Table 14 (Appendix), the occurrences of the most important domains hosting the LSUs are shown in Figure 1 and Figure 16. Table 14 (Appendix), and the “Africamaval code” have been produced using the LSUs information (ranging from the Supergroup to the Formation) together with the age of the unit.

1.2.1 Selection of the ECRM for mineral prospectivity

Among the thirty ECRMs present in DRC, three groups of commodities were selected for mineral potential mapping (MPM) to demonstrate the principle of the method: Cu-Co, Sn-Ta-Nb-W and Li. These three groups were tested at a scale of 1:2.5M and a specific zoom have been proposed for the Cu-Co group on the Lufilian arc (Copperbelt). The lack of homogeneous geoscientific data (e.g., aerial geophysics, satellite data, soil and stream geochemistry) and the relatively low resolution of the geological map used for this study (1:2.5M) implies only limited interest of the weakly constrained mineral potential maps for exploration. There was no use to illustrate this for the whole range of ECRM's.

The MPM was performed using the disc-based association (DBA) grid method coupled with Random Forest (RF) method (Vella, 2022); the algorithm applying these principles has been labelled “FAMME” by the author. The method is based on the analysis of the local spatial associations of geological variables and features of various natures to describe the relationships between the predictors and the mineralization. This allows the identification of geological environments in the study area around each node of the DBA grid, and the integration of either quantitative or non-quantitative spatial data. In a second step, RF classification is used to perform a generalisation of complex geological environments and features and evaluate their likelihood to host potential occurrences of mineralisation by giving a score between 0 (low potential) and 1 (high potential).

The data for the MPM of DRC comprised the following elements:

- SIG-Afrique mineral resources database (BRGM, 2023);
- IPIS database on artisanal and small-scale mining in eastern DRC (IPIS, 2023)
- S&P Global database on mining projects (S&P Global, 2023)
- 1:2,500,000 DRC Geological map (Fernandez-Alonzo et al., 2015).

The DBA grid for predictive modelling is mainly defined by four parameters:

- d: Size of cell – d;
- R: Search radius buffer for lithologies – R;
- R1-occ: Search radius buffer for mineral occurrences;
- R2-fault: Search radius buffer for faults.

To maximise the grid resolution while minimising overlaps and cells with only one lithology, the parameters of DBA grid for the four selected commodities in individual areas of interest (AOI) used in this study are as indicated in Table 1.

Predictivity parameters	Cu-Co	Sn-Ta-Nb-W	Li (Be)	Cu-Co Lufilian Arc
Occurrences	531	1 678	16	378
d (m)	5 000	5 000	5 000	1 000
R (m)	10 000	10 000	10 000	2 000
R1-occ (m)	5 000	5 000	5 000	1 000
R2-fault (m)	no	no	no	1 000
Cells number	93 876	93 876	93 876	192 127

Table 1: The applied parameters for the MPM’s of DRC. “no” = not used for the analysis.

1.2.2 Mineral high potential areas

Four mineral potential maps were produced for the eight ECRM’s Cu-Co, Sn-Ta-Nb-W, Li at 1:2.5M, and Cu-Co with a zoom on the Lufilian arc (Copperbelt). The results of the DBA-RF (TN, FN, FP, TP = confusion matrix) with the critical parameters for the assessment of the model are shown in Figure 3 and Table 2. The final maps are presented in the appendix.

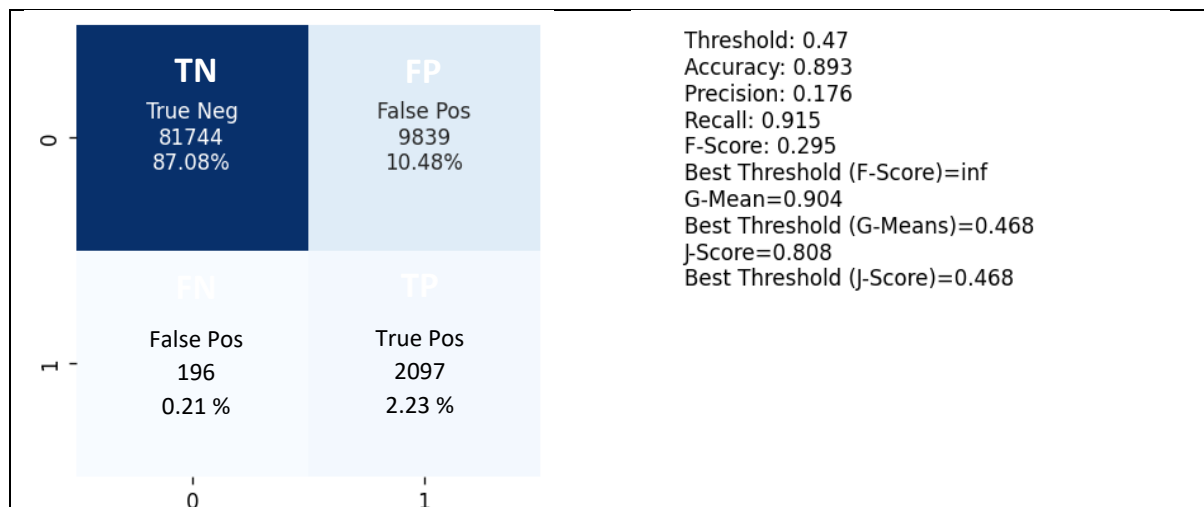


Figure 3: Example of confusion matrix for Ta-Nb-Sn-W favourability model.

Model ³	TN	FN	FP	TP	TPR	FPR	PPA (%)	Acc.	J-score	Thresh.
Ta-Nb-Sn-W	81 744 (87.08 %)	196 (0.21 %)	9 839 (10.48 %)	2 097 (2.23 %)	0.91	0.11	12.71 %	0.89	0.807	0.47
Li	91 900 (87.08 %)	0 (0 %)	1 951 (2.08 %)	25 (0.03 %)	1.00	0.02	2.10 %	0.98	0.979	0.7
Cu-Co	88 538 (94.31 %)	270 (0.29 %)	4 308 (4.59 %)	760 (0.81 %)	0.74	0.05	5.40 %	0.95	0.691	0.5
Cu-Co Lufilian Arc	152 479 (76.36 %)	757 (0.39 %)	36 077 (18.78 %)	2 814 (1.46 %)	0.9	0.19	20.24 %	0.81	0.597	0.5

Table 2: Results of data driven mineral potential mapping in DRC applying the FAMME algorithm.

Copper and Cobalt (Cu-Co):

Copper is found in more than 700 minerals and cobalt in around 70 minerals. The most important ores of copper include native copper, chalcocite, chalcopyrite, bornite and covellite. Minor copper minerals are malachite, cuprite, tenorite and azurite. From the other side, the most important cobalt minerals include cobaltite, glaucodot, skutterudite and erythrite. Nine minerals incorporate both copper and cobalt, including carrollite, gobelinite and kolwezite.

Known for the resources of cobalt and copper, data available to test the Cu-Co favourability in DRC is based on more than 530 occurrences. Thanks to this relatively rich occurrence database,

³ True Positive (TP) and True Negative (TN) correspond to the number of grid cells, which are correctly predicted by the RF model (i.e. mineralised and non-mineralised cells, respectively). Inversely, False Positive (FP) and False Negative (FN) correspond to the number of grid cells, which are incorrectly predicted by the RF model (i.e. mineralised instead of non-mineralised cells and non-mineralised instead of mineralised cells, respectively). FP indicate cells with high mineral potential, which so far are not indicated in the mineral occurrences database. From these data the following useful parameters are calculated: True positive rate (TPR, also "recall") = TP/(TP+FN) ; False positive rate (FPR) = FP/(FP+TN) ; Percentage of prospective area (PPA) = (TP+FP)/All ; Accuracy = (TP+TN)/All and J-score = TPR - FPR.

the production of favourability maps has made it possible to produce the DBA-RF model with an accuracy of 95.1% (Table 2; for a threshold of 0.5). This DBA-RF model indicates that about 4.5% (4308 cells) of DRC has potential for Cu-Co. The resulting MPM shows, as expected, that the most favourable region is located in the south-eastern DRC, in the Lufilian Arc/Copperbelt, and associated to the Neoproterozoic Katanga Supergroup. Analysis of the Cu-Co favourability shows that the statistically most favourable factors are, in decreasing order, linked to the Nguba Group: NP2_Kt_Ngu (and in particular the “grand conglomérat” of the Mwale sub-group: NP2_Kt_N_1), the Roan Group: NP_Kt_Roa (succession of carbonate and shale), and the Kundelungu group: NP1_Kt_K1 (dolomitic siltstone and fine sandstone). To the northwest of DRC, some potential is expressed in relative restricted zone mostly associated to the Likibembe Supergroup: MP_LB (schists and metasandstone). Finally, the eastern part of DRC, close to the borders with Burundi and Rwanda, shows a relatively low potential, with neither a specific deposit pattern nor a lithostratigraphic affinity having been identified. However, analysis of the information linked to the occurrences that can explain this favourability, shows that this potential could either be linked to a Mesoproterozoic structural control, and origin of these occurrences could be associated to the gold prospecting around the Archean greenstone belt system.

The focus was set on the Katanga region (Figure 4) to emphasise the special nature of this region in terms of Cu-Co favourability. It allows to propose a MPM with a DBA-RF model showing an accuracy of ~81 and indicate that ~19 of the regions have a potential of Cu-Co. Pattern of favourability is significantly the same where the statistically most favourable factors are; in decreasing order linked to the Nguba Group: NP2_Kt_Ngu (and in particular the “grand conglomérat” of the Mwale sub-group: NP2_Kt_N_1), the Roan Group: NP_Kt_Roa (succession of carbonate and shale), and the Kundelungu group: NP1_Kt_K1 (dolomitic siltstone and fine sandstone).

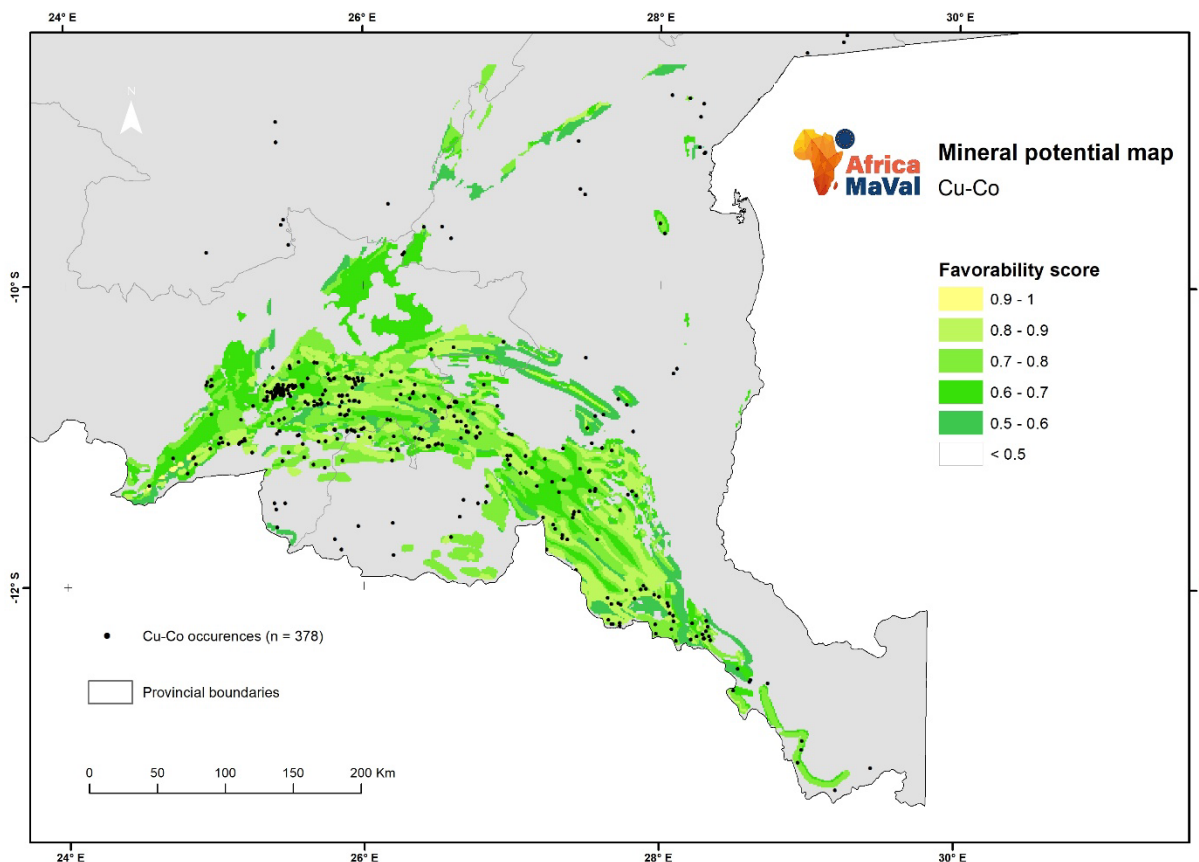


Figure 4: Selection of favourability cells (FP and TP) for copper and cobalt (threshold > 0.5).

This favourability test should be considered in the light of the available data and therefore, in the context of the DRC, the over-representation of Copperbelt, both in terms of occurrences and of details of geological knowledge. The few regions that show potential outside of the Copperbelt, i.e. the east of the DRC, the north-west and, to a lesser extent, the south-west, should of course be favoured in order to improve the available dataset and statistically balance the dataset on a national scale. Better geological maps produced at scales that allow us to refine our knowledge in terms of lithology and geological history (e.g. a 1:250K map), together with geochemical prospecting campaigns in these regions, could greatly improve these favourability maps.

Lithium (Li): Lithium is incorporated in several magmatic minerals mostly found in lithium pegmatites or rare-metal granites. The most important lithium minerals are amblygonite, lepidolite, petalite and spodumene. In DRC, 16 occurrences are recorded in the database used to generate the favourability map, especially around the Manono-Kitotolo district on the boundary between the provinces of Tanganyika and Haut-Lomani where several Li-Sn-Nb-Ta pegmatites are known (Dewaele et al. 2016). Another cluster of occurrences is located in the centre of the Kibara Belt in the Sud-Kivu province.

The DBA-RF model (for a threshold >0.7) has an accuracy of $\sim 98\%$ (Table 2) and indicates that 2.1% of DRC (1,976 cells) are prospective for lithium deposits (Figure 5). Statistically, the most

favourable factors are in decreasing order (without taking into account alluvial and superficial formations): MP_MKB_GK__ (Mesoproterozoic Kibarian granitic suite), hS_KA_Luk__ (Paleozoic Lukuga Group), PP2_RU__ (Paleoproterozoic Ruzizi Supergroup) and MP_KV__ (Mesoproterozoic Kivu Supergroup).

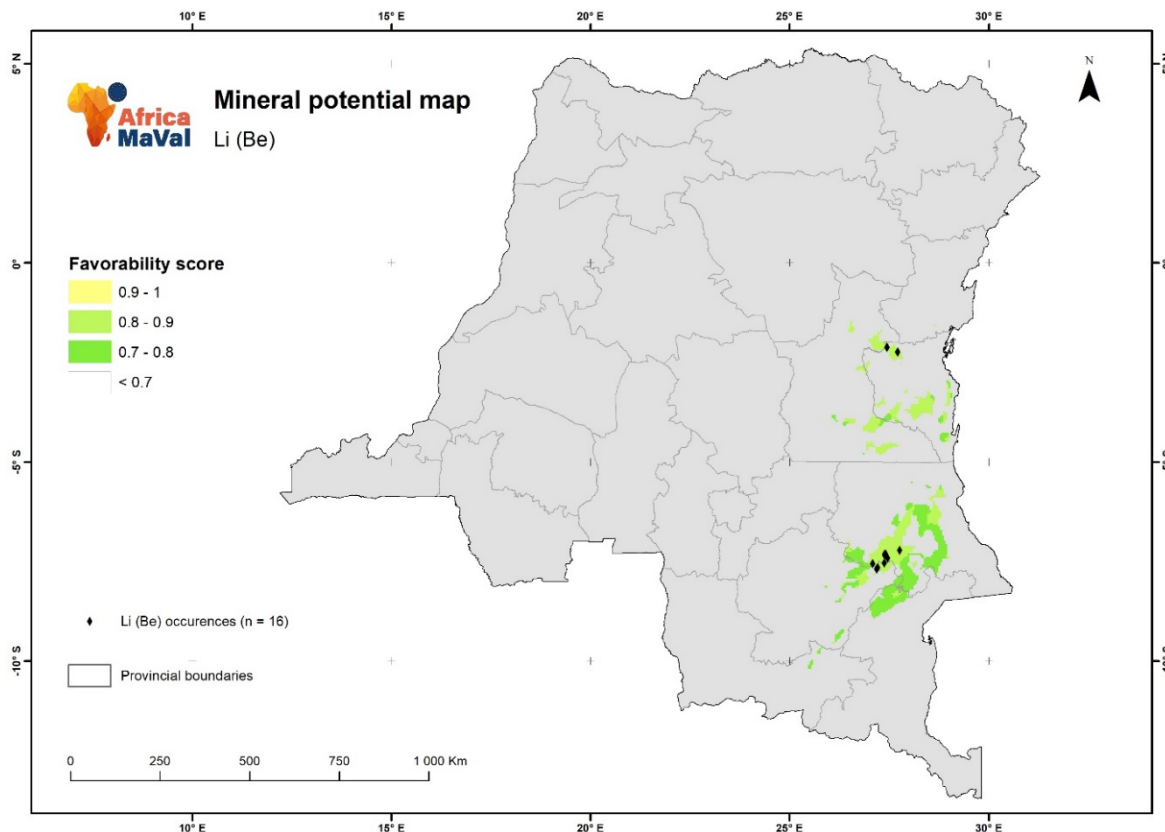


Figure 5: Selection of favourability cells (FP and TP) for lithium (threshold > 0.7).

In term of cartography, the most favorable cells present a significant extension due to their link with the Mesoproterozoic Kibarian granites. These results must be qualified taking into account the following elements:

- the lack of geological constraints of the lithostratigraphic units model used;
- the absence of detail on the different granite environments (all the granites of the Kibara belt being coded in the same way);
- lithium occurrences are associated with pegmatites or little intrusions of rare-metal granites which are not mapped at this scale.

The same problems of statistical processing and mineral predictivity apply to other elements present in pegmatites (e.g. Be, Sn, Ta-Nb, etc.). To more accurately define the mineral potential of lithium (and associated raw materials) and target the relevant areas of interest, better resolution data (1:200,000 scale and higher) should be used to refine the geological model used.

Tin, Tantalum, Niobium and Tungsten (Sn-Ta-Nb-W): Tin (Sn), tantalum (Ta), niobium (Nb) and tungsten (W) are critical raw materials mainly associated with oxide minerals, such as cassiterite,

columbite-tantalite (or “coltan”) and wolframite, respectively. These commodities are present in magmatic environments associated with pegmatites, quartz-veins or rare metal granites and are particularly represented in eastern DRC.

To generate the mineral potential map, 1,678 known occurrences were used, from the BRGM database (SIG Afrique) for historical occurrences and from the IPIS database for the most recent sites. This database was particularly useful and provided reliable input data to carry out this predictive mapping work.

The DBA-RF model (for a threshold > 0.47) has an accuracy of $\sim 89\%$ (Table 2) and confirms the Sn-Ta-Nb-W potential of DRC with 12.71 % of Congolese territory (11,936 cells) which are prospective for this type of mineralisation (Figure 6).

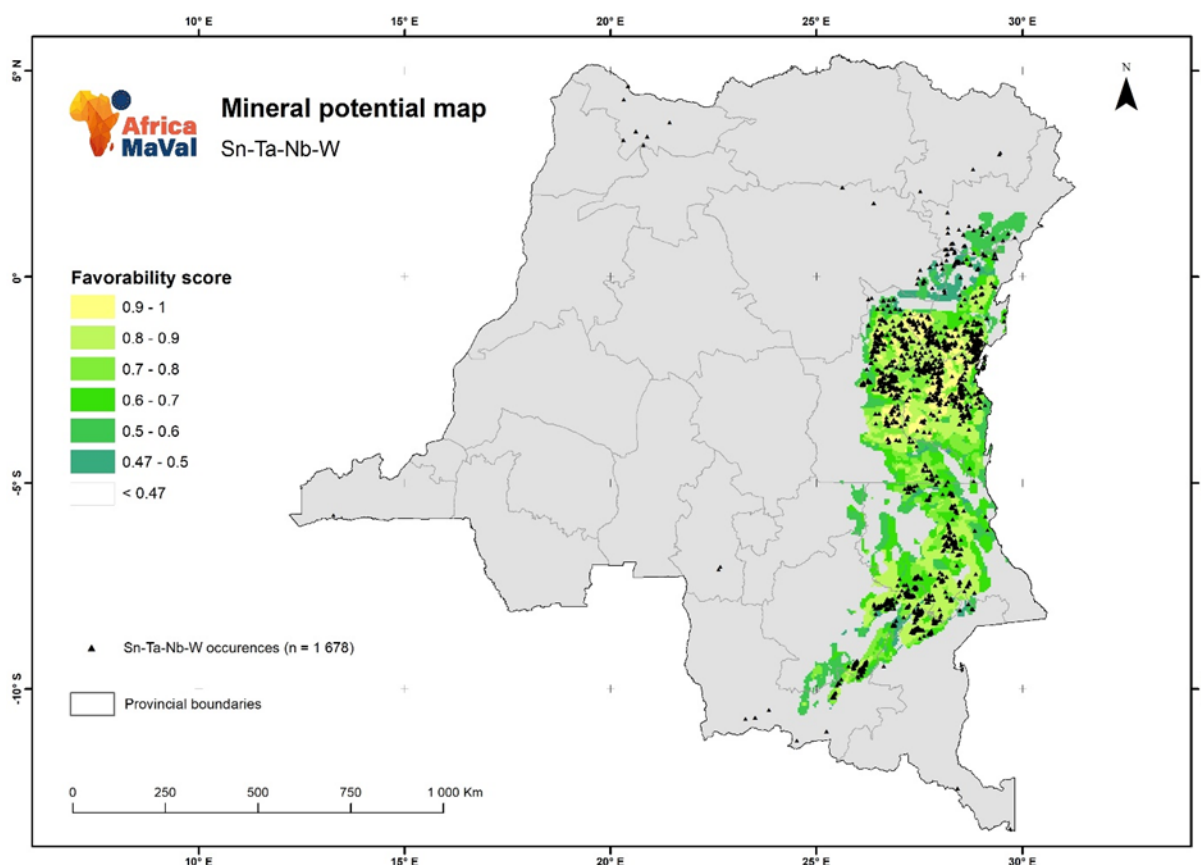


Figure 6: Selection of favourability cells (FP and TP) for tin, tantalum, niobium and tungsten (threshold > 0.47).

In term of cartography, the MPM shows without surprise that high potential areas are mainly located around known occurrences in the eastern DRC, along the Rwenzori-Kibara Belt. The most favourable geological environments are associated with the local formations within this Paleoproterozoic-Mesoproterozoic hybrid domain. In detail, the most favourable factors are in decreasing order: MP_MKB_GK__ (Mesoproterozoic Kibaran granitic suite), PP2_RU__

(Paleoproterozoic Ruzizi Supergroup), MP_KV___ (Mesoproterozoic Kivu Supergroup), hS_KA_Luk___ (Paleozoic Lukuga Group), MP_KB___ (Mesoproterozoic Kibara Supergroup) and NA_PP_CPXakb___ (Ante-Kibaran complex).

The main area of high Sn-Ta-Nb-W potential is located in the north of the Rwenzori-Kibara Belt, at the border triangle of the Nord-Kivu, Sud-Kivu and Maniema provinces. The second area is located to the south, where the Kibara Belt is oriented NE-SW. Between these two clusters, the predictive map indicates favourable areas where few occurrences are known and which can be potential targets for exploration. In the same way, further south, where the Kibara Belt connects to the Lufilian Arc, several prospective areas are highlighted.

However, as for lithium, this predictive mapping has limits and must be nuanced given the lack of constraints of the geological model used. To have better resolution, a regional geological synthesis is necessary to better constrain the geometry and the lithostatigraphic attribution of the different geological formations within this domain. A specific work on the typology (geochemical and geochronological) of the different magmatic suites would need to be carried out.

Predictivity mapping summary: The two main regions identified according to the predictors used in this study are the Rwenzori-Kibara belts for Sn-Ta-Nb-W and Li and the Lufilian Arc (Copperbelt) for Cu-Co. North of the Rwenzori-Kibara belts and the Kibara-Lufilian Arc connection are particularly interesting for tin, tantalum, niobium, and tungsten. Concerning Li, the most favourable factors include the Mesoproterozoic Kibaran granitic suite, the Paleozoic Lukuga Group, the Paleoproterozoic Ruzizi Supergroup, and the Mesoproterozoic Kivu Supergroup. For Cu-Co favourability, the study identifies specific geological formations such as the Nguba Group, Roan Group, and Kundelungu Group.

This study acknowledges limitations, such as the lack of geological constraints and detail on different granite environments. The need for regional geological synthesis to better constrain the geometry and lithostatigraphic association of the different geological formations could be supported by higher resolution geological mapping and geochemical prospecting campaigns, which would improve the favourability maps.

Improved coverage around the Lufilian arc to complement the 1:250K geological maps could help to better constrain predictivity in this region. Similarly, a geological map specified to the Kibara belt, either at a scale of 1:500K or in greater detail, would help to better constrain geological features such as pegmatites, which are the most interesting mineral-bearing features. Finally, with regard to occurrences, a sorting between data associated with deposits and other occurrences would enable the study to better target the most favourable objects and better constrain the prediction on key and economically viable zones.

DRC strategic national exploration plan:

The DRC Ministry of Mines has defined six priority areas in order to develop a strategic national exploration plan (Table 3). Exploration activities in the Kasai priority area target nickel, among others. This would be a commodity of high strategic relevance for the DRC, as it is important for lithium ion batteries. While the DRC has abundant cobalt resources, some lithium resources (including the largest undeveloped hard rock deposit in the world, Manono) and historical manganese exploitation, it is currently lacking nickel as an important element for battery cathodes. Likewise, the DRC is currently lacking another important battery metal, graphite, and this is not included in the national exploration plan. There are abundant graphite deposits in Tanzania and Mozambique, which raises the question whether parts of the DRC might have a similar geological environment with potential graphite endowment.

Priority area	Target commodities (including non-ECRM)
Kasai	Gold, diamonds, copper, cobalt, nickel, chrome, zinc, iron ore
Ituri	Gold, diamonds, tantalum-niobium
Tanganyika	Tin, lithium, gold, tantalum-niobium, copper, cobalt
Equateur	Gold, diamonds, REE, tin, tantalum-niobium, tungsten
Kivu	Gold, tin, tantalum-niobium, tungsten, REE
Kwango & Kongo-Central	Gold, diamonds, phosphate, aluminium, copper, vanadium, limestone cement

Table 3: Democratic Republic of Congo national exploration priority areas.

1.3. Ore processing and refining capacities

Article 108 of the Mining Law (2018) restricts the holder of a mining licence or a permanent mining permit from exporting unprocessed mineral substances. Exceptions to this rule are described in section 3.2.7 Intricacies of import and export mechanisms.

According to the Ministry of Mines (2023), ECRM sales (local and exports) during the financial year 2022 included copper (~2.5 Mt) and cobalt (~115 kt), manganese concentrates (~15 kt, only local sales) as well as tin (24.3 kt industrial, 8.5 kt artisanal), tantalum (~2.2 kt artisanal) and tungsten (~300 t artisanal) concentrates.

Whereas the 3Ts are exported as concentrates, in recent years, the DRC has increasingly enforced the processing restrictions in the copper-cobalt sector. Some notable large projects, such as the Kamoia copper mine, however, are currently allowed to export part of their production as copper concentrate, reflecting limited in-country smelting and refining capacities. Kamoia is currently constructing its own smelter such that it will at some point also export copper cathodes only (part of its concentrates are already processed in-country by a third-party smelter in Kolwezi).

A list of processing facilities in the DRC is presented in Table 4.

Name of processing entity	Status	ECRM	Operator (or owner)
Fonderie Electrique de Panda Cobalt Plant	Assumed Active	Co	Gécamines SA
Luapula Plant	Active	Co	Private Interest (China)
Plants in former Katanga Province	Assumed Active	Co	Congo Dong Fang International Mining sprl
Etoile	Active	Cu	Chemaf
Gecamines Smelter	Active	Cu	Gécamines SA
Huachin leach plant	Active	Cu	CN Nonferrous Mining Corp. Ltd [67.50%] ; China Huachin SPRL [32.5%]
Kakanda concentrator	Active	Cu	Boss Mining SPRL
Kamoa Smelter	Construction	Cu	Ivanhoe Mines Ltd.
Kamoto	Active	Cu, Co	Kamoto Copper Company (KCC)
Kipoi Central SX-EW Refinery	Active	Cu	Tiger Resources Ltd (Société d'Exploitation de Kipoi)
Kolwesi Smelter	Active	Cu	AuKing Mining Ltd.
Kolwezi Copper Mine	Active	Cu	La Compagnie Minière de Musonoie Global (COMMUS)
Lualaba Smelter	Active	Cu	China Nonferrous Mining Corp. Ltd
Luilu Smelter. Kolwezi	Active	Cu	Gecamines
Luita Plant	Active	Cu	Boss Mining SPRL
Nova Smelter	Care and maintenance	Cu	Unknown
Plant at Likasi	Care and maintenance	Cu	Kai Peng Mining Ltd.
Plant at Mabende	Assumed Active	Cu	CNMC Huachin Mining Mabende
Plant in former Katanga Province	Assumed Active	Cu	Shituru Mining Corp. SPRL
Plant in former Katanga Province	Assumed Active	Cu	La Compagnie Minière de Musonoie Global SAS
Plant in Likasi	Assumed Active	Cu	Rubamin SPRL
Plant near Kolwezi I	Assumed Active	Cu	La Minière de Kalumbwe Myunga (MKM)
Plant near Kolwezi II	Assumed Active	Cu	Compagnie Minière de Luisha (COMILU)
Roan Tailings Retreatment Plant (Metalkol RTR)	Active	Cu	Eurasian Resources Group (ERG)

Name of processing entity	Status	ECRM	Operator (or owner)
Shituru	Active	Cu	Gécamines SA
Usoke Plant	Closed	Cu, Co	Chemaf (Shalina Resources Ltd)
Deziwa & Ecaille	Active	Cu, Co	Société Minière de Deziwa et Ecaille (SOMIDEZ)
Etoile - Lubumbashi Slag Treatment Smelter	Active	Cu, Co	Chemaf (Shalina Resources Ltd)
Kambowe	Active	Cu, Co	CNMC [55%]; Gécamines [45%]
Kinsevere Plant	Active	Cu	MMG Ltd.
Metalkol Roan Tailings Reclamation (RTR)	Active	Cu, Co	ERG
Musonoie (SX-EW)	In construction	Cu, Co	Jinchuan
Mutanda Processing Plant	Active	Cu, Co	Mutanda Mining SPRL
Ruashi Plant	Assumed Active	Cu, Co	Ruashi Mining SPRL
Sicomines - Dikuluwe	Active	Cu, Co	La Sino-Congolaise des Mines Sarl, (SICOMINES)
SOMIKA Plant	Assumed Active	Cu, Co	Société Minière du Katanga SPRL (Somika)
Tenke Fungurume Mine	Active	Cu, Co	Tenke Fungurume Mining SARL
STL (Big Hill)	Active	Cu, Co, Ge	La Société pour le Traitement du Terril de Lubumbashi (STL)
ASC Smelter	Active	Sn	Mining Mineral Rsrc S.P.R.L. (MMR)
TITan Plant	In construction	Sn	Tantalex

Table 4: List of processing facilities in the Democratic Republic of Congo⁴. Note the list may not be complete/up to date due to the highly dynamic business development in Haut-Katanga and Lualaba.

2. Assessment of the ECRM value chain

2.1. Characterisation of the value chain for primary and secondary raw materials

2.1.1 List of the mining and recycling projects

According to the ECRM list, copper, cobalt, the 3Ts and manganese are currently mined in the DRC. The copper and cobalt sector (Copperbelt of Haut-Katanga and Lualaba) dominates the number of industrial mining projects, but also current exploration. Alongside copper and cobalt, some of these projects have also targeted germanium, such as Big Hill (Gecamines) or Kipushi (Ivanhoe Mines). In East Congo, the focus of exploration, in addition to the 3Ts, is increasingly on lithium (Manono - AVZ Minerals or Blue Sky - Tantalex).

⁴ Data provided by AfricaMaVal (WP1), with minor adjustments by BGR

ERCM recycling in the proper sense does not take place in the DRC. However, there are some projects that treat or plan to treat tailings, e.g. for lithium (Manono tailings) or copper and cobalt (Kipushi tailings, Luilu tailings and Shituru tailings). A detailed list of exploration, mining and "recycling" (tailings) projects in the DRC is provided in Table 5. For inactive projects, the name of the last known operator is inserted, if available. The listed projects exclusively concern industrial mining. Details and locations of artisanal small-scale mining (including semi-mechanised operations) can be found in IPIS (2023) and in Figure 2.

Operation	Status	ECRM	Operator/Majority owner
Boss & Frontier	Operating	Cu	ERG
CNMC Huachin Mabende	Operating	Cu	CNMC
Congo (DRC)	Operating	Cu	Chengtun Mining Group
Dikulushi	Operating	Cu	JCHX Mining Management
Hanrui Metal Congo	Operating	Cu	Hanrui
Kamoa	Operating	Cu	Ivanhoe
Kimin (Kisanfu Mining)	Operating	Cu	Kisanfu Mining
Lonshi	Construction Started	Cu	JCHX Mining Management Co.,Ltd.
Lubembe	Prefeas/Scoping	Cu	Jinchuan Group International Resources Co. Ltd
Luisha	Reserves Development	Cu	Shalina Resources Ltd
Miniere Musoshi Kinsenda	Operating	Cu	Jinchuan Group International Resources Co. Ltd (Venturer) 77%; SODIMICO (Venturer) 23%
Mufunta	Reserves Development	Cu	Shalina Resources Ltd
New Minerals Investment	Operating	Cu	Ke Fei
Western Foreland	Target Outline	Cu	Ivanhoe Mines Ltd.
Kimono	Target Outline	Cu, Co	Société d'Investissement Minier Akon et Sodimico S.A.
292	Target Outline	Cu, Co	African Energy Metals Inc.
Basse Kalembe	Exploration	Cu, Co	Red Rock Resources Plc
Commus	Operating	Cu, Co	Zijin Mining

Operation	Status	ECRM	Operator/Majority owner
Dezita	Reserves Development	Cu, Co	Eurasian Natural Resources Corporation Limited
Deziwa	Operating	Cu, Co	China Nonferrous Mining Corp. (CNMC) (JV with Gecamines)
Dikuluwe-Mashamba	Operating	Cu, Co	Sicomines
Gambov	Construction Started	Cu, Co	China Nonferrous Mining Corporation Limited
Haute Kalembe	Target Outline	Cu, Co	Red Rock Resources Plc
Kabolela	Target Outline	Cu, Co	Unnamed Owner
KaiPeng (Kambove)	Operating	Cu, Co	Shenzhen Yite Holdings
Kalongwe	Committed	Cu, Co	Xuchen International (Chengtun Mining)
Kalongwe	Feasibility Complete	Cu, Co	Chengtun Mining Group Co., Ltd.
Kalukundi	Feasibility	Cu, Co	Camrose Resources Limited
Kaluminés	Feasibility	Cu, Co	Gécamines SA
Kambove Mining SAS	Operating	Cu, Co	China Nonferrous Mining Corp. (CNMC)
Kambove/Kolwezi	Operating	Cu, Co	Gécamines
Kamilombe	Target Outline	Cu, Co	Private Interest
Kamoto/KOV/T17 (Katanga)	Operating	Cu, Co	Glencore
Kamoya	Operating	Cu, Co	Comika (Wanbao Mining)
Kankutu	Target Outline	Cu, Co	Unnamed Owner
Kansuki	Satellite	Cu, Co	Glencore plc
Kasombo	Target Outline	Cu, Co	Paragon Mining Sarl
Katanga	Exploration	Cu, Co	Rubamin FCZ
Kinsevere	Committed	Cu, Co	MMG Limited
Kipushi tailings	Commissioning	Cu, Co	Paragon Mining Sarl
Kisanfu	Committed	Cu, Co	CMOC, CATL & Gecamines
Kisanfu Mining	Operating	Cu, Co	Société Minière du Katanga SPRL (Somika)
Kisinka	Exploration	Cu, Co	Power Metal Resources plc
Luanshimba	Target Outline	Cu, Co	Red Rock Resources Plc

Operation	Status	ECRM	Operator/Majority owner
Luilu	Target Outline	Cu, Co	Cobalt Blue Ltd.
Luilu tailings	Operating	Cu, Co	Hong Kong Excellen Mining Investment
Luisha (Comilu)	Operating	Cu, Co	Congo International Mining Corporation (China Railways)
Luisha South	Reserves Development	Cu, Co	Excellen Minerals SARL
Luiswishi	Operating	Cu, Co	Congo Dongfang International Mining SPRL (Huayou) (CDM)
Lupoto (Iverland)	Operating	Cu, Co	Société Minière du Katanga SPRL (Somika)
Metalkol - Roan Tailings Reclamation (RTR)	Operating	Cu, Co	Eurasian Natural Resources Corporation Limited
MIKAS	Operating	Cu, Co	Congo Dongfang International Mining SPRL (Huayou) (CDM)
MKM Lubumbashi (Kolwezi?)	Operating	Cu, Co	La Minière de Kalumbwe Myunga (MKM)
Mukabe-Kasari	Target Outline	Cu, Co	CoCu Pty Ltd
Mukondo Mountain	Satellite	Cu, Co	Eurasian Natural Resources Corporation Limited
Musonoi	Construction Started	Cu, Co	Jinchuan Group International Resources Co. Ltd
Mutanda	Operating	Cu, Co	Glencore
Mutoshi	Construction Started	Cu, Co	Chemaf SPRL (Shalina Resources)
Pumpi	Operating	Cu, Co	Lamikal (JV Wanbao Mining & Managem)
Ruashi	Operating	Cu, Co	Jinchuan Group Ltd
Shandwe	Target Outline	Cu, Co	MMG Limited
Shituru	Feasibility	Cu, Co	Pengxin International Mining Co.,Ltd
Shituru Tailings	Operating	Cu, Co	Shituru Mining Corporation (SMCO) - Pengxin Resources
Tenke Fungurume	Operating	Cu, Co	CMOC and Gecamines
Kipoi East	Target Outline	Cu, Co	Unnamed Owner
Big Hill (STL)	Operating	Cu, Co, Ge	Gecamines

Operation	Status	ECRM	Operator/Majority owner
Kipushi	Construction Started	Cu, Co, Ge	Ivanhoe Mines Ltd.
Blue Sky	Target Outline	Li	Tantalex Lithium Resources Corp.
Manono	Feasibility Complete	Li, Sn, Ta, Cs, Nb	AVZ Minerals Limited
Manono tailings	Prefeas/Scoping	Li, Sn, Ta	Tantalex Lithium Resources Corp.
Mpokoto	Construction Planned	Mn	Arrow Mining Pty Ltd
Kisangani	Preproduction	Sn	Congo Premier
Bisie	Operating	Sn, Cu	Alphamin
Buckell	Operating	Sn, Ta, Li, Cs	Tantalex Lithium Resources

Table 5: List of exploration, mining (operating) and “recycling” (tailings) projects in the DRC and their project status.

2.1.2 Existing ESG indicators

The ESG framework of the DRC is still in its early stages of development, but the government and various stakeholders are making efforts to improve the sustainability of the country's economic activities. Legal and regulatory frameworks are implemented to promote sustainable development and address ESG issues in the mining industry. Overall, the DRC ESG framework in the mining industry is focused on promoting sustainable development, protecting the environment, and ensuring that mining activities benefit local communities and the Congolese people. The following sections provide a brief overview about the ESG indicators. For further details on the DRC ESG framework, challenges and potential see sections 4.1 Country-level assessment and context and 4.1 Mining practices vs. Environmental, Social and Governance (ESG) goals.

Environment and sustainable development: The government has implemented several environmental regulations which aim to balance the country's economic development with the need to protect its rich natural resources and biodiversity. In the mining sector, companies shall prepare a Mitigation and Rehabilitation Plan as well as an Environmental and Social Impact Assessment (ESIA) with associated Environmental Management Plan in accordance with the guidelines contained in the Mining Regulations. For reasons of national security, public security or environmental preservation, areas may be classified as prohibited areas without time limit, and mining rights may not be granted in a protected area (Art. 6, Mining Code).

Social: The DRC government has established requirements for mining companies to engage with local communities and obtain their consent for mining activities. The government has also established a framework for community development agreements that require mining companies to invest in local development initiatives. The government has established labour standards that require mining companies to adhere to local labour laws. The government also promotes the development of local skills and capacity-building in the mining industry.

Governance: The mining sector in DRC is governed by the Mining Code (2018) as well as the ministerial decrees supporting and/or domesticating the national and/or regional mineral traceability initiatives, ratified texts and sub-regional and international commitments (e.g., OECD, EITI, ICGLR, Kimberley Process).

2.1.3 Status of economic links between the formal and informal sectors

In the DRC, there are complex and dynamic economic links between the formal and informal mining sectors. The formal mining sector typically consists of large-scale mining projects, often operated by local companies or joint ventures (JV) that are in turn controlled by foreign-owned companies, operating under government-issued licenses, with minor shareholding through a free-carried interest by the government, usually through parastatal Gecamines. While not all of these companies fully adhere to all regulations (corruption risks), they may nonetheless be classified as formal. The informal mining sector, on the other hand, comprises cooperatives and sometimes unorganised artisanal miners, who often operate without formal licenses, in less mechanised operations. Some of these operations are small, while others are major operations with up to about 15,000 artisanal miners working on one site. The following text is a brief summary of key facts from Vasters and Schütte (2023).

Formalisation of the ASM sector comprises a range of measures, including the creation of the governmental “Service d’Assistance et d’Encadrement des Mines Artisanales et de Petit Echelle (SAEMAPE, formerly SAESSCAM) responsible for ASM supervision, legal requirements to work in cooperatives, registration of miners and traders and the creation of artisanal mining zones (“ZEA”). However, the implementation of these measures is challenging as SAEMAPE agents may not be present at every mine site, cooperatives may not form structures owned by the workers but rather by “company management” and artisanal mining zones are often of marginal geological prospectivity or have difficult logistical access.

Tantalum production in the DRC is primarily attributed ASM sector. Some ASM mines are run by operators who registered industrial small-scale or even large-scale concessions. Tin mining in the DRC is primarily carried out through artisanal production, with a notable exception being Alphamines' Bisie mine, which began industrial production in May 2019 and has expanded since. Previously, Bisie was a hotspot for artisanal cassiterite production, but these informal activities were officially banned to facilitate the development of the industrial mine. In 2021, ASM

operators contributed one-third of Congolese tin concentrate exports, while the Bisie mine and a few other concessions made up the remaining fraction. The Kanuka mine, located on the border between Haut-Lomami and Tanganyika provinces, can be considered a semi-industrial producer of mixed tin and tantalum concentrates. Additionally, artisanal Rare Earth Element (REE) mining is taking place through the re-processing of tin mine tailings and alluvial material on the state-owned SAKIMA concession in North Kivu province, which is registered as an industrial mining concession. Mining in the Copperbelt is mostly by industrial means, with artisanal cobalt miners variably contributing up to about a quarter of national cobalt production in some years. From 2017-2021, Vasters and Schütte (2023) estimate an average national cobalt ASM production share of 17%.

In addition to manual mining and processing methods, semi-mechanised processes are used at certain 3T mine sites and processing centers in the DRC. These semi-mechanised operations involve equipment, which require cooperation between the (semi-)industrial mining license holders, who oversee the usage, and mining cooperatives.

Grade control practices vary, with some applying grade control when selling concentrate to local traders or exporters, while others do not. All of the DRC's 3T minerals are presently exported in concentrate form, with typical export grades consisting of 20-30% tantalum and 50-60% tin or tungsten content. Copper and cobalt ore mined by artisanal miners usually corresponds to the oxidized upper part of the ore deposits. This ore type is easier to process than the deeper-seated sulfide ore or mixed sulfide-oxide ore. At the mine site, the ore variably undergoes washing, manual crushing and screening before being sold as ore or pre-concentrate to local traders and processors. In 2018, the mean metal content of sold ASM pre-concentrate was estimated at 14% copper and 4.2% cobalt (BGR 2019). At that time, local traders rarely accepted ASM material with grades <1% cobalt or <3% copper; with the recent positive copper price development, lower copper cutoff grades may apply by now. The traders and processors ('depots') receiving these pre-concentrates directly from mining cooperatives or through intermediaries perform particle size classification and milling, with the aim of reducing grain size sufficiently to allow for subsequent leaching at local hydrometallurgical processors. Artisanal oxide ore is sometimes blended with mixed sulfide-oxide ore from other mines, as this may allow for cheaper processing (avoiding the use of expensive oxidation agents that must be added otherwise). While artisanal miners do locally sell copper concentrates as well, their relative share in the total Congolese copper exports is not very high, due to the large tonnages supplied from industrial copper production. In 2018, the BGR estimated a total artisanal copper production of about 16,000 tons (copper content; BGR 2019). This corresponded to about 1% of the DRC's copper exports of that year. The recent strong growth in ASM copper mining output makes it likely that the current production share and total ASM copper output is higher though.



2.2. Identification of the bottlenecks along the value chain

2.2.1 List of the main bottlenecks and the links between them

The DRC scores very low in international ratings concerning raw material governance and investor attractiveness. The DRC appears very badly quoted by international agencies in several indices. See Table 6 for comparison with the other Country Case Studies of this report and for references in the table caption. The DRC ranks 183 of 190 in doing business, 166 of 180 in the Corruption Perception Index, 49 of 54 in the Index of African Governance and 82 of 84 in the index referring to attractivity seen by mining companies. More specifically, the main identified bottlenecks that may affect the development of the extractive sector in the DRC are described below.

Country	Doing Business 2020 (score on 190) (World Bank 2023a)	Corruption Perception Index 2020 (score on 179) (Transparency International 2023)	Index of African Governance 2021 (score on 54) (IIAG 2023)	Attractivity seen by mining companies 2021 (score on 84) (Fraser Institute 2022)
AfricaMaVal case study countries				
Morocco	53	86	10	8
Senegal	123	67	9	46
Gabon	169	129	27	-
Namibia	104	57	8	59
DRC	183	170	49	82
Tanzania	141	94	21	67
Mozambique	138	149	26	-
Zimbabwe	140	157	29	84
South Africa	84	69	6	75
Madagascar	161	149	34	-
DRC neighbouring countries				
Angola	177	142	40	-
Burundi	166	165	43	-
Central African Republic	184	146	50	-
Congo Republic	180	165	46	-
Rwanda	38	49	12	-
South Sudan	185	179	54	-
Uganda	116	142	31	-
Zambia	85	117	24	-

Table 6: Comparison of the ratings concerning raw material governance and investor attractiveness by different international agencies.

- **Road infrastructure:** Infrastructure gaps are particularly large in road transport and no road connects Eastern and Western DRC. Much of the DRC is disconnected with only 5 % of roads being tarred and 14 % in good conditions (IMF 2023). The total “on paper” road network in DRC

is about 152,400 km long, but most of these roads are impassable due to poor conditions. There is no reliable land connection between the national road corridors that run east-west (between the Atlantic and the Kasais) and north-south (along the Great Lakes region), severely impacting the flow of people and goods (World Bank 2022a). Due to the high frequency of trucks transporting ore, some good roads are available in the main copper mining region (Haut-Katanga), e.g., between Kolwezi and Lubumbashi.

- **Rail infrastructure:** The DRC has one of the most extensive rail networks in Africa, with close to 3,500 km of rails in the South and formerly 1,000 km in the North (Chemin de fer des Uélé), where operations ceased in 2000. However, today the railways are not functioning, being in a state of disrepair, suffering from broken-down infrastructure, weak management and governance, and high operational costs. The “Société Nationale des Chemins de Fer du Congo” (SNCC) operates an extensive network centred in the southeast of the country, i.e., connecting Katanga on the Zambian border to Dilolo on the Angolan border and the northern part of the Katanga region to Ilebo in the Kasai region (World Bank 2022a). The SNCC network is used extensively for copper exports leaving the DRC for the port of Durban and will also facilitate exports through Lobito in Angola. The latter requires the completion of the Lobito Corridor, connecting the southern DRC and north-western Zambia to regional and global trade markets via the Port of Lobito in Angola. An EU-U.S. partnership will immediately support the governments of the DRC, Zambia and Angola to launch pre-feasibility studies for the construction of the new railway line (White House 2023).
- **Port capacities:** With poor connections to the sea, the DRC is predominantly landlocked. No ports in the DRC can take direct calls from conventional cargo liners and the country has to rely on transshipments from Pointe Noire in the Republic of Congo using smaller vessels that may use the port of Matadi. Inland cargo-handling is limited and inefficient, thus trade from southeast DRC, notably copper, is channelled mainly through Durban in South Africa and, in particular since the Covid crisis, through other southern African ports in Mozambique and Namibia. The most important port for the eastern DRC is Dar Es Salam in Tanzania; since 2021, this port is also receiving an increasing number of copper export shipments. Mombasa in Kenya remains the key port for Kisangani and the northeast part of the country. The DRC government plans to develop the Port of Banana and convert it into a deep-water port. Currently, the government has a concession agreement over the port of Banana with the Emirati company DP World (Africa Intelligence 2022).
- **Energy:** DRC’s installed grid power has a capacity of 2,844 MW and is sourced from hydroelectricity (99.6 %), biomass and waste, fossil fuels and solar (0.4 %) (Africa Energy 2023). The dominant contribution of hydroelectric power in the grid reflects relatively low CO₂ emissions of the mining sector. Currently, there are 16 dams in operation in the DRC, 12 of which are operated by the state-owned company Société Nationale d’Electricité (SNEL) and 4 by private



individuals (Int. J. Hydropower Dams 2016). The majority of the installed capacity (1,800 MW) originates from the Inga 1 and Inga 2 dams (completed in 1972 and 1982, respectively), however, the poor condition of the two power plants results in only a fraction of the capacity being produced. Thus, about 40 % of firms in the DRC own and operate their own backstop generator to shield themselves from frequent power interruptions. Others, such as Ivanhoe, have entered into a partnership with SNEL to ensure energy security by taking care of the refurbishment of hydropower turbines themselves (e.g. turbine no. 5 of the Inga II dam). Despite these challenges, the DRC has immense power generation potential. It boasts the largest and most cost-effective hydropower potential on the continent and could produce up to 100,000 MW of power. The first step in achieving this goal is the construction of the Grand Inga dam (Inga 3-8) with a proposed capacity of up to 40,000 MW. However, after the World Bank withdrew from the project in 2016 and the partnership with a Chinese-Spanish consortium failed, the Australian developer Fortescue stepped in 2021. South Africa has binding offtake agreements with the DRC over 5 MW supplied by the Grand Inga dam project. Delays, however, could now lead to South Africa being allowed to withdraw from their contract even before the commencement of construction (DW 2020).

- **Political Instability and security:** The DRC has a history of political instability and conflict, such as the two Congo wars in the late 1990s. Since then, supported by international organisations, such as the United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo (MONUSCO), the country's first free and fair elections in 46 years were held on 30 July 2006 and many regions in the country generally stabilised. The eastern part (i.e., Ituri, North Kivu and South Kivu), however, continued to be plagued by recurrent waves of conflict, chronic humanitarian crises and serious human rights violations, including sexual and gender-based violence. About 27 million are in need of humanitarian assistance and 5.5 million are displaced (as of January 2022). The Armed Forces of the Democratic Republic of the Congo (FARDC) fight against numerous armed rebel groups, such as the Allied Democratic Forces (ADF), the Cooperative for the Development of the Congo, the March 23 Movement, and local Mai Mai militias. Nonetheless the UN plans the complete withdrawal of MONUSCO for 2024 (UN 2022). See also section 4.2.2 Socio-economic issues).



3. Investment/financing prospects for ECRM projects in the DRC

3.1. Fiscal, legislative and regulatory context for in-country financings

The mining sector in DRC is governed by Law N° 007/2002 of July 11, 2002 on the mining code (Mining Code 2002), which is amended and supplemented by Law N° 18/001 of March 09, 2018 (Mining Code 2018) as well as the ministerial decrees supporting and/or domesticating the national and/or regional mineral traceability initiatives, ratified texts and sub-regional and international commitments (e.g., OECD, EITI, ICGLR, Kimberley Process). The numbers mentioned in the following sections originate from the Finance Law 2015, the Mining Code 2018 and a KPMG report (2020).

3.1.1 Fiscal framework for mining investment (due to the Finance Law 2015)

- **Royalty rates:** 3.5% for iron and ferrous metals, non-ferrous metals and precious metals (except for the Primera Gold JV, which pays a reduced rate), 6% for gemstones, 1% for industrial minerals, 0% for common construction materials as well as 10% for strategic minerals determined by the government (i.e., cobalt, coltan, germanium).
- **Corporate tax:** Resident companies and individuals are exempted from paying withholding tax on foreign dividends. Latent capital gains on business assets are exempted in so far as they are not realized by the taxpayer.
- **Tax on salaries:** Salaries and all benefits in cash or in kind paid to local and expatriate employees are taxable at a maximum rate of 30% after deduction of the employee's social security contribution. The tax is withheld by the employer who is liable for the payment of the tax. Family allowances, pensions, annuities, housing, transport allowance and medical expenses are exempted up to the proportion published by the Government.
- **Value-Added Tax (VAT):** Imports and transactions within the DRC are taxed at 16%, while exports are zero rated. Exporting mining companies, oil producing companies and companies having made significant investments which are in the implementation phase are authorised for their local acquisitions, to be delivered free of VAT, goods and services that they are geared to their operating and investment needs. The law exempts the import and purchase of equipment, materials, reagents and other chemical products intended for prospecting, exploration, research and development and construction of mining and petroleum projects, before the beginning of operations.

- **Investment incentives:** Small and medium enterprises (SME) and small and medium industries (SMI) carrying out on an investment program receive a total exemption from duty and import taxes for machinery and equipment, second-hand machinery and spare parts for first allocation not exceeding 10% of the CIF value of such equipment, as well as industrial inputs necessary to achieve the approved investment. SMEs and SMIs are also exempted from registration fees in the Trade Register and the acts of cooperatives or company.
- The legal framework for subcontracting (loi de sous-traitance) and repatriation of capital gains are explained below as well as for exports in section 3.2.

Authorisation	Duration	Tax	Requirements
Research (exploration) license	5 years (renewable once)	US\$ 16.99/km ² for year 1 US\$ 25.49/km ² for year 2 US\$ 29.73/km ² for year 3 US\$ 33.98/km ² for the following years	A person and his associates cannot hold more than 50 licenses (less than 20,000 km ²).
Exploitation license (large-scale mining)	Max. 25 years; renewable over periods of 15 years	US\$ 424.78/km ² per year	A person and his associates cannot hold more than 50 licenses. Exploited materials are to be processed in the DRC. Participation of natural persons of Congolese nationality in the share capital of up to 10%.
Exploitation license for mine tailings	5 years (renewable)	US\$ 679.64/km ² per year	-
Small-scale mining licence	5 years (renewable)	US\$ 195.40/km ² per year	Only for those areas where large-scale mining is not economically viable.
Artisanal mining area (ZEA)	May be closed if the factors leading to its creation are no longer applicable.		Established by order of the minister. Artisanal mining areas and other mining permit areas are mutually exclusive. Requires registration of artisanal miners in cooperatives.
Research authorization of quarry products	5	US\$ 4.25/km ² per year	-
Permanent operating license for quarry	25	US\$ 169.91/km ² per year	-
Authorisation for processing or beneficiation	-	-	The processing or beneficiation of mineral substances is carried out either by the holder of the Exploitation Permit or by a beneficiating entity.

Table 7: Authorisation requirements and process⁵

⁵ Mining Code 2018; KPMG 2020

Resident companies	
Corporation Tax	
- Normal rate	30%
- Mining companies	30%
Capital gains	30%
Dividends (local)	20% (withholding tax)
Dividends (foreign)	Exempt
Dividends distributed by mining companies and their subcontractors	10% (withholding tax)
Interest	20% (withholding tax) / 0% for mining companies under conditions.
Income for services provided by foreign companies	14% (withholding tax)
Resident individuals	
Individual salary tax	Schedule with 30% maximum
Dividends (local – WHT deducted at source)	20%
Dividends (foreign)	Exempt
Dividends distributed by mining companies and their subcontractors	10% (withholding tax)
Rental revenue	22% (monthly withholding tax of 20%; 2% tax on landlord at the end of the year)

Table 8: Income Tax, Withholding Tax⁶

Country	Dividends qualifying companies	Interest	Technical Management & consultancy fees (%)	Royalties
Belgium	15/10	10	N/A	10
South Africa	15/5	10	N/A	10
African Continental Free Trade Area	The African Continental Free Trade Area (AfCFTA) is a free trade area brokered by the African Union and encompassing 43 African parties and another 11 signatories committing its members to eliminating tariffs on most goods and services.			

Table 9: Double tax treaties and reduced rates Treaties⁷

Conversion of local currency into hard currency: The holder of mining rights is free to convert capital contributions, funds advanced by shareholders, drawings on loans and foreign currency receipts from the sale of products into Congolese Francs (CDF) at the best exchange rate offered by approved banks on the day of the conversion operation. However, the holder of mining rights may use approved non-banking intermediaries other than financial messengers to exchange cash (Art. 263, Mining Code 2018).

Transfer funds to abroad: The holder of the mining rights shall be authorised, after payment of the taxes and duties due, to make capital transfers directly related to the activities permitted by his mining right. In addition, foreign personnel residing in the National Territory and employed by the holder of a mining title are guaranteed the free conversion and transfer of all or part of

⁶ Finance Law 2015; Mining Code 2018, Chapter 3; KPMG 2020

⁷ PwC 2023

the sums due to them, provided that the persons concerned have paid their taxes and various contributions in accordance with the legislation in force in the DRC (Art. 264, Mining Code 2018).

Foreign/local currency accounts: The holder exporting the mining products may open and maintain an account or group of accounts in foreign currency with approved commercial banks located in the Democratic Republic of Congo to manage the revenues and expenses of the project he is operating under his mining rights in foreign currency. He is free to keep all revenues from export sales of the project products in foreign currency without being obliged to convert them into local currency (Art. 268, Mining Code 2018).

Foreign exchange monitoring fee: The holder is required to pay the Banque Centrale du Congo a foreign exchange monitoring fee of 0.2% on all payments abroad with the exception of repatriation of income from the main account as well as any debit or credit transaction carried out on its main account, with the exception of transfers to foreign debt service accounts (Art. 270, Mining Code 2018).

Requirement to repatriate funds: A licensee who exports marketable products from the mines during the amortisation phase of its investment is:

- a) Authorised to keep and manage up to 40% of its export sales revenue in its main account and foreign debt service accounts. The terms and conditions for funding the foreign debt service accounts, as well as the terms and conditions for payment of the holder's foreign debt service, are set out in the borrower's loan agreements with its foreign lenders;
- b) Obligated to repatriate 60% of export receipts to its account in the Democratic Republic of Congo within fifteen days of receipt in the main account provided for in Art. 267 (Mining Code 2018).

In the event of amortisation of its investment, it is obliged to repatriate 100% of the revenue from its export sales to its main national account in the DRC within the period stipulated in paragraph b above; Only the holder of mining rights who has provided bank details and who sends the Central Bank of the Congo a quarterly report of his activities recorded in the main account, as set out in Art. 271 (Mining Code 2018), may keep a share of export receipts or pre-financing abroad. The repatriated portion is intended to cover domestic expenses for residents and may not be used to finance the transactions referred to in Art. 264 (Mining Code 2018).

Transfer Pricing: Transfer pricing is of great importance in the extractive sector because companies often operate in different countries and trade commodities or products between their different entities. Transfer Pricing affects tax, risk management, compliance and business performance, and is regulated as followed. Companies established in the DRC are obliged to have transfer pricing documentation on operating transactions with their affiliated companies located



offshore (Finance Law 2015). In practice, the Ministry of Mines currently (2023) sees transfer pricing as a major problem affecting the mining sector.

3.1.2 Legislative framework for mining investments

Subcontracting law (loi de sous-traitance; from BGR 2023): The Subcontracting Act (Law N°17/001 of 8 February 2017 determining the rules applicable to subcontracting in the private sector), promulgated for the mining sector in March 2018. The law aims to involve small and medium-sized local companies in mining projects and to promote them with Congolese capital. National labour should be protected and the tax base broadened in favour of the treasury. However, local companies often have difficulties meeting the requirements of mining companies, which makes it difficult for them to participate in subcontracts. A detailed assessment of potential implications of the legal, regulatory and institutional context related local procurement and especially the Subcontracting Act is presented in BGR (2023). The Subcontracting Act, which application to mining companies is expressly reaffirmed in the revised Mining Code of 2018, notably provides that:

- Activities can only be subcontracted to “companies with Congolese capital promoted by Congolese nationals”, defined as in the 2013 Ministerial “arrêté”, as companies headquartered in DRC, with a majority of their share capital held by Congolese natural or legal persons, governance bodies with a majority of Congolese nationals, and staff essentially made up of Congolese nationals.
- An exception is made for the case of proven unavailability or inaccessibility of expertise, in which case it can be done by a foreign company for less than 6 months, beyond which the foreign company must register locally. This deadline was later revised by the ministerial decree in January 2021 which enshrines a derogation regime, including a permanent exception.
- Tender must be done for subcontracts exceeding 100 million CDF.
- Companies may not subcontract more than 40% of the value of a contract.
- Subcontractors are to be paid a 30% advance and the balance within 30 days of contract completion (with a possible extension for specificity of the contract).
- Companies established in DRC must disclose annually their turnover with subcontractors and the list of those, and put in place a policy of training to enable Congolese nationals to acquire the technical know-how and the qualifications necessary to accomplish certain activities.
- Sanctions include monetary penalties (up to 150 million CDF), nullity of the subcontracting contract, and an administrative measure of temporary closure.
- The Ministry of SME monitors subcontracting at the national level, through a structure to be put in place; provincial and local authorities also have a role in control of the Law.
- A 12-month transitional period was provided for companies to comply with the new Law.

International arbitration: According to Article 30 of the Uniform Act (1999), for the enforcement of an arbitral award in OHADA States, including the DRC, there must be a recognition order



(exequatur) from a competent court. The Code of Civil Procedure (1960), in turn, provides in Article 184 that an arbitral award can only be enforced in the territory of the DRC by an order of enforcement issued by the president of the competent court. Article 185 provides that such an order is appealable. The DRC is also a State Party to the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards, which governs the enforcement of foreign arbitral awards in its territory.

In the recent past, international arbitration tribunals, particularly the one in Paris and Geneva, have been called upon to take up Congolese mining cases. These include the case of MMG Limited (Hong Kong) against the Congolese state-owned mining company Gecamines, following the alleged occupation by the armed forces of the DRC of two concessions near its Kinsevere copper mine (Mining 2022). Furthermore, there are multiple arbitration proceedings initiated by AVZ (Australia) regarding the rights on the Manono lithium concessions, including one with a unit of Zijin (China) and another with Cominiere (DRC) (Mining Weekly 2023).

3.2. Macroeconomic context for in-country financings

This section provides an overview of the economic landscape of the DRC, traversing the intersections of gross domestic production (GDP) dynamics, foreign direct investment (FDI) trajectories, foreign exchange (FX) and inflation undulations, sovereign debt burdens, regional economic integrations, and the intricacies of import and export mechanisms.

3.2.1 Overview

Table 10 gives an overview on the macro economy of the DRC.

Key Indicator	Value	Year	Source
Population	96 million	2021	UNCTAD 2023
Poverty	60% of population lives in extreme poverty (<US\$ 2.50)	2022	World Bank 2023b
GDP	US\$ 58 billion	2022	World Bank 2023b
GDP per capita	US\$ 1,100	2021	CIA Factbook
Annual average CDF per USD	2,0010	2022	IMF 2023
Annual average inflation rate	9.0%	2022	IMF 2023
Government budget balance as % of GDP	-1.2%	2022	IMF 2023
Central Government Expenditures as % of GDP	17.1%	2022	IMF 2023
Share of extractives in GDP	46.7%	2021	BCC 2023

Key Indicator	Value	Year	Source
Share of Cu and Co in exports	88.0%	2021	BCC 2023
Public debt (absolute, as % of GDP)	US\$ 11.2bn, 23.1%	2020	World Bank 2022b
World Bank Classification (2022)	Low income	2022	World Bank 2023b
Fitch Rating Agency Rating	CCC	2022	Fitch Rating Agency 2023
Real annual GDP growth (2014-2022)	5.5	2014-2022	World Bank 2023b
Ease of Doing Business Index	183 rd out of 190	2020	World Bank 2023a
Corruption Perceptions Index	170 th out of 180	2020	Transparency International 2023
Global Competitiveness Index	139 th out of 141	2019	World Economic Forum 2023
Mining Investment Attractiveness Index	55 th out of 62 countries	2022	Fraser Institute 2023
Sovereign credit rating	B- (negative)	2022	S&P 2023c
Sovereign credit rating	B3 (negative)	2022	Moody's 2023
Country risk classification (export credits)	7 (highest risk)	2023	OECD 2023

Table 10: DRC Economic Fact Sheet.

The DRC is generally considered as a developing economy. Its economy is characterised by a low level of industrialisation, a low income level, a high poverty rate, and a great reliance on agriculture and natural resource extraction. The latter include minerals like copper (African no. 1 copper producer, global no. 2 as of 2022), cobalt (global no. 1 cobalt producer), gold, tin and diamonds (USGS 2022). However, the DRC also faces challenges such as political instability, inadequate infrastructure, poverty, and limited access to education and healthcare.

At the time of its independence in 1960, the DRC was the second most industrialised African country after South Africa. Sometime after Mobutu became the sole ruler in 1965 its economic situation started to deteriorate. By 1979, purchasing power was only 4% of 1960 levels. A report of the International Monetary Fund (IMF) in 1982 exposed Mobutu's corrupt system and economic mismanagement. Foreign exchange shortages forced money printing for spending. The DRC's growth turned negative in 2000 due to donor conditions, low export prices, and post-coup instability (Shantz 2008).

Stability improved in most areas after foreign troop withdrawal in 2002, but to this day remains precarious in the eastern DRC. For the past 10-15 years, there has been a significant re-industrialisation of the DRC's copper-cobalt sector in the former Katanga province (now split in different new provinces). Due to the Congo wars and the widespread liquidity challenges in the final Mobutu years, the sector had shown significant decay. With the increasing international demand for copper and cobalt, combined with the relative stability in this part of the DRC, the sector has recently seen massive growth, well exceeding historical peak production. Since copper

and cobalt are raw materials required for the energy transition (copper for transmission lines, cobalt in the cathodes of lithium-ion batteries), this has put the DRC at the centre of the global transition to decarbonisation, along with other countries such as Indonesia. The DRC currently does not produce any other battery metals than cobalt, though.

3.2.2 Gross Domestic Production dynamics

The DRC has a complex economic history with periods of growth, decline, and instability. According to the World Bank (2023c), DRC's GDP (current US\$) grew from US\$ 3.4bn in 1960 to US\$ 58.1bn in 2022, representing an average annual growth rate of 1.8%. The country's highest recent GDP (except 1962) growth rate was recorded in 2014, at 9.5%, while the lowest was in 1993, at -13.5% (World Bank 2023c). However, the global shocks, such as the global financial crisis in 2008 and the COVID-19 pandemic in 2020 had significant impacts on the DRC economy, resulting in contractions (Figure 7).



Figure 7: Gross Domestic Product Growth Rates, in percentage (World Bank 2023c).

Exploitation of the DRC's significant mineral wealth has historically been a major contributor to the GDP. Over the past decade, copper has played the by far most important role, while cobalt (as a by-product of copper) and gold made significant contributions as well. These and other minerals have fuelled export earnings and government revenue. The mining sector's performance heavily influences the country's economic prospects. The extractive sector dominates growth dynamics with growth benefitting from increasing copper-cobalt mining production (Figure 8; World Bank 2022b). It should be noted that the GDP in the DRC only reflects the formal part of the national economy. There is a significant informal sector, associated with many business activities and including ASM as well.

The non-extractive sector (agriculture, services and manufacturing) as percent of GDP is displayed in Figure 8. Agriculture has traditionally been a vital source of livelihood for many Congolese. However, due to limited modernisation, infrastructure and access to markets, the agricultural sector's contribution to GDP has been relatively modest compared to its potential

(World Bank 2022b). The services sector includes activities such as trade, transportation, and finance. While the services sector has grown in importance over time, it has often been constrained by inadequate infrastructure and a challenging business environment (World Bank 2022b). Manufacturing has historically faced challenges such as power shortages and limited investment. However, there have been efforts to promote industrialisation, particularly in sectors like textiles and food processing. Non-extractive growth has decelerated lately due to services and manufacturing as investment moderated (World Bank 2022b).

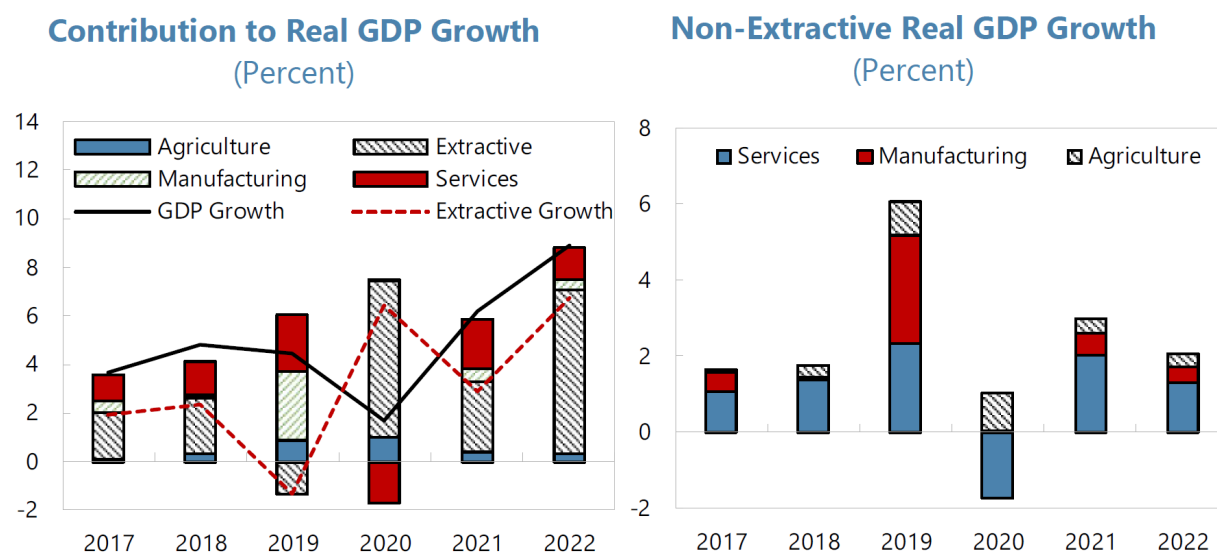


Figure 8: Contribution to the Real GDP Growth, inclusive extractive economy (left) and exclusive extractive economy (right) (IMF 2023).

The mining sector is expected to expand further in 2022 and pick up pace out to 2024, as Kamoakakula, which aims to become the second-largest copper mine in the world, entered its second phase of expansion in late 2022 (World Bank 2022b). Mining sector growth may average 9.3 percent in 2021-24, fuelled by continued expansion in domestic mining production and overall favourable, though volatile commodity prices, especially copper and cobalt prices. Increased output from the mining sector, together with political stability, the removal of the remaining COVID-related restrictions, and improved regulation in the telecommunications sector will boost the services sectors, which will be among the main growth drivers (World Bank 2022b).

The DRC economy's vulnerability to commodity price fluctuations and the growth of its trading partners, combined with geopolitical conflicts, poses significant risks. The economy heavily depends on mining, while investment and infrastructure remain weak (World Bank 2022b). The country's high dependence on copper and cobalt exports, mainly to China, makes it susceptible to global market volatility. Political tensions surrounding elections may hinder reforms and investment. Climate change-related risks also impact the agriculture sector. Maintaining stability while pursuing sustainable growth is the immediate challenge (World Bank 2022b).

3.2.3 Foreign Direct Investment trajectories

To date the country has faced problems such as corruption, political instability, lack of infrastructure and legal uncertainties, which have often prevented broader and more diversified FDI inflows. The FDI potential of the DRC is based on abundant mineral resources as well as in sectors like energy (especially hydroelectric) and infrastructure. The government sees major potential for future FDI growth to be directed to mineral-associated value addition in a special economic zone on battery value chains which may initially focus on refining and chemical production, and later on progressively expand towards more steps of the battery value chain until, eventually the level of electric vehicles (including two- and three-wheelers). Another special economic zone is under construction near Kinshasa. Figure 9 displays the development of the FDI in absolute values (Figure 9) and as percent of GDP (Figure 9). To date, the mining sector is the one that attracts most FDI, followed by telecommunications. South Africa, Belgium and China are the country's main investors. According to UNCTAD (2022), FDI flows into the DRC increased from US\$ 1.6bn in 2020 to US\$ 1.8bn in 2021.

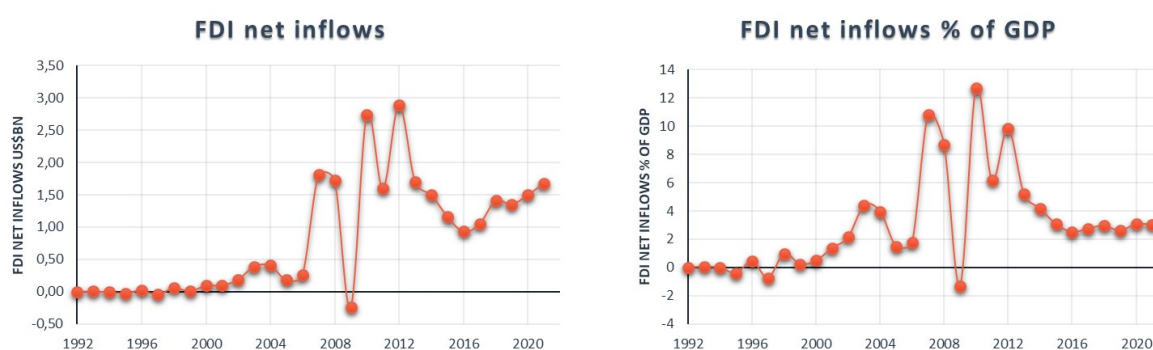


Figure 9: Foreign Direct Investment inflows into DRC, absolute values in billion US\$ (left) and as % of GDP (right) (World Bank 2023c).

Around the mid-2000s, a global commodities boom led to increased interest in the DRC's mineral resources, particularly copper (including cobalt as by-product). Significant historical mining assets often held by the parastatal Gecamines were sold to new developers in a challenging governance framework, sometimes involving controversial middlemen such as Dan Gertler, an Israeli businessman under US sanctions who enjoyed privileged access to then-president Kabila. In 2008, former DRC president Kabila negotiated a “mining for infrastructure” deal with Chinese partners, initially valued at US\$ 9 billion and subsequently reduced to US\$ 6 billion. Chinese stakeholders were to invest in infrastructure and energy projects in return for obtaining mining rights, such as the ‘Sicomines’ operation near Kolwezi. Subsequently, Chinese influence in the copper-cobalt sector grew strongly. According to an evaluation by the IMF (who contested the initial agreement), as part of the deal Chinese partners invested close to US\$ 3 billion while in turn realising gains of US\$ 76 billion. New president Tshisekedi has questioned the deal and calls for its re-negotiation. Aside from Chinese partners, a range of other foreign investors are engaged

in the DRC's mining sector. Prominent investors in the industrial mining sector hail from Switzerland (Glencore), Kazakhstan (ERG), Canada (Barrick, Ivanhoe) and the UAE (Chemaf). Mineral trade in the mostly informal ASM sector for critical metals (producing copper, cobalt, tantalum, tin and subordinate tungsten) is controlled by Congolese, Chinese and other stakeholders who often provide pre-financing of minerals and goods along their trading networks, although actual investment in the ASM mine infrastructure is very low.

The DRC also has potential reserves of oil and gas, although this sector has seen less FDI compared to mining. Oil exploration and production activities have attracted some foreign investment, including from companies like Total. Oil and gas exploration is seen as particularly controversial where it occurs in the Virunga national park in the eastern DRC.

The DRC has vast agricultural potential, and there has been interest from foreign investors in agribusiness projects, including large-scale farming and agro-industrial ventures. The telecommunications sector has attracted FDI as well, as the DRC seeks to improve its digital connectivity and expand access to communication services.

3.2.4 Foreign exchange fluctuations and inflation undulations

The DRC utilizes the CDF as its official currency although in day to day business the US Dollar plays an important role as well. The DRC's foreign exchange market has experienced periods of volatility, influenced by factors such as commodity prices, global economic conditions, political instability, and trade dynamics. The nation's significant dependence on mineral exports, especially copper and cobalt, makes it susceptible to shifts in global commodity prices. Inflation has historically been a challenge within the DRC. Elevated inflation can erode purchasing power, influence consumer expenditures, and introduce economic uncertainties.

Throughout the forecast period, the foreign exchange market remain relatively stable, against a backdrop of well-coordinated good coordination of economic policies. The domestic currency is expected to depreciate by 0.4% and 1.3% in 2022 and 2023 respectively (Figure 10; BCC 2023).

The DRC's banking sector remains heavily dollarized, with a significant proportion of deposits and loans denominated in foreign currencies, mainly US Dollars. These measures collectively aimed to stabilize inflation, promote currency stability, and address the challenges posed by the pandemic while ensuring adequate liquidity in the financial system (World Bank, 2022b).

Graphique II | 16 Evolution du taux de change de 2022 à 2024
(en CDF le dollar US)

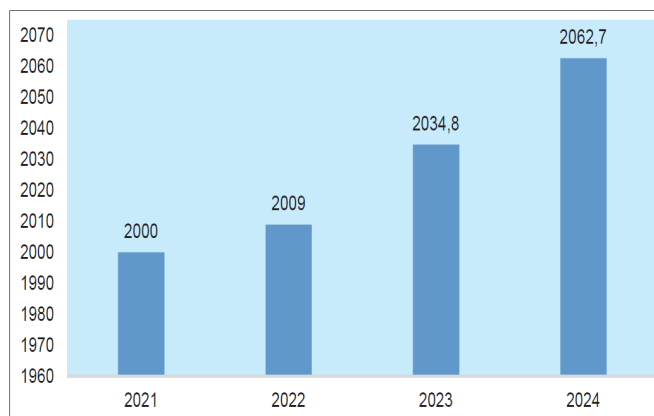


Figure 10: Exchange rate trends from 2021 to 2024 in CDF per US dollar (BCC 2023).

On the basis of the price index, an acceleration in the pace of domestic price formation was noted in 2020 compared with 2019. The inflation rate was 15.8%, compared with a target of 7.0% and targets of 4.6% in 2019 and 7.2% in 2018 (Figure 11). The average annual inflation rate was 11%, compared with 4.7% a year earlier (Figure 11). This acceleration has affected all consumption functions, particularly food and non-alcoholic beverages, due to the disarticulation of supply chains, which has reduced the supply of goods and services on the market, and the depreciation of the CDF against the main foreign currencies in a context marked by the Covid-19 pandemic (BCC 2023).

Monthly Inflation and Exchange rates, 2019-2021

Percent and CDF/USD (right)

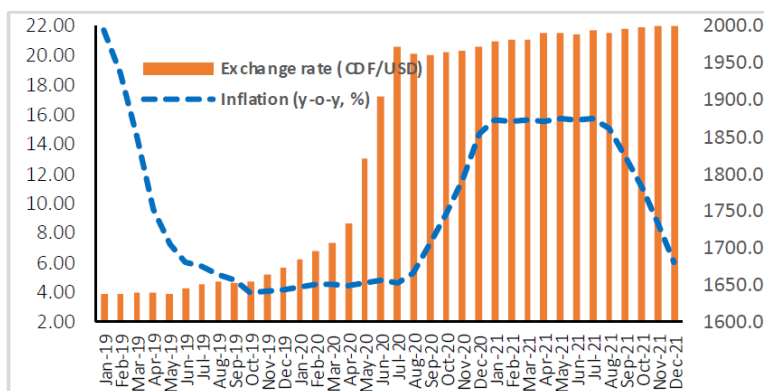


Figure 11: Monthly Inflation and Exchange rates, 2019-2021 in percent (left) and CDF/USD (right) (World Bank 2022b).

In 2020, the pandemic led to increased domestic price pressures, inflation, and economic instability due to lockdown measures and import restrictions. Inflation reached 11.2% in 2020,

up from 4.7% in 2019. However, in 2021, the situation improved, and inflation decreased to 5.3%, which was below the Banque Centrale du Congo (BCC) target of 7.0%. This improvement was attributed to currency stability and BCC policy tightening in late 2020 (World Bank 2022b).

The BCC adopted a flexible monetary policy approach to address the pandemic's impacts. Initially, it lowered its policy rate, eliminated reserve requirements, and provided liquidity to commercial banks. As inflation and currency depreciation became issues, the BCC gradually raised its policy rate from 18.5% in August 2020 to 7.5% in early 2022. The BCC also intervened in the foreign exchange market, injected foreign currencies, and used measures like mandatory reserve ratios and BCC debt securities auctions to control money supply growth, which slowed from 45.9% in 2020 to 35.2% in 2021 (World Bank 2022b).

The exchange rate continued to depreciate, fuelling inflation and tightening government's domestic borrowing conditions (IMF 2023). Inflation is expected to decelerate due to the coordinated tightening of monetary and fiscal policies. Inflation in 2023 is projected at 11.5% and is expected to moderate further to 7.1% by end-2024 (Figure 12). Inflation is projected to revert to the BCC's 7% target over the medium term. The current account deficit is projected to narrow to 2.9% of GDP by end-2028, driven by an improved trade balance (IMF 2023).



Figure 12: Annual targets and actual annual average values of inflation (IMF 2023).

3.2.5 Sovereign debt burdens

An analysis of Congolese public debt shows that its cost is relatively low, thanks to the high concessionality of the portfolio. As a result, the country is exposed to refinancing risk and only slightly to interest rate risk. However, the portfolio carries a major foreign exchange risk due to the preponderance of public debt denominated in foreign currencies (BCC 2023).

According to the December 2021 debt sustainability analysis, the DRC's debt is considered sustainable with moderate risks of external and public debt distress. The total debt in 2020 was US\$ 11.2bn referring to 23.1 % of GDP, including external debt of US\$ 7.4bn (~50 % is owed to China) (World Bank 2022b).

While higher debt issuance and temporary fiscal deficits have occurred due to investment needs financed by budget support, the medium-term trajectory of external and public debt does not raise significant concerns about debt sustainability. However, extreme shock scenarios, such as lower nominal exports, could breach debt thresholds, particularly due to the DRC's vulnerability to commodity price fluctuations. As a result, both external and overall public debt are at a moderate risk of debt distress (World Bank 2022b).

Efforts are ongoing to improve data coverage for state-owned enterprises' debt. While data on all state-owned enterprises' debt is not currently available, steps are being taken to include debt data for strategic state-owned enterprises in the coming years. State-owned enterprises' debt is factored into the debt sustainability analysis for contingent liability shocks, even if not captured under public and publicly guaranteed debt parameters (World Bank 2022b).

3.2.6 Intricacies of import and export mechanisms

The import and export situation in the DRC is characterised by its heavy reliance on mineral commodities, primarily on copper and, to a lesser extent, cobalt and gold (Figure 13). Gold exports are largely due to industrial production whereas artisanal gold production (approximately one third of total national gold production), until recently, used to be smuggled out of the country to the United Arab Emirates, through transit states in eastern Africa. This has only changed since 2022 with the arrival of the new Primera Gold JV which, due to a strongly reduced special export royalty, has been able to capture a lot of the formerly smuggled gold from the eastern DRC (except for ASM gold in the north-eastern part of the country, which is a major gold mining region). Smaller DRC mineral export commodities such as coltan (tantalum) are partly officially exported and partly, in unknown proportion, smuggled to eastern neighbouring countries, in particular Rwanda, from where they are then exported officially. From 2010 through 2020, mineral export values rose from about US\$5 billion to US\$13 billion. With the strong commodity price increase in 2022, the combined value of mineral exports surpassed the US\$25 billion threshold. Copper and cobalt together make up about 90% of mineral export revenues. Copper is mostly exported as cathodes while cobalt is exported as crude hydroxide. Tin and tantalum are mostly exported as concentrates, while a small proportion of tin has also been exported as tin ingots since 2023.

Currently, exports remain highly concentrated in mining products while broad-based products constitute imports (Figure 13). The DRC faces fiscal policy challenges due to volatile resource revenues. It needs to avoid pro-cyclical fiscal practices and establish rules for medium-term fiscal

sustainability. While the domestic fiscal balance aims to curb pro-cyclical spending, experts advise adopting a resource-based fiscal framework due to uncertain extractive revenue projections, fiscal volatility, and limited transparency in the extractive sector's financial flows.

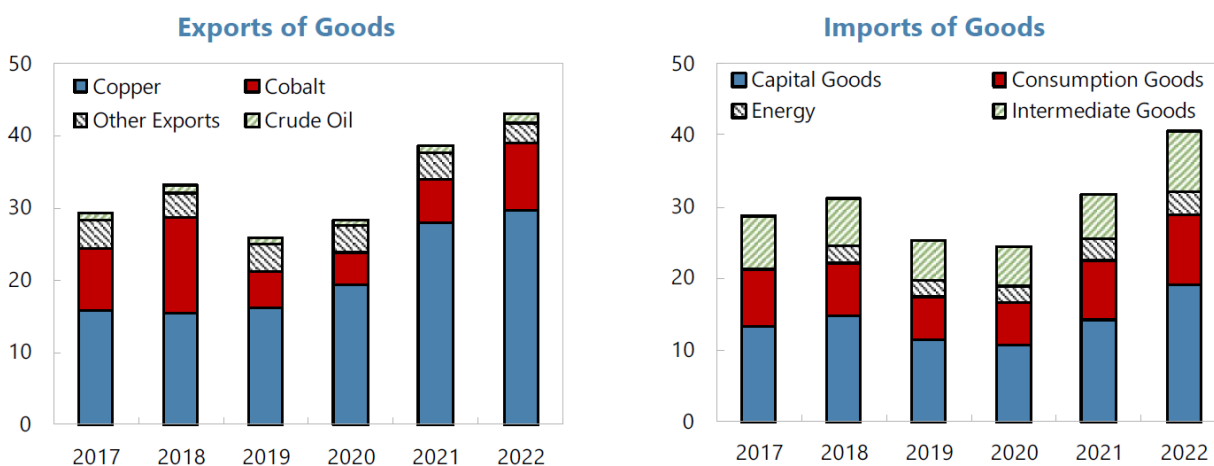


Figure 13: External Sector Developments, 2017-23 showing (left) the export of goods and (right) the import of goods as percent of GDP (IMF 2023).

Buoyant exports, driven by the extractive sector's growth, partially offset a significant rise in imports, attributed to increased public spending and mining sector capital goods imports. Although the current account deficit widened to 5.3 percent of GDP, strong private sector capital inflows contributed to rising gross international reserves, reaching US\$ 4.5 billion by December 2022, equivalent to two months of imports.

The DRC's top export partners in 2022 were China, the UAE, the Republic of Korea, Spain, Portugal and Zambia (Figure 14) whereas the top import partners in 2022 were China, Zambia, South Africa, Rwanda, India and the UAE (Figure 14).

Looking ahead, the mining sector will continue to significantly influence the current account balance. Mineral exports, a substantial part of total exports, are expected to increase further due to new mining projects or expansions of existing projects, in response to global demand for climate-transition-related commodities. Imports are projected to gradually increase due to growing demand for capital goods and intermediates for infrastructure investments.

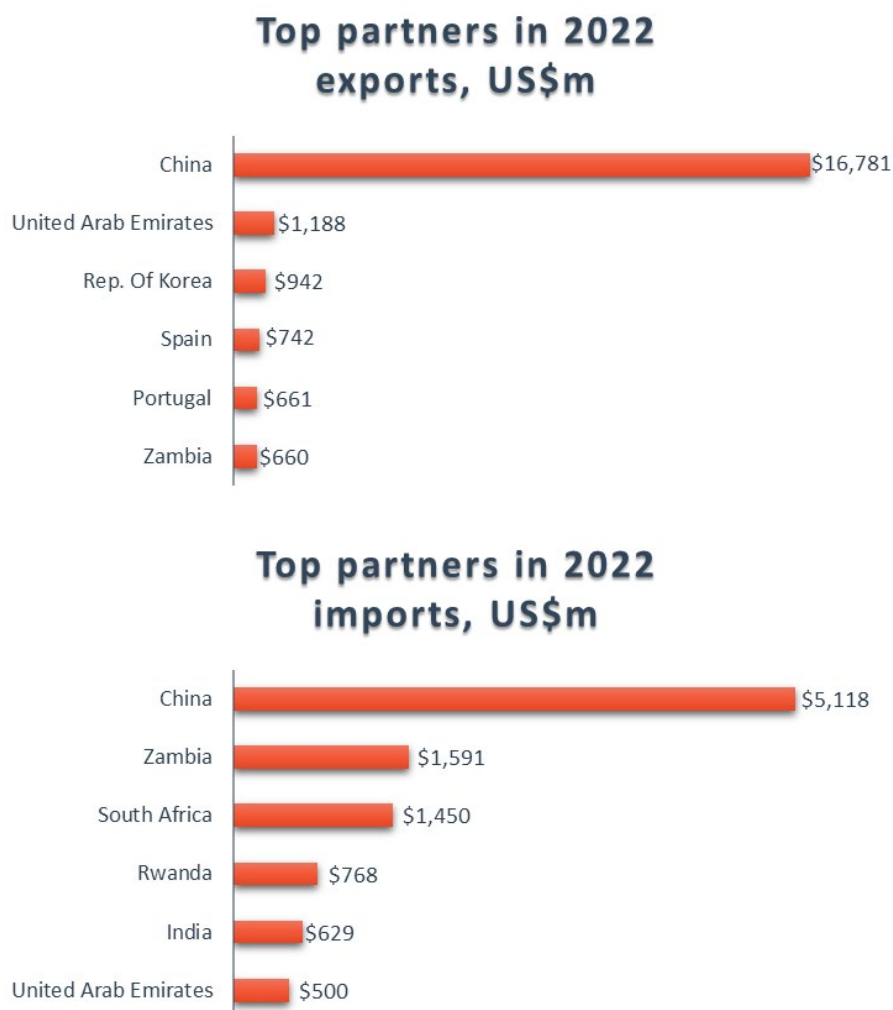


Figure 14: DRC's top (top) export and (bottom) import partners in 2022 (UN Comtrade 2023).

Export restrictions: Article 108 of the Mining Law restricts the holder of a mining licence or a permanent mining permit from exporting unprocessed mineral substances. There is an exception to this restriction, if the holder of the mining licence is authorised by an inter-ministerial decree of the Minister of Mines and the Minister responsible for foreign trade to have its mining products processed outside the national territory, subject to the payment of the related tax and an authorisation period of only one year. In the past, exemptions happened frequently but, in recent years, the DRC has increasingly enforced the processing restrictions in the copper-cobalt sector. Some notable large projects, such as the Kamao copper mine, are currently allowed to export part of their production as copper concentrate, though, reflecting limited in-country smelting and refining capacities which requires sufficient energy infrastructure. Kamao is currently constructing its own smelter such that it will at some point also export copper cathodes

only (part of its concentrates are already processed in-country by a third-party smelter in Kolwezi).

3.3. Political context for in-country financings

The DRC hosts resources of a number of critical raw materials that are relevant for the global energy transition or other strategic applications. This includes copper, cobalt, manganese and lithium (power transmission lines and battery applications) as well as tantalum and tin (e.g., electronics sector) and strategic niche commodities including germanium and gallium. The Congolese government is keenly aware of the country's actual and potential relevance for global mineral supply, and is seeking to expand its strategic position by supporting exploration for nickel, among others. The DRC's relevance as a mining powerhouse is mirrored in the major production growth the country has achieved in recent years, rising to the second largest copper producer in the world. Annual mining conferences such as the DRC Mining Week attract thousands of delegates from around the globe. The government seeks to attract investment in value adding activities in the country in addition to exporting raw materials in the form of metals or intermediate products. Note that, with some notable exceptions, the DRC generally does not export significant tonnages of unprocessed raw materials, without any form of value addition; instead the country mostly exports refined metal (copper cathodes) or chemical products such as crude cobalt hydroxide.

The initiative for creating a special economic zone for battery supply chains, as a joint initiative of the DRC and Zambia, reflects the ambition to incentivise investment in further in-country value addition. It is however clear that a significant range of cathode active materials as well as anode materials required for lithium ion batteries are not yet produced in the DRC (lithium) or have not yet been identified in the DRC or Zambia at all in economically viable concentrations (nickel, graphite). ARISE Integrate Industrial Platform (ARISE IIP), a pan-African infrastructure developer, has been selected as the technical consultant to conduct a pre-feasibility study for the establishment of the Special Economic Zones in DRC and Zambia. This study is planned to be completed in Q4 2023 (UN 2023). ARISE IPP's project shall deploy well-established and proven EV technology that will enable both countries to exploit their mineral resources at scale. Closing this gap would be important, either by increased exploration and project development for the above commodities, or in terms of setting up local supply chains for imports from other countries, perhaps incentivised through the fiscal framework of a special economic zone and benefiting from the African continental free-trade area. Owing to the logistical position of the Copperbelt, being located in the centre of the continent with long transport routes to the next port, relying on significant imports would however present a challenge for the business case of local value addition in the battery supply chain. The latter might seem attractive in case of high cobalt prices but, considering that the trend in battery chemistry is towards producing high-nickel cathode chemistries or producing other battery chemistries such as lithium iron phosphate, both reducing



the role of cobalt in the cathode, and further considering cobalt price volatility and increasing cobalt supply from Indonesia, the prospects for creating an economically viable business case may appear somewhat cloudy. In fact, some industry sector stakeholders in the DRC claimed that the country already missed its window of opportunity in this regard. Other locations in Africa, most prominently Morocco, appear to have been more successful to achieve actual on the ground progress in terms of attracting investment in battery value chains. The latter reflects, among others, preferential tax arrangements with downstream markets, which allow market access and potential access to subsidies, in addition to raw material endowment. Nonetheless, investors proposing in-country value addition steps in the DRC and the associated infrastructure development will likely be preferred over investors seeking to focus exclusively on mining, except for the commodities noted above. Infrastructure projects such as the Lobito railway corridor, energy generation projects, and improvements of the conditions of road transport (currently characterised by extensive trucking times due to multiple administrative procedures along the route) may be of major significance not only for mining but also for value addition prospects in the DRC.

The somewhat uncertain governance framework in the DRC may appear challenging to potential investors. For example, in 2023, exploration licenses of a prominent foreign investor in the Copperbelt were called into question by the ministry of mines before the situation was resolved without any changes to the status quo. Targeted mineral export restrictions for some major copper-cobalt producers in recent years have left a mark on the country's reputation as attractive investment target as well. Finally, there is competition among different investors on attractive investment targets such as the giant Manono pegmatite deposit and its lithium resources. All this occurs on the background of a challenging location in terms of local infrastructure development, logistics, and contextual supply chain due diligence issues referring to the ASM sector and associated risks such as child labour. There are also other risks, such as legal risks and their economic implications of declaring certain commodities as strategic, which will lead to significantly increased export royalties.

As such, investment opportunities in the DRC are difficult to navigate. While the geological endowment of the country as a host of mineral resources is significant, the associated governance and logistical challenges may lead to a certain ambiguity of the business case. This argument becomes more pronounced when considering that the DRC currently does not represent a viable downstream market for products such as electric vehicles, due to the widespread poverty in the Congolese population.

The government is aware of these challenges for investment and seeks to increase the country's attractiveness for foreign investors. The new mining sector strategy (Ministère des Mines 2022) foresees a number of steps in this regard: (1) improving the DRC's score in global governance ratings through improved environmental and social performance; (2) promoting DRC investment



opportunities in national and international fora, emphasizing measures to increase transparency, improve control and reduce corruption; (3) putting in place legal incentives for investment protection, such as fiscal stability and avoiding expropriation; and (4) facilitating supply chain due diligence, mineral traceability, and a legal base for activities in the ASM sector, the latter having a reputational and sometimes physical impact on the industrial mining sector. To overcome environmental problems, DRC's government already created the Mining Fund for Future Generations (FOMIN) to take into account the contemporary imperatives related to environmental protection and sustainable development. The funds managed by FOMIN will help to overcome the environmental problems that people who are constantly exposed to certain risks due to mining may encounter. The organisation and operation of FOMIN are determined by the Prime Minister's Decree n° 17/19 of November 25, 2019.

4. Assessment of social, environmental, and governance challenges

4.1. Country-level assessment and context

4.1.1. Context

Despite being richly endowed with mineral resources, in global comparison, the GDP of the DRC is one of the lowest, making it one of the poorest and least developed countries ranking at 86 (AWIMA 2023). In 2021, the GDP was estimated to be US\$ 55.4 billion with a US\$ 577 GDP per capita. The mining sector currently represents more than 20% of the Country's GDP and constitutes almost one third of state revenue, and 90% of the country's exports. As such, the mining sector is of considerable importance for national development and poverty reduction. This includes both the industrial as well as the artisanal and small-scale mining sector, the latter having a particularly high relevance for informal employment. This special situation – the widespread poverty, instability in the eastern DRC, governance challenges and the highly dynamic mining sector – creates a range of ESG challenges in the DRC.

Since the two Congo wars in the late 1990s, the DRC has been in the spotlight of public attention due to the role of so-called conflict minerals (gold and the 3Ts) mined in the eastern DRC which contribute to conflict financing and other due diligence risks. This initially mainly affected the downstream electronics and led to the development of international due diligence guidelines for the associated supply chains (OECD 2018).

4.1.2. Mineral/mining policies, industry policies

The DRC has a relatively modern mining law (“code miner”), published in 2018 (law 18/001 of March 9, 2018). The law is operationalised through a general set of mining regulations (Reglement Minier 2003) as well as additional mining regulations on specific topics.

The legal and regulatory framework of the mining sector in the DRC is based on six pillars:

- The parties involved in the management of the Mining Code;
- Management of the Mining Domain;
- Management of Mining Titles;
- Socio-Environmental Responsibility (specifications, contribution to local development of 0.3% minimum of turnover, etc.);
- Taxation;
- Governance and Transparency.

Mineral resources are the exclusive property of the Congolese State. However, holders of mining rights acquire ownership of market rights by virtue of their right. Mineral resources are classified into mines and quarries (Art. 3, Mining Code). Any legal person is authorised after acquisition of mining rights to engage in research or exploitation of mineral substances, especially the extent of the territory. But only natural persons of Congolese nationality are authorised to practice artisanal mining (Art. 5, Mining Code). The State under its discretionary law and in view of the particular circumstances may declare a strategic substance with a particular legal regime or reserved subject to special rules.

The role of the State is to promote and regulate the development of the mining sector (Art. 6, Mining Code) and to ensure development by appealing in particular to private initiative. Decisions can be taken at the central level (Prime Minister, Minister, Administration of Mines competent in the granting of mining rights, Art. 8 to 14 of the Mining Regulations and/or at the Provincial level (Provincial Governor, Minister Provincial, Provincial Division).

The DRC has recently published a mining sector strategy for 2023-2027, focusing on five areas: (1) reinforcing the capacities of the ministry of mines; (2) intensify geology and mining research and manage the associated data infrastructure; (3) develop and support a competitive mining industry which creates employment and is environmentally sustainable; (4) improve the image of the DRC for mining sector investors; and (5) support the formalization and development of the ASM sector.

4.1.3. Mining regulations

The national mining laws and regulations, for both the industrial and artisanal mining sector, include reference to and define requirements for a number of transparency and ESG-related topics. This includes issues such as transparency (EITI), mine site certification, mineral traceability and due diligence. While this appears to be beneficial from an ESG perspective, the challenge frequently lies in the implementation and enforcement of the law at the mine sites. Formalisation of the ASM sector comprises a range of measures, including the creation of a government service (SAEMAPE, formerly SAESSCAM) responsible for ASM supervision, legal requirements to work in cooperatives, registration of miners and traders and the creation of artisanal mining zones (“ZEA”). Again, the challenge often lies in the practical implementation of these measures. For example, SAEMAPE agents may not be present at every mine site, cooperatives may not form structures owned by the workers but rather by “company management” and artisanal mining zones are of marginal geological prospectivity or have difficult logistical access. At the same time, industrial mining and exploration concessions cover the most prospective areas in the Copperbelt region, leaving little space for legal ASM activities.

As such, the mining regulations represent somewhat of a balancing act between the industrial and the ASM sector. Developing the former may be favoured by some due to its high relevance



for the national economy and state revenues. Controls of the implementation of regulations in the industrial mining sector are stricter in comparison to the ASM sector. Government authorities from both the ministry of mines and the ministry of environment oversee monitoring environmental performance in mining. This is not to say that the industrial mining sector is without problems. For example, dust emissions from copper-cobalt mines and historical dumps result in high exposure and health risks for the local population, often living next to active or former mines. A recent Amnesty International (2023) report called for attention on the problem of forced resettlement of the local population living in or around concession areas in order to develop the mine site infrastructure. These issues point to a general conflict between strict regulatory enforcement and the country's reliance on generating income from the growing mining sector.

4.1.4. Taxation and royalties

The fiscal, customs and tax regime applicable to the mining activities of the holder on the national territory is defined exclusively and exhaustively in the Mining Code (Title IX). It concerns taxes, duties, royalties and other parafiscal levies collected both for the benefit of the Government and for that of the provinces and decentralised territorial entities.

Mineral	Royalty rate (%)
Iron and Ferrous metals	3.5
Non-Ferrous metals (copper, tin)	3.5
Precious metals (gold)	3.5
Gemstones	6
Industrial minerals	1
Common construction materials	0
Strategic minerals determined by the government (currently defined as cobalt, coltan (tantalum), germanium)	10

Table 11: Royalty rates per mineral category.

The corporate income tax rate is set at 30% of turnover, as it is the case under the DRC's common regime. Specific taxes are subject to the standard or common tax regime, such as taxes on rental revenues, real estate contributions (for surfaces falling outside the scope of the mining surface taxes or rights) and taxes on vehicles and roads.

Mining companies employing expatriates are subject to payment of an exceptional tax on the basic salary of these employees. The tax rate on remunerations for mining companies employing expatriates' is set at 25%.

The Mining Code has further implemented a super profit tax at a rate of 50%. The super profit tax is due when the commodity prices rise by 25% in comparison to those referred to in the feasibility study. The revenues subject to the super profit tax are then exempted from the profit tax (i.e., the corporate income tax at 30%).

Mining companies seeking to invest in the DRC must note that, pursuant to the New Mining Code, subcontracting activities in the mining sector are subject to Act No. 17/001 of 8 February 2017 establishing the rules applicable to subcontracting in the private sector (the Subcontracting Act). The Subcontracting Act notably provides that:

- Activities can only be subcontracted to Congolese-owned companies or by Congolese nationals (with strictly limited exceptions);
- All companies established on Congolese national territory must put in place, internally, a policy of training that should allow Congolese nationals to acquire the technical know-how and the qualifications necessary to accomplish certain activities; and
- Companies may not subcontract more than 40% of the value of a contract.

In this respect, whereas local content requirements were already imposed on subcontracting activities in the mining sector by a Ministerial Decree, the Subcontracting Act's implementation measures impose rather unclear obligations on mining operators and subcontractors. Furthermore, the subcontracting authority has recently increased the frequency of its on-the-ground visits to control compliance of the mining actors with the Subcontracting Act and related regulations.

4.1.5. Land-use and mineral rights

Title XI of the Mining Code regulates the relations between holders of mining and/or prospecting rights and landowners. There is no provision in the Mining Code that provides for joint use of land by the mining company and the land owner, as these are two exclusive rights. There is initially the idea of an agreement between the mining operator and the land owner on the use of the land under certain terms and conditions. Without agreement or authorisation, any encroachment by the mining permit holder on private land ownership is an abuse of rights (ICLG 2023).

The holder of the mining right is fully entitled to repair any damage caused by the work carried out by him in the course of his mining activities, including authorised work.

Any occupation of land which deprives the beneficiaries of the use thereof, or any alteration which renders the land unsuitable for cultivation, shall result in the holder of a mining right being required to pay, at the request of and at the convenience of the beneficiaries, reasonable compensation equal either to the rent or to the value of the land at the time of the occupation, increased by half.

Possession of an indigenous title or other legal surface use right confers on its holder, even if he or she does not hold a mining right, the right to claim compensation in the event of damage suffered or payment by the holder of the mining right of an amount that could represent rent for

the occupied site. Land use without the consent of the landowner is considered abuse. This is of particular relevance in the DRC where a system of traditional authorities plays a significant role in the local population. This is also a cause of disputes in the ASM sector. The latter may not have formal mining titles in many cases but might get their activities authorized by a local chief – this then raises the question whether or not these activities may be considered legitimate.

4.1.6. Environment

In industrial mining, the mining regulations require any mining project to present an environmental plan and have it validated by the competent services before the actual start of its activities. For reasons of national security, public security or environmental preservation, areas may be classified as prohibited areas without time limit, and mining rights may not be granted in a protected area (Art. 6, Mining Code). Companies shall prepare a Mitigation and Rehabilitation Plan as well as an Environmental and Social Impact Assessment (ESIA) with associated Environmental Management Plan in accordance with the guidelines contained in the Mining Regulations.

As for the artisanal mining sector, it is governed by the code of good conduct (Annex IV of the Mining Regulations) to which the operator is subject under the supervision of SAEMAPE. Moreover, the social and environmental performance of ASM operations may be monitored according to other subject matter standards. For example, the DRC has formally adopted the CTC (Certified Trading Chains) standard for responsible ASM activities. The scheme was updated in 2019, following its initial inception in 2011, and includes most ASM commodities in the DRC. An additional standard that includes environmental as well as social issues was developed by the Entreprise Générale de Cobalt, a parastatal company which plans to trade in artisanal cobalt ores and concentrates. The company, in coordination with international offtakers, developed a dedicated ESG standard which would apply to all its suppliers.

Mineral exploration and exploitation operations must be the subject of a Mitigation and Rehabilitation Plan previously drawn up and approved in accordance with the provisions of Chapter IV of the Mining Regulations. According to the regulations, the Mitigation and Rehabilitation Plan must include carrying out backfilling, erection of reinforced slabs, construction of a fence and signalling of dangers signs on the area of the proposed activity (ICLG 2023).

For mining exploration operations, the Mitigation and Rehabilitation Plan is submitted after the granting of the Exploration Permit. Its approval by the Congolese Environment Agency in collaboration with the Department responsible for the Protection of the Mining Environment is a prerequisite for the start of exploration activities. For exploitation operations, the Mitigation and Rehabilitation Plan is filed at the same time, as the application for the proposed activity and its approval, by the competent authority, is a condition of the permit. Pursuant to Article 204,

paragraph 4 of the Mining Code, any person carrying out exploration or mining operations is required to constitute a financial security for the rehabilitation of the environment in order to ensure or cover the cost of the environmental rehabilitation measures.

In practice, mine closure is at the back of the priority list in the DRC's mining sector, as most companies and the government seek to expand existing and develop new mines, especially in the copper-cobalt sector. Moreover, the decades of historical mining activities have left large dumps and other mine infrastructure without adequate rehabilitation. It is not clear who will be in charge of rehabilitating these sites, if any. The lack of space, with the direct juxtaposition of neighbouring mining concessions and local villages and towns complicates things further. In addition, two licenses, focusing on mining and tailings re-processing, might cover the same area simultaneously. This factor creates further complications for possible rehabilitation. As such, despite a legal framework providing for rehabilitation in theory, this does not necessarily imply that all mining legacies are adequately taken care of.

The texts that regulate water management, protection and development in DRC is Law No. 15/026 of December 31, 2015 relating to water. The DRC has an abundance of water resources and low water stress. Over 50% of Africa's surface water reserves and approximately 25% of the continent's water resources are located in the DRC. The total volume of freshwater withdrawn by major economic sectors is 0.2% of the total resource endowment and total annual renewable water resources per person is 15,773 m³, far exceeding the Falkenmark Water Stress Index threshold for water stress. The vast resources of the Congo Basin contribute to year-round surface water flows. Approximately 30 % of water resources originate in neighbouring countries (USAID 2021).

The Congolese legislation regulating the mining sector is fairly developed and obliges companies to make sure that they do not pollute water resources as part of their operations. DRC has no national water quality monitoring programmes. The lack of data limits regulatory capacity and enforcement and increases vulnerability to water-related environmental and public health safety risks.

Surface and groundwater pollution pose a risk to public health and biodiversity. Mining in the Katanga Copperbelt (southern DRC) has increased concentrations of trace metals and pollutants such as mercury, lead, cadmium, and copper in surface waters (and soils). High concentrations of faecal coliforms from poor sanitation systems and unprotected drinking water sources have contaminated drinking water, especially near large urban centres like Kinshasa. Deforestation has led to sedimentation of surface waters, especially along the eastern border and near Kinshasa (USAID 2021). Artisanal mining operations frequently use surface waters – ponds, and sometimes rivers – for washing the ore. In the hills of the eastern DRC, artisanal miners apply the practice of ground sluicing, leading to major erosion of hill flanks while possibly increasing flooding risks



where eroded sediments blocks rivers. The resulting floods may negatively affect local agriculture. Despite the legal framework in place, there are therefore major environmental risks associated with ASM operations.

4.1.7. Societal and community aspects, cultural heritage

The exploitation of mineral resources has been the engine or the accelerator of the economic growth of the DRC for several years now, especially during periods of high mineral prices on the world market. Periods of improvement, such as the last base metals super-cycle of 2009-2013, and the more recent positive copper price trend (cobalt prices are more volatile), constitute opportunities for a country rich in resources to transform not only its economy but also its local community (AWIMA 2023). On the other hand, the extremely dynamic mining sector development is also associated with a number of social risks.

The holder of the mining rights must comply with the labour legislation (Law No. 015/2002 of October 16, 2002 on the Labour Code; Labour Code 2002) in terms of employment, more particularly the regulation of the work of foreigners with regard to the authorised percentages that fix the list of jobs prohibited to foreigners as well as the regulations determining the conditions of engagement of foreigners.

With equal skills, the holder of the mining rights has to recruit nationals in priority. The holder also has to implement training programmes for Congolese personnel identified by the needs. They must cover all levels of qualification, to enable them to acquire skills required for the management of the company, in order to occupy management and supervisory positions within ten years, following the date of the start of commercial production.

The mining company establishes and transmits to the Cellule Technique de Coordination et de Planification Minière (CTCPM), for information and monitoring, their staff training and development plan. This plan includes a component of training courses for pupils and students of Universities, Technical Higher Education Establishments whose school and academic curriculum, as the case may be, covers mining sciences and techniques as well as jobs in the mining sector.

The protection of cultural heritage falls to the Congolese State. The holder of a mining right is required to inform the local administrative authority and the authority in charge of culture, Arts and Museums, of the discovery of archaeological evidence if this research or exploitation work reveals the existence of these indices (Art. 205, Mining Code). Additional provisions of the Mining Code are intended to ensure the conservation of any archaeological findings that occur during the course of the project.

The 2018 Mining Code recognises artisanal mining as a legal activity. The aspects in the Mining Code pertaining to artisanal mining are:

- Artisanal miners must register and restrict their activity to certain designated areas, namely artisanal exploitation zones (ZEA);
- Be affiliated with a cooperative to be able to work in ZEAs (Ministerial Order 2010) and
- Any actor involved in the chains of Mineral sourcing is required to adhere to the OECD (2018) Due Diligence Guidelines as well as the ICGLR Regional Certification Scheme (Ministerial Order 2012).
- ASM activities are reserved for Congolese nationals and limited in scope and equipment.
- They are governed by a code of conduct with safety, health and environmental requirements.
- ASM licences (“carte d’artisanal miner”) must be renewed annually.
- Local mineral traders must be in possession of a trading licence (“carte de négociant”) and sell their minerals to designated buying establishments (the so-called “comptoirs” or “processing entities”). The latter are the only entities officially authorised to export minerals from artisanal production.

The SAEMAPE was created under Decree No. 17/009 of April 04, 2017. SAEMAPE is a Technical Service in charge with administrative and financial autonomy in order to supervise and support the development of the ASM sector.

All aspects related to labour practices in the DRC are governed by Law No 015/2002 of October 16, 2002 on the Labour Code. The holder of the mining and/or quarry right is required to repair any damage caused by diseases attributable to the mining activity in accordance with the common law rules. The list of illnesses attributable to mining activity is determined in the Mining Regulations (Article 258 bis).

Mining has a significant impact on the daily life of the community in which it operates in terms of revenue to finance social services and infrastructure. Chapter IV of Title XI of the Mining Code (2018) governs all the social and community aspects related to mining activities. The highlights are discussed below and are visually illustrated in Figure 15:

- The holder of mining exploitation rights is required to contribute, during the period of his project, to the definition and implementation of socio-economic and industrial development projects for local communities affected by the project activities on the basis of specifications for the improvement of the living conditions of the said communities.
- The institution of specifications to serve as a framework of agreement allowing the realisation of development actions aimed at improving the economic, social and cultural well-

being of local populations affected by the mining activities of the holders of mining exploitation rights during and after exploitation.

- A mining fund is established for future generations (FOMIN). The resources of this fund consist of a portion of the mining royalty. A decree from the Prime Minister creates and organises the fund.
- The holder of a mining exploitation right is required to constitute, free of tax on profits and profits, an endowment for contribution to community development projects, the minimum amount of 0.3% of the turnover of the financial year during which it is constituted. The endowment must be fully made available to local communities before the expiry of the financial year following that in which it was incorporated (Art. 285). This provision replaced a different system under the previous mining law where mine operators made payments that were used for public benefit and infrastructure development in specific provincial committees.

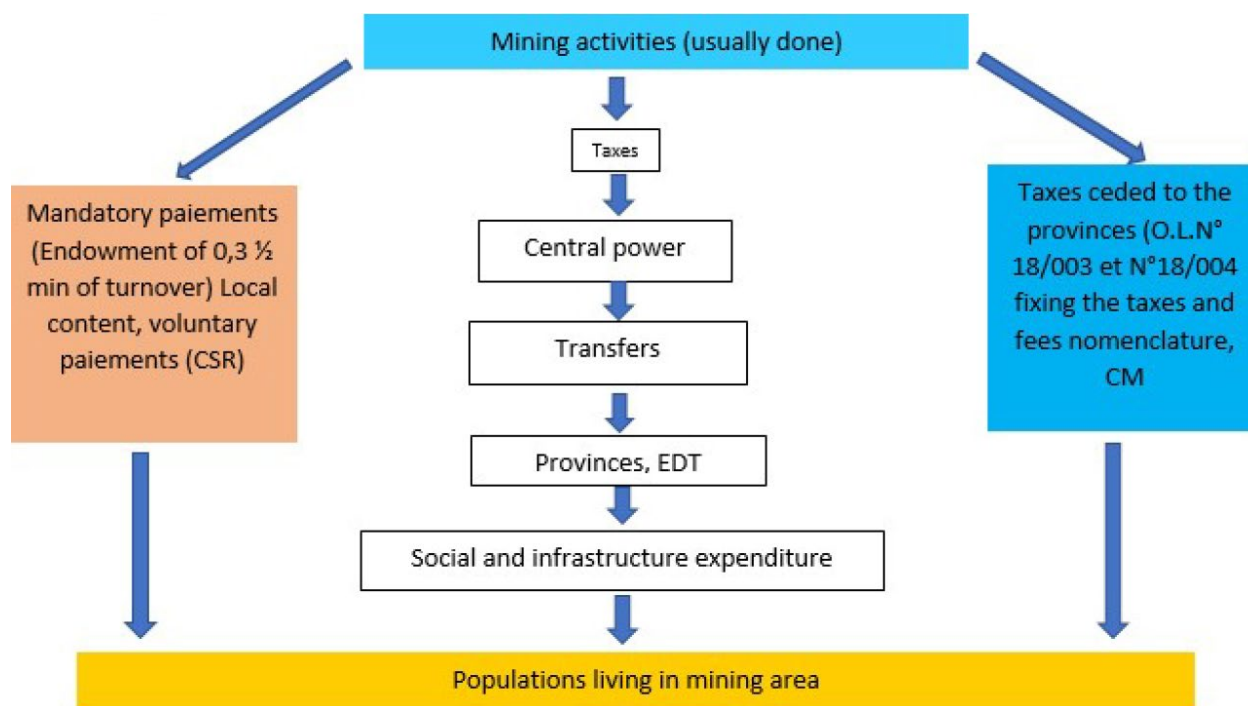


Figure 15: Revenue sharing through fiscal decentralisation⁸.

4.1.8. Public health and safety

The 2018 Mining Code has no indication regarding public health issues. All questions relating to health are governed by Law No. 18/035 of December 13, 2018 laying down the fundamental principles relating to the organisation of public health.

⁸ Mining Code 2018

Mining activities are subject to safety, health and protection measures enacted by special regulations ordered by the Mines and Health Administrations (Interministerial decree; Labour Code 2002). The holder of the mining rights must comply with the measures that are ordered by the Ministry of Mines in order to prevent or remove the causes of the dangers mining activities poses to public safety and health, to services, water and public roads.

Any serious or fatal accident occurring in a mine must be brought, immediately and by the fastest means of communication, to the attention of the Directorate of Mines and the administrative and judicial authorities of jurisdiction (Art. 209, Mining Code 2018). As this creates public attention and scrutiny, certain industrial mine operators may seek to avoid reporting on such incidents in practice. In the ASM sector, occupational health and safety is a major concern and fatal accidents are common, especially in underground operations.

4.2. Mining practices vs. Environmental, Social and Governance (ESG) goals

4.2.1 Environmental challenges

During the last decades of mining, the DRC has seen numerous acts of environmental damage:

- According to data available on the Global Forest Watch platform managed by the World Resources Institute, the DRC has lost 8.6% of its tree cover since 2000. One of the major causes of deforestation in the DRC is mining, though local charcoal production is a major contributor as well (Global Forest Watch 2023).
- The Kahuzi Biega National Park in North and South Kivu has been subject to illegal coltan mining operations, especially during the early years of the conflict in the eastern DRC (Mongabay 2022). The illegal miners encroaching on the park additionally engage in poaching to feed their families. This was a major problem for the local wildlife, including for eastern lowland gorillas whose population decreased from 8000 (1991) to 40 (2005).
- Emissions associated with historical and present mining activities (and associated mine dumps) in the Copperbelt area have led to substantial pollution of waterbodies, air and soil by certain heavy metals. It is often difficult to identify the source of pollution and there is a general deficit in terms of national standards and background parameters for such kind of pollution risks. The pollution observed in places has a negative impact on agriculture, on local ecosystems, and is impacting on public health.
- Artisanal miners often rely on waterbodies and streams to wash their mineral concentrates. An even stronger impact is generated if ASM activities are mechanized using river-borne dredges. These activities increase the sediment load in water bodies. ASM operations in the gold sector frequently use mercury for amalgamation which introduces a toxic chemical in



the water, which may bio-accumulate along the food chain. Hillside erosion caused by artisanal ground sluicing operations represent an additional problem for ecosystems and may negatively impact local agriculture. These examples illustrate the locally strong impact by ASM operations on local water quality and availability.

The Mining Code conditioned the granting of a mining license to the development and prior implementation of an ESIA, as well as an environmental management plan. The ESIA's are, in most cases carried out, however, based on the presentation given at the stakeholder engagement workshop (AWIMA 2023), the following points are highlighted:

- Lack of monitoring by the authorities during the implementation phase due to financial and human resources shortage;
- Consultation of local populations during the preparation of impact studies and as a prerequisite for the granting of mining license seems to pose many problems. In general, the local populations are not effectively involved in decision making that affects them. Furthermore, these people suffer numerous violations of their rights as a result of mining activities in their territories. These violations include alleged cases of uncompensated relocations and pollution of rivers, among others. In some cases, these violations have led to severe social conflicts.

4.2.2 Socio-economic issues

Despite the country's vast natural resources, two-thirds of the Congolese citizens were living below the poverty line in 2021. According to the World Bank (2021), the DRC ranks 164 out of 174 countries on the 2020 Human Capital Index, reflecting decades of conflict and fragility, and constraining development. Many people still face marked inequality because most of the wealth is held by a minority, despite the mining sectors contribution of more than 20% to the formal economy of the country:

- Working conditions in the ASM sector are appalling and unsafe. While artisanal mining may allow miners to earn enough money to sustain their families, the work is extremely dangerous, in particular underground. For example, at Mwenga in Shabunda (South Kivu), 50 artisanal miners died in September 2020 as a result of a coltan mine collapse (Aljazeera 2020). Similar accidents occur frequently elsewhere and for other commodities.
- Conflicts between members of an artisanal miners' cooperative and mine permit holders occur in places and may sometimes escalate. An example is the conflict between the Cooperamma cooperative and the coltan mining company SMB in North Kivu, which led to violence (Reuters 2020). In 2019, the government deployed the army to evict artisanal miners from industrial copper-cobalt concessions. Artisanal miners may start riots and destroy equipment if they are no longer granted access to certain concessions where they used to be allowed to work, in particular in Lualaba province.

- Local people claim to have been evicted from a number of copper concession areas in the Copperbelt and inadequately compensated, while the involved mining companies largely claim they followed the applicable legal procedures for compensation.
- Conflict financing, child labour and other due diligence risks continue affecting mineral supply chains. The DRC conflict is claiming more civilian lives now compared to the situation ten years ago; conflict intensity has intensified and the local population does not feel safe. It is important to note though that mining and mineral trade are not the root cause of the DRC conflict. As such, improving mining sector governance and supply chain controls may only be expected to have a limited impact towards ending the on-going conflict in the eastern DRC. Child labour risks in the DRC's mining sector have decreased in recent years, in response to increasing international scrutiny and improved local monitoring efforts.
- Corruption is a significant risk in the DRC and contributes to the disproportionate distribution of wealth in the country. Both the artisanal and the industrial mining sector are affected by corruption risks. In the ASM sector, corruption contributes to the undermining of supply chain due diligence and traceability efforts, leading to informal trade and mineral smuggling. In the industrial mining sector, the employed procedure for international companies to obtain attractive mining concessions in the DRC is sometimes highly questionable. In addition, at a smaller scale, corruption plays a role in avoiding the reporting of accidents and other ESG challenges, so that risks are not adequately mitigated.

4.2.3 What would be the best practices for a responsible mining?

Despite a sound legal and regulatory framework for the mining sector, DRC remains one of the poorest countries in the world. This is mostly attributed to the lack of implementation of certain legal and regulatory provisions in terms of transparency.

Some private sector stakeholders, driven by downstream demand, have started to consider adopting international standards and assurance procedures referring to local mining operations (both industrial and artisanal), local trade and smelting/refining. There are a number of international industrial mining standards (e.g., IRMA, Coppermark, ITA Code of Conduct), artisanal mining standards (e.g., CTC, the Fair Cobalt Alliance Framework, the EGC ESG standard), as well as due diligence initiatives (e.g., iTSCi, Better Mining, RMI/RMAP, the RCI) that would be applicable in the DRC and which illustrate best practice. These standards address a broad range of ESG aspects and a few of them (focusing on artisanal mining and due diligence) have been specifically designed based on the situation in the DRC.

In addition, minerals produced in the DRC are subject to a number of downstream regulations established in the EU and other jurisdictions. This includes the EU conflict mineral regulation (2017), which partly mirrors the US Dodd Frank act's conflict mineral provisions (2011) or the

upcoming EU battery regulation. While the former focus on supply chain due diligence procedures, the latter goes further by addressing certain ESG factors as well, eventually including carbon emission reporting. This growing landscape of international standards and regulations impacts on the DRC and may lead to improvements in certain supply chains. However, these standards and regulations were often developed without significant DRC ownership and they do not replace the government's responsibility to manage both the industrial and ASM sectors. In addition, certain parts of the DRC mining sector mainly supply downstream jurisdictions where there is little demand for improved mining and due diligence performance, again emphasising the key role of the DRC government to address the challenges affecting its mining sector.

The revision of the legal framework for the mining sector in 2018 and the new mining sector strategy of 2023 show that the state is committed to ensuring that the country's natural resources benefit its people. Revenue sharing through fiscal decentralisation is an attempt to improve this situation. If properly implemented and monitored, it could have a very positive impact on the livelihoods of DRC citizens. The government's strategy itself emphasises the need for strengthening the ministry's capacities to fulfil its mandate in the mining sector. The increasing demand for DRC minerals on the global market may represent an opportunity for the government to request more support by international partners in this regard. At the same time, the DRC has always benefited from the strong role of local civil society which engages in joint discussions with the government and the private sector. Leveraging international attention in combination with local multi-stakeholder fora and discussion platforms, which already exist in different provinces (e.g., IDAK) and at the national level (e.g., EITI), may be a key strength for the DRC government to mobilise in order to define sustainable solutions with full Congolese ownership.

5. Business network between the European Union and the DRC

5.1. Assessment of the upstream and downstream business ecosystem

5.1.1 Context, formal and informal players

The DRC's mining sector encompasses both formal and informal players across the upstream and downstream segments of the business ecosystem. The following presents an overview of these players. Formal upstream players first of all include Government Ministries such as the Ministry of Mines, and their associated technical services, such as the Geological Survey of the Congo (SGN-C), the national ASM oversight and support organisation (SAEMAPE), a government think tank (CTCPM), the mining environmental agency (DPEM), the national certification agency for exports (CEECE), and, with a semi-independent status, the Mining Cadastre Office (CAMI). The ministry and its associated technical agencies run offices at the provincial level in all relevant DRC provinces. A number of additional DRC ministries and their services, as well as the President's and the Prime Minister's offices, are playing a role in the mining sector and the associated value addition as well.

Furthermore, state-owned companies, such as Gécamines or SNEL (electricity company), and foreign-owned LSM companies are important formal upstream players. The latter comprise companies, such as Glencore (Kamoto, Mutanda), China Molybdenum Co. Ltd. (CMOC; Tenke Fungurume, Kisanfu Cu-Co mine), Eurasian Resources Group (ERG; Metalkol, Boss and Comide), the Vinmart Group and its local subsidiary Chemaf SPRL (Etoile and Mutoshi), Sicominer, Congo Dongfang, Jinchuan Group, Zijin Mining or China Nonferrous. These companies are usually members of the Congolese Federation of Companies (the FEC), which has an important chapter for mining, and are additionally organised in the national chamber of mines. In addition to small- or large-scale mining companies, ASM cooperatives occupy a semi-formal space. While they are organised and registered, as such formal, the ASM operations themselves are often informal, as outlined below. Mineral exporters buying from ASM (comptoirs) are usually registered as formal companies.

The DRC government joined the EITI in 2007 and has made meaningful progress in transparency of its mining sector, but this could not accurately represent standards due to the latest EITI validation of 2017 (EITI 2021). Germany, Belgium and other international development partners have worked or are working with the national DRC EITI secretariat which is in charge of increasing transparency in both the LSM and ASM sectors. A number of DRC ministries are directly involved in the national EITI process.

Informal upstream players first of all include ASM engaged in manual or semi-mechanised mining activities, typically in gold (230,000 miners), 3Ts (30,000-60,000 miners) and copper-cobalt



(50,000-200,000 miners) (Vasters and Schütte 2023). Furthermore, mineral traders and intermediaries are involved in buying minerals from ASM and sell them to larger traders or export companies. They play a role in facilitating the flow of minerals from informal to formal supply chains but can also contribute to opacity in the mineral trade. The illegal upstream sector is also influenced by illegal mining syndicates and smugglers. Importantly, every job in mining has a multiplier effect and creates indirect employment – this applies both to the formal and informal sector. The ASM sector creates indirect employment in agriculture and food supply, and local services such as transport and other small business. Many of these jobs, and indeed large parts of the DRC subsistence agricultural activities, are informal as well. A typical ratio employed for ASM is 4-5 indirect jobs are created for every full-time artisanal miner, but the ratio may differ and depends on the commodity and local economic context.

Formal downstream players include mineral refiners, which often also relate to large mining companies involved in the production of copper cathodes. Processing of raw ore into concentrates (tin, tantalum) or chemical intermediate products (cobalt hydroxide) are however, part of the upstream sector. Manufacturers and end users, such as companies in electronics, automotive and construction industries are important downstream players. Currently, almost all of these are situated outside of the DRC and thus irrelevant for this country case study at this stage. Regulatory bodies, such as the Ministry of Mines and the Ministry of Finance are involved in regulating mineral exports. Financial Institutions and other entities, e.g. logistics companies as well as environmental and quality control organisations are part of the downstream industry.

Informal downstream players include craftsmen which may create jewellery, ornaments and other handicrafts for local and regional markets. These are very few in number. The largest part of the informal economy is associated with the upstream supply chain.

5.1.2 Relationships at local or regional levels

Regional Integration: The DRC is a member of several regional economic integration initiatives in Africa. These initiatives aim to promote economic cooperation, trade and development among participating countries. Regional economic integration initiatives offer opportunities for the DRC to enhance trade relations, attract investment, and collaborate with neighbouring countries to address common challenges:

- **Common Market for Eastern and Southern Africa (COMESA):** The DRC is a member of COMESA, a regional organization consisting of 21 African countries. COMESA aims to create a common market and promote economic integration in Eastern and Southern Africa. It focuses on trade facilitation, infrastructure development, and investment promotion.
- **Southern African Development Community (SADC):** The DRC is also a member of SADC, a regional economic community comprising 16 countries in Southern Africa. SADC seeks to



promote sustainable economic development, regional cooperation, and integration. It emphasizes areas such as trade, infrastructure, and industrial development.

- **Economic Community of Central African States (ECCAS):** The DRC is part of ECCAS, a regional organization that aims to promote economic integration and development in Central Africa. ECCAS focuses on areas such as trade, infrastructure, and harmonization of economic policies.
- **Great Lakes Region:** The DRC is part of various initiatives aimed at promoting peace, security, and economic development in the Great Lakes region of Africa. These initiatives aim to address conflict, promote cross-border trade, and enhance cooperation among countries in the region. Noteworthy initiatives are the International Conference on the Great Lakes Region (ICGLR) and the Economic Community of the Great Lakes Countries (CEPGL).
- **East African Community:** The DRC joined the East African Community in 2022, an important trade block with seven member states. This trading block is important for the DRC because much of the trade in the central-eastern DRC is handled through the transit ports of Dar Es Salam (Tanzania) and Mombasa (Kenya), while trade in the south-eastern DRC (Copperbelt) often flows through transit ports in southern Africa (South Africa, Mozambique, Namibia, potentially Angola).
- **African Union:** The DRC is a member of the African Union, a continental organisation that aims to promote political and economic integration among African countries. The African Union's Agenda 2063 outlines the vision for a united, prosperous, and integrated Africa. The New Partnership for Africa's Development (NEPAD) was adopted by the African Union in 2001 and is a pledge to eliminate poverty and to achieve a sustainable path of growth and development on the continent.

Special Economic Zones: In partnership with Arise IIP, the DRC plans to establish SEZs focussing on the mining and processing of electric vehicle-relevant commodities and related products along the value chain. These comprise both the SEZs in the Copperbelt on the DRC and Zambian sides (see section 3.3 Political context for in-country financings; UN 2023) and the SEZ Kinshasa (or Kin-Malebo industrial zone). The construction of the latter has started in October 2022 with the aim to be operational in September 2023. The Kin-Malebo industrial zone will host wood processing, poultry processing, and beverage production for the local market, but also companies specialising in the pharmaceutical sector, plastic recycling, household appliances, electric vehicles, and other processing industries (Arise IIP 2022).

Local fora: Many discussions related to mineral supply chains in the DRC focus on sustainability and due diligence questions. These are coordinated in different provincial fora, such as the CPS (comité provincial du suivi), IDAK (former Katanga region) or IDAKI (Kivu region). Some



international partners (for instance, German organisations such as BGR and GIZ) are from time to time participating in these meetings, such that they provide an interface from the local to the global level.

5.2. Building new B2B relations

A couple of bilateral partner (donor) interactions over the past years have directly supported B2B relations, for instance linking local ASM cooperatives with international buyers. Both in the ASM and LSM sectors, there are abundant supply chain discussions between DRC stakeholders, international partners and the international downstream supply chain. Examples include pilot supply chains such as the past Solutions for Hope project (tantalum), Trafigura's support to the Mutoshi ASM cobalt development project, different companies funding the GIZ International Service intervention "Cobalt for Development" ("C4D"), the Fair Cobalt Alliance and its engagement at the Kamilombe copper-cobalt site, actions by the Responsible Minerals Initiative and the Responsible Cobalt Initiative, and private sector engagement with international certification and assurance schemes, such as iTSCi and Better Mining in the 3T sector. Collectively, these interventions show a broad and dynamic B2B networking process along DRC mineral supply chains that has been in place for years. Existing multi-stakeholder discussion platforms in the DRC, such as IDAK and IDAKI, represent good entry points for discussing shared supply chain concerns and establishing new relationships. Prolific opportunities for B2B networking in the context of the industrial mining sector may be sought at annual events such as the DRC Mining Week or via visiting delegations, such as those from time to time provided by the German-Southern African chamber of commerce (AHK). Also, the Mining Indaba in Cape Town frequently features attendance by the DRC government, by state-owned Gécamines, and by several mining companies and service providers active in the country, such that it presents an opportunity to engage in B2B networking.

5.3. Promoting local content and enabling mining cluster actors

To improve the framework conditions for European and African companies and organisations to co-create new value, businesses, products and services by transforming the ways they interact, hereafter Geoscience/mining related accredited education and training programmes are listed. A number of structures offer training courses of varying quality in the field of mining in the DRC, generally centred around mining engineering, geology, metallurgy, mineral resource management, mining safety, the environment and sustainable development:

- The **Department of Earth Sciences, University of Kinshasa (UNIKIN)**, offers training courses in mine geology, hydrogeology and geotechnics, geochemical and geophysical prospecting, ore deposit evaluation and modelling, mining engineering, mining economics and project management as well as environmental impact assessment.



- The **Faculty of Sciences, University of Lubumbashi (UNILU)**, offers training courses in geology focussing on exploration and mining geology as well as on environment and hydrogeology, and own mineral processing and geophysics laboratories. Furthermore, the African Centre of Excellence in Battery Manufacturing (CAEB) is to be established at UNILU with the aim of promoting training, research, innovation and technological capacity building. The actual inauguration took place on 22 April 2022 in the presence of political and academic authorities as well as members of the academic and scientific staff from the DRC and other countries (UNILU 2022).
- The **Faculty of Sciences, University of Kisangani (UNIKIS)**, offers training courses in geology.
- **School of Mines, Official University of Bukavu (UOB)**, offers training courses in exploration and mining geology as well as civil mine engineering.
- The **Faculty of Science and Technology, University of Goma (UNIGOM)**, offers training courses in geology.
- The **Faculty of Mines and Geology, University of Uele**, offers training courses in mining-related topics.
- The **Faculty of Science, Official University of Ruwenzori (UOR-Butembo)**, offers training courses in mine geology, hydrogeology and geotechnics, geochemical and geophysical prospecting, ore deposit evaluation and modelling, mining engineering, mining economics, mining law and project management, environmental impact assessment as well as geothermal energy.
- The **Faculty of Science, University of Nature Conservation and Development (UCNDK)**, offers training courses in geology.
- The **Academy of Mines ERG, University of Kolwezi (UNIKOL)**, is a partnership of the UNIKOL and the company Eurasian Resources Group and offers training courses in geology focussing on exploration and mine geology as well as in metallurgy and mining.
- The **University of Mbandaka (UNIMBA)** offers training courses in Geology.
- The **Polytechnic Department (Faculty of Applied Sciences), University of Mbuyi-Mayi**, offers training courses in mining and exploration geology, mining engineering, mining economics, law and project management as well as hydrogeology.

In the DRC mining sector, it is common practice for international industrial companies to hire Congolese staff to maximise their share of the workforce, as required by regulations. A frequently employed procedure for more complex tasks is to send local staff abroad for training (depending on where the company has its global headquarters for such activities). Major international industrial companies are for example:

- ERG (Kazakhstan);
- Ivanhoe (Canada);
- Glencore (Switzerland);
- CMOG (China).



Mining training schools were originally established by parastatal Gecamines when it still had a monopoly over all mining activities in the DRC. Today, these schools are more or less independent of Gecamines. They offer courses in mining, electricity, mechanics, chemistry and electronics. From north to south the names and locations of the schools are (according to information provided by BGR’s DRC project team in 2023):

- Mutoshi (Kolwezi);
- Viombo (Likasi);
- Kitendo (Lubumbashi);
- Tutumike (Kipushi).

A large number of international development partners and their implementation agencies as well as NGOs are supporting local partners in the DRC’s mining sector, including the ASM sector, as far as sustainable economic development, transparency and good governance or responsible supply chains are concerned. Partners also work on related aspects, such as environmental protection of national parks or energy supply, including strengthening renewable energy. Table 12 provides a few examples of these organisations. Many mining companies implement CSR activities that address in particular the topic of local economic development as well.

Organisation	Origin (government or funding)	Field of engagement
BGR	Germany	Mining sector transparency (ASM), ESG, economic development
GIZ	Germany	Mining sector transparency, economic development
GIZ International Service (C4D project)	Private sector (downstream industry funding)	Mining sector transparency, economic development (ASM)
IPIS	NGO (Belgium; various international funding partners)	Mining sector transparency (ASM)
Responsible Minerals Initiative	Private sector (downstream)	Mining sector transparency (ASM)
USAID and others	United States	Mining transparency, economic development, ESG (ASM)
EU	EU	Mining governance, economic development
World Bank	World Bank	Mining transparency (Encore), economic development (RISE)
African Parks	South Africa	Environment
Greenpeace	Canada	Environment
Bboxx	UK	Renewable energy
Nuru (formerly Kivu Green Energy)	United States/DRC	Renewable energy

Table 12. Examples of organisations currently engaged in the DRC mining, environment or energy sector.

6. Energy and digital transition: develop a strategy for the EU and Africa Partnership

General strategy: This section first provides a general strategy for an EU-DRC partnership focussing on energy and digital transition followed by information on ongoing actions.

Backed by EU support, private sector entities, could:

- Invest in renewable energy infrastructure in DRC (e.g., solar, hydroelectric power plants);
- Facilitate the transfer of EU's renewable energy technology;
- Upgrade and expand the electricity grid to reach underserved areas;
- Introduce smart grid solutions for efficiency and reliability in energy distribution;
- Collaborate on capacity-building programs to train local workforce in renewable energy technologies and management;
- Invest in expanding and improving DRC's telecommunication networks, including broadband infrastructure;
- Promote initiatives for digital inclusion, ensuring access to technology and digital education across the country;
- Assist DRC in implementing e-government solutions;
- Support the digitisation of healthcare and education systems;
- Collaborate on establishing robust data security and privacy regulations, fostering a secure digital ecosystem;
- Offer training and expertise in cybersecurity to safeguard digital infrastructure.

The partnership framework should consider:

- Private-Public-Partnerships (PPPs) between EU private sector firms and the DRC government to ensure sustainable investment and operational excellence;
- Joint investment funds or facilities can be established to support projects aligned with the transition goals;
- Policy alignment between the EU and DRC to facilitate smooth implementation of projects and regulatory coherence;
- Sustainable Development Goals (SDG) to ensure that energy and digital transition projects contribute to sustainable development, social inclusion, and environmental protection.

The DRC mining sector strategy: According to the government's mining sector strategy plan, the following areas are to be improved, in order to achieve the goals of a pro-developmental mining sector:

1) Strengthening geological knowledge and research as well as centralisation of geological and mining data:

- Drawing up an inventory of documentation relating to geological data;
- Analysis and processing of geological data;
- Creation of the database;



- Improving knowledge of the soil and subsoil;
- Strengthening the geodetic network;
- Regional geological studies in selected areas;
- Certification of mining reserves.

2) Industrialisation of the mining sector:

- Acquisition of appropriate production and refining technology (Article 108 of the Mining Law restricts the holder of a mining licence or a permanent mining permit from exporting unprocessed mineral substances, however, processing/refining options are not always available due to infrastructure (i.e., power supply) bottlenecks; see also sections 2.2.1 List of the main bottlenecks and the links between them and 3.2.7 Intricacies of import and export mechanisms);
- Strategic minerals determined by the government are currently defined as cobalt, coltan (tantalum) and germanium (see also section 4.1.4. Taxation and royalties);
- Reinforcing commitments to social responsibility on the part of mining operators.

3) Strengthening environmental performance:

- Strengthening the capacities of the structures responsible for environmental protection;
- Drawing up a community development policy for mining areas;
- Capacity-building for environmental protection bodies;
- Protection;
- Drawing up a community development policy in mining areas, etc.

4) Promoting FDI into DRC and its mining industry:

- Strengthening measures to combat mining fraud and smuggling;
- Strengthening control and transparency of the sector's revenues and combating corruption (The DRC government joined the EITI in 2007 and has made meaningful progress in transparency of its mining sector, but this could not accurately represent standards due to the latest EITI validation of 2017; EITI 2021; see section 5.1.1 Context, formal and informal players);
- Annual organisation of the DRC Mining Conference.

5) Promoting formalised production from ASM:

- Deployment of modern laboratory equipment in the former Katanga Province, Maniema, North Kivu and South Kivu ;
- Monitoring of the application of the OECD Due Diligence Guidelines in the Cobalt, Copper and 3T production chain;
- Continuing to set up Artisanal Mining Zones;
- Training for SAEMAPE staff;
- Training for executives of mining cooperatives in company management companies;
- Creation of trading centres near mining sites.

EU-DRC strategy and partnership: The EU supports the sustainable and inclusive development of the DRC, in line with the National Strategic Development Plan (PNSD) and the Global Gateway



strategy. The EU's action builds on the strategic position of the DRC in Central Africa to foster regional peace and stability, preserve biodiversity and sustainably manage natural resources. In February 2023, the EU adopted a renewed EU Great Lakes Strategy to support the transformation of the root causes of regional instability into shared opportunities.

Team Europe in the DRC brings together the EU, Belgium, France, Germany, the Netherlands, Sweden, and European financial organisations such as the European Investment Bank (EIB), the Agence Française de Développement (AFD), Proparco, the Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden (FMO) and the German Kreditanstalt für Wiederaufbau (KfW) (EC 2023).

The EU allocated € 424 million grants to the partnership with the DRC for the period 2021-24. The DRC also benefits from regional and global EU programmes. For EU's engagement in the DRC related to energy and digital transition see section 6 Energy and digital transition: develop a strategy for the EU and Africa Partnership, which focusses on critical raw materials value chains, related transport, energy as well as digital infrastructure.

Due to the sluggish nature of the Congolese private sector, the EU provides economic aid at both macro and micro-economic level as part of development financing. This aid includes:

- The PROINVEST programme for the promotion of foreign direct investment;
- The Centre for the Development of Enterprise for the support of small and medium enterprises and the supply of skills and capacities to businesses across a wide range of sectors. It also focuses its activities on businesses launching new projects (e.g., BizClim programme, Microfinance framework programme, EIB Investment Facility).

The EU supported the DRC government developing the national trade strategy paper, which is focused on participating in global trade. This strategy is part of a comprehensive development plan to be implemented by 2035 envisaging opportunities offered by globalisation (value chains, integration into regional economy).

In addition, the EU and its member states and industry are funding the European Partnership for Responsible Minerals (EPRM), which is implementing short-lived pilot projects in the context of responsible raw material extraction, often under the lead of local civil society organization. This represents another example of the integrated nature of local and international interactions in the DRC's mining sector.

The EU already has some initiatives in the DRC related to the energy and digital transition, which focus on critical raw materials value chains, related transport, energy as well as digital infrastructure (EC 2023).

In November 2023, the EU and the DRC agreed on a Strategic Partnership on sustainable critical raw materials value chain to diversify raw materials supply chains, as well as to develop local



value addition and transforming trafficking of mineral resources into legitimate trade. EU action focuses on the integration of sustainable raw materials value chains, the mobilisation of funding for infrastructure, sustainable and responsible production, research and innovation as well as on capacity building.

Under the label “Global Gateway”, the EU participates in the expansion of the Lobito Corridor, which aims to increase multimodal transport capacity between the Congolese Copperbelt and the Angolan port of Lobito. The investment will extend the railway tracks to Zambia, ultimately creating a 420 km rail link between Angola, the DRC and Zambia. For the DRC, this will facilitate trade and transport and contribute to the economic growth and integration of the region (see also sections 2.2.1 List of the main bottlenecks and the links between them and 3.3 Political context for in-country financings).

The EU is engaged in supporting renewable energy production, which aims to meet the growing needs of the mining sector and the population and to improve the regional electricity distribution between the DRC, Uganda and Zambia.

The EU is supporting the development of digital infrastructure, including the laying of a fibre optic cable in eastern DRC and the construction of GSM antennas in remote areas, as well as systematic support for digitalisation in a number of sectors, including health, education, public finance and cybersecurity.

Non-EU-DRC partnerships: Besides Europe, the United States supports the government of the DRC’s decision to review mining contracts and greater accountability in the sector. The USA encourages the DRC to continue its collaboration and work on fiscal transparency, labour rights, and adherence to environmental, social, and governance standards for the mining sector. The USA is providing more than \$ 30 million in assistance to help the DRC promote responsible and sustainable mining practices (US GOV 2022).

In 2008, the “mining for infrastructure” deal between the DRC and Chinese partners was negotiated, initially valued at US\$ 9 billion and subsequently reduced to US\$ 6 billion. Chinese stakeholders were to invest in infrastructure and energy projects in return for obtaining mining rights, such as the ‘Sicomines’ operation near Kolwezi. Subsequently, Chinese influence in the copper-cobalt sector grew strongly. According to an evaluation by the IMF (who contested the initial agreement), as part of the deal Chinese partners invested close to US\$ 3 billion while in turn realizing gains of US\$ 76 billion. The Congolese president Tshisekedi has questioned the deal and calls for its re-negotiation.

7. Opportunities for responsible investments

7.1. Identification of individual exploration, mining and refining projects

The following projects (Table 13) related to exploration, mining and refining of ECRM were identified and are proposed for presentation as fact sheets in WP7. This is a non-exhaustive list subject to change while the BGR is implementing AfricaMaVal project Task 7.2. The political appropriateness of these projects (e.g. exclusion of highly controversial projects or controversial stakeholders and owners) have been verified as of November 2023.

Each project was supposed to fulfil the following minimum requirements:

- Credible ECRM resource estimate available (for mining projects);
- Sufficient availability of project-specific information;
- The project operator is seeking investment or financing related to project development, project expansion, or optimising certain aspects of a project (e.g. to improve ESG performance) or, alternatively, the project could be of interest for European industry offtakers;
- Part of the project's current or anticipated future ECRM production is potentially available to the EU industry, which excludes projects where owners or offtake partners exclusively direct the large majority of project ECRM production to third countries outside of the EU.

Since it was challenging to find suitable projects meeting all these criteria, the definition was subsequently broadened to also include examples for projects that could be of interest to European offtake partners, without necessarily requiring financing for project development.

Project	Operator	Commodity	Address	Location	Status	Reserves/Resources
Bisie	Alphamin	Sn, Cu	Perrieri Office Suites, Office Block C, C2-302, Level 3, Suite 1, La Croisette, Grand Baie, Rivière du Rempart 30517, Mauritius	1.03361 S, 27.74500 E	Mining, Expansion	9.78 Mt @ 3.54 % Sn, 0.16 % Cu
Manono (tailings)	Tantalex	Li, Sn, Ta	1410-120 Adelaide Street West,	7.31977 S, 27.40828 E	Scoping & Prefeasibility	11.93 Mt @ 0.61 % Li ₂ O,

			Toronto, Ontario M5H 1T1, Canada			0.031 % Sn, 0.003 % Ta
Western Foreland	Ivanhoe	Cu	999 Canada Place Suite 606 Vancouver, British Columbia V6C 3E1 Canada	10.85420 S, 24.97147 E	Scoping & Prefeasibility	Maiden resource estimate expected in Q4/2023.
Mutoshi	Chemaf (Shalina)	Cu, Co	LOB 5, Office 107, Jebel Ali Free Zone, Dubai, United Arab Emirates	10.67444 S, 25.53556 E	Construction	0.3 Mt of contained Co
Special Economic Zone for battery value chains					Scoping & Prefeasibility	

Table 13: Projects to be proposed for fact sheets in WP7.

7.2. Artisanal and small-scale mining

In the AfricaMaVal project, the consulting company Levin Sources is responsible to develop investment recommendations targeting the ASM sector but work on this task is not yet complete. In the meantime, Vasters & Schütte (2023) developed country profiles showing the geological, mining and processing status for ECRM production in the ASM sector of the DRC and other African countries. These country profiles include a short section on investment opportunities, which is reproduced in the following. The full country profile is shown in Vasters & Schütte (2023).

The DRC's artisanal tin and tantalum (+/- tungsten) subsector may represent a straightforward investment target to increase the country's artisanal ECRM production. Several mine sites appear to have sufficient production potential to warrant undergoing semi-mechanisation. Note, however, that there are a number of geological and economic uncertainties and risks to consider for such investments. In the absence of actual exploration data, the size of the ore body, the grade distribution and the remaining mineral resources are poorly known, and resource depletion at any given site will occur eventually. In implementing mechanization programs, mining companies and investors might further create conflict and tensions with local cooperatives or informal artisanal mining groups. These stakeholders often resist mine mechanization efforts as this may result in job losses for unqualified workers. This has happened at the Bibatama mine site (SMB) in North Kivu, for instance, the country's largest coltan producer for many years. Another economic risk for investment in the artisanal 3T sector refers to the impact of the Primera JV, set up between the DRC and a company based in the United Arab Emirates in December 2022, and to its influence on artisanal mineral exports. While Primera

Gold's role in controlling the artisanal gold exports in the eastern DRC has become well known since then, the JV additionally includes provisions for Primera Metals DRC to develop a technical business plan regarding exporting and setting up a smelter for 3T minerals. As part of the JV agreement, the DRC government commits to authorizing an exclusive export tax rate of 3.5% for 3T minerals. For tin (cassiterite) and tungsten (wolframite), this rate is the same as the general export royalty rate in place for base metals. For tantalum (coltan), however, this exclusive rate awarded to Primera Metals DRC would be substantially lower than the current export royalty rate in place for other companies, set at 10% due to coltan being classified as a 'strategic substance' by the DRC government.

The lithium content of artisanal pegmatite mine sites (producing tin and tantalum) and associated tailings is of potential market interest at certain lithium price levels if operators were to introduce lepidolite and/or spodumene processing circuits that would allow separation and recovery of lithium concentrates for export. Currently, most lithium minerals contained in 3T pegmatite ore report to the tailings fraction. The efficiency of recovering lithium concentrates also depends on the degree of weathering of the lithium minerals, among others, and would hence require conducting metallurgical processing studies. Also, artisanal mine site operators rarely engage in systematic ore stockpiling and tailings storage, which may complicate lithium recovery through re-processing. In any case, it is possible that basic handpicking of high-grade lithium pegmatite ore would be economically viable for individual artisanal miners at the current (03/2023) lithium price level if local traders offered to buy such material. Similar considerations apply to REE concentrates obtained from re-processing of tin mine tailings, though monazite is more resistant to weathering (and, in fact, enriched in placers) than lithium minerals. There is a small potential to increase the value potential in artisanal gold supply chains in the Lubero area if gold concentrates were analysed for their PGM content.

At the time of writing (04/2023), despite its major commercial significance, the artisanal copper and cobalt sector represents perhaps the most challenging subsector to engage in terms of structured national ECRM production growth, due to the associated legal uncertainties and pending decisions by the DRC government. Unless the DRC mining authorities enforce a clear framework on enabling factors such as artisanal copper and cobalt trade and the associated roles of parastatal companies such as the *Entreprise Générale de Cobalt*, it is likely that the subsector's output will mainly be driven by external commodity price developments. In any case, it is important to underline the economic importance of the country's artisanal copper production, in addition to artisanal cobalt production.



Conclusions

This report shows that the DRC will honour its reputation as a mining powerhouse in the years to come. In 2022, total DRC ECRM exports were dominated by copper, followed by cobalt, tin and tantalum; tungsten is of minor importance. Outside of the ECRM space, the DRC is also a major exporter of gold. The DRC government's strategy for the mining sector also increasingly focuses on lithium (especially Manono, the world's largest undeveloped hard rock lithium project), while there might be potential for a couple of other ECRM as well (e.g., aluminium, chromium, nickel, phosphate, rare earths and vanadium).

Currently, industrial ECRM projects are in various development stages, from grassroots exploration, active mining, brownfield expansions of operating projects, to re-evaluations of tailings from historical production. In addition to a number of Chinese partners, other foreign investors are also active in the DRC's industrial mining sector. Prominent investors in this sector come from Switzerland (Glencore), Kazakhstan (ERG), Canada (Barrick, Ivanhoe) and the United Arab Emirates (Chemaf).

The government seeks to attract investment in value adding activities in the country in addition to exporting raw materials in the form of metals or intermediate products. At least since the modernisation of the Mining Code (2018), with a few notable exceptions, the DRC does not generally export significant tonnages of unprocessed raw materials without any form of value addition. Instead, the country mainly exports refined metal (copper cathodes) or intermediate chemical products such as raw cobalt hydroxide.

Besides environmental and social risks, the somewhat uncertain governance framework in the DRC may appear challenging to potential investors. In recent years, this has included, for example, the questioning of exploration licences of a prominent foreign investor by the Ministry of Mines, targeted mineral export restrictions for some large copper and cobalt producers and strong competition from various investors for attractive investment targets.

The government is aware of these challenges for investment and seeks to increase the country's attractiveness for foreign investors. The new mining sector strategy foresees a number of steps in this regard:

- improving the DRC's score in global governance ratings through improved environmental and social performance;
- promoting DRC investment opportunities in national and international fora, emphasising measures to increase transparency, improve control and reduce corruption;
- putting in place legal incentives for investment protection, such as fiscal stability and avoiding expropriation; and
- facilitating supply chain due diligence, mineral traceability, and a legal base for activities in the ASM sector.



There is undoubtedly a great need for investment in the DRC. With respect to mineral resources, the DRC does currently produce cobalt, but it does not represent a viable downstream market for the battery value chain. There is also no strong recycling sector apart from the revaluation of tailings. A planned Special Economic Zone, designed in partnership between the DRC and Zambia, aims directly at the battery supply chains and may therefore develop upstream mining projects, for instance for lithium, nickel and graphite, or trade agreements with third countries to import these commodities. Crucially, developing the zone will require the production of refined battery cathode chemicals in the DRC, which is not yet the case. While this offers a major investment opportunity, it is also associated with market risks, given the anticipated changes in battery chemistry, towards other cathode types and, eventually, towards solid-state batteries. Considering possible future market changes, speed is key to provide a product while there is still significant demand for market growth.

The ASM sector also offers investment opportunities, although formalisation through the government service SAEMAPE is progressing sluggishly. In recent years, the ASM sector has accounted for 100% of total tantalum, up to a third of total tin and up to a quarter of total cobalt production. Pilot projects such as Mutushi and Kasulo not only show how productivity can be increased through semi-mechanisation, but also how ESG risks can be minimised.

In addition to mineral resources, the DRC also has enormous hydropower potential. However, the power supply is also one of the country's key bottlenecks for mining, refining and other sectors. An expansion of capacities, e.g. through the Grand Inga project, is planned, but has repeatedly stalled in the past due to failed partnerships between the DRC government and external consortia. In addition to the energy bottlenecks, the road and rail sector also requires massive investment. As part of the “Global Gateway”, the EU is currently involved in the expansion of the Lobito corridor, which is intended to increase exports from the DRC and Zambia via the port of Lobito in Angola.

This is also part of the planned Strategic Partnership between the EU and the DRC on sustainable critical raw materials value chain to diversify raw materials supply chains, as well as to develop local value addition and transforming trafficking of mineral resources into legitimate trade. Such strategic partnerships and the memberships in several African economic integration initiatives will remain of great importance in the future to achieve economic stability and optimise access to global markets.



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APPENDICES



Appendix

A1.2. Prospectivity and mineral high potential mapping

A1.2.1 Geological framework used for prospectivity mapping

The DRC geological structure is composed of the "Cuvette Centrale" (CC) or "Central Depression". The CC covers an area of over 2,000,000 km² where it is bounded to the south by the Lufilian Pan-African chain, the Kasai craton to the west, the West-Congolian Pan-African chain to the north-west, the Ntem craton to the north, the NE Congolese craton to the northeast and the Ubundian chain to the east. It is composed of Cambrian to Triassic successions comprising the Bianco-Banalua-Inkisi Groups and then the Karoo Supergroup, surmounted by the Jurassic terrains of the Stanleyville series (i.e. the Kisangani Group) and the Cretaceous deposits of the Sankuru and Lukula Supergroups. The sedimentary pile ends with the Kalahari Supergroup. The Precambrian basement outcropping towards the edge of the CC is composed of distinct cratonic blocks of Archean and Paleoproterozoic age (Chaillu-Ntem, Angola-Kasai, Tanzania-Bangweulu, Bomu-Uélé-Bomokandi). Mobile chains and crystalline terrains of Meso- and/or Neoproterozoic age, forming the «Congo craton», join these blocks, of roughly similar size. These blocks outcrop respectively to the W, S, E and NE of the CC (Fernandez-Alonso et al., 2015). Around the CC, the most important mobile chains include the Ruzizian (Paleoproterozoic) chain, Kibaran and Irumide belts (Mesoproterozoic), West-Congolian and Lufilian belt/Copperbelt (Neoproterozoic), as well as the slightly deformed terrains of the Neoproterozoic Mbuji-Mayi and Lindian Supergroups, which act as foreland platforms and/or aborted rifts on the Congo craton. The entire Proterozoic rim of the CC is well known for its metallogenic provinces (Fernandez-Alonso et al., 2015), in particular for the Lufilian arc and the Kibara belt. This Kibara belt includes all the Mesoproterozoic metasedimentary and metavolcanic rocks of the SW-NE-trending Kibaran chain developed north of the Lufilian arc and in the vast Lubudi plain as far west as the Archean rocks of the Kasai. On a regional scale, the Mesoproterozoic rocks involved in the Kibaran orogen, equivalent to the Grenvillian orogeny, cover an interval of 1400-900 Ma and are linked to the aggregation of the Rodinia supercontinent. It extends over more than 2,000 km, from the Katangan, Kolwezi-Mutshatsha region (Kibara belt), to the Tanganyika-Kivu and Victoria Great Lakes (Karagwe-Ankole belt) and continues into Tanzania, Rwanda and Uganda as well as the Irumides in south-eastern DRC and Zambia. The entire stratigraphic pile, comprising siliciclastic and volcanic terrains, is almost 10. km thick and is frequently cut by acidic and basic plutonic intrusions between 1415 and 1000 Ma old. At least three phases of deformation affect the Kibaran series: the term 'Kibaran events' is strictly reserved for granitic intrusions intersecting the basic terms, the age of which is computed on the basis of the age of the Kibaran events. Formed after the Kibaran event, the Lufilian arc domain is represented by the Neoproterozoic terrains of the Katanga Supergroup of the DRC Copperbelt, which form the Congolese part of the Central African



Copperbelt (CAC), itself a segment of the Lufilian (i.e. pan-African) Neoproterozoic belt between the Congo craton to the west, the Kalahari craton to the south and the Bangweulu block to the east. These terrains form an arc (i.e. a Lufilian arc) whose convexity is oriented towards the north, extending over approximately 700 km in length and 50 km in width on either side of the border between the DRC and Zambia.

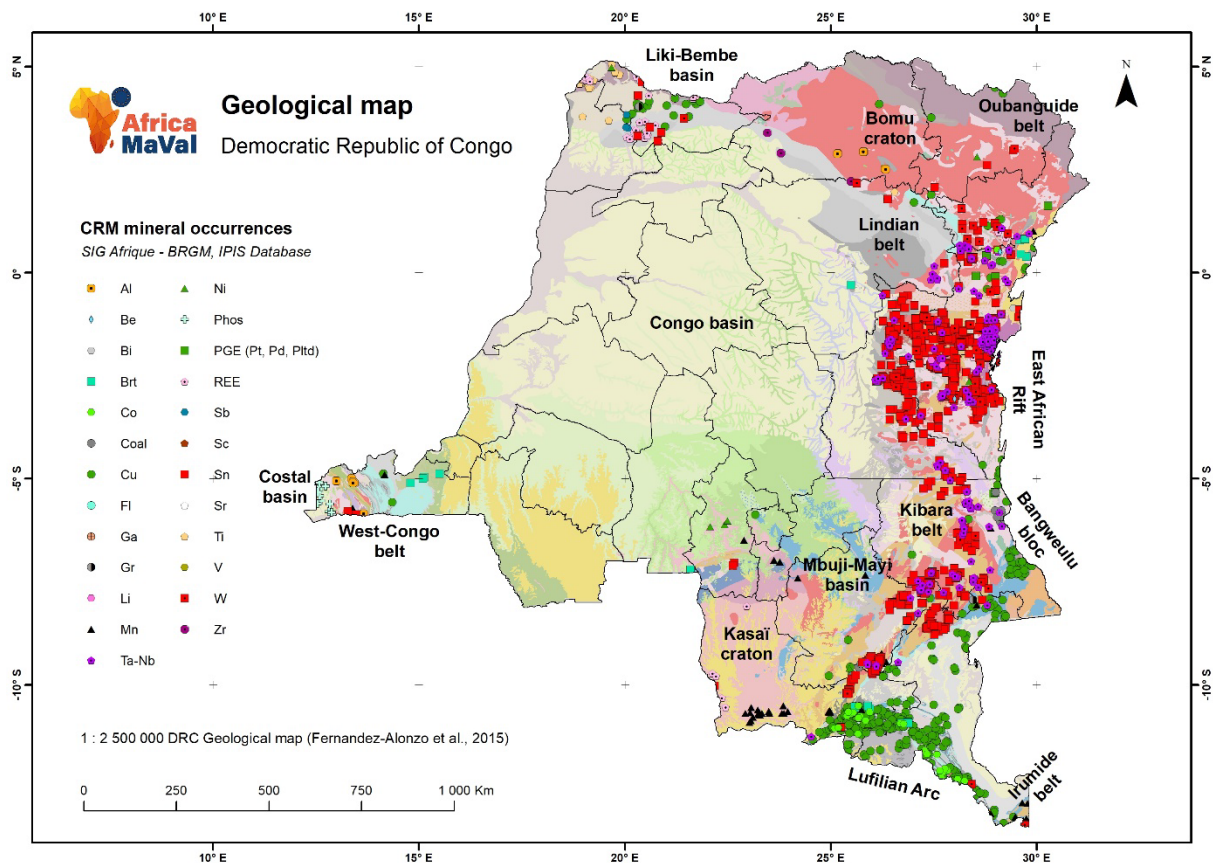


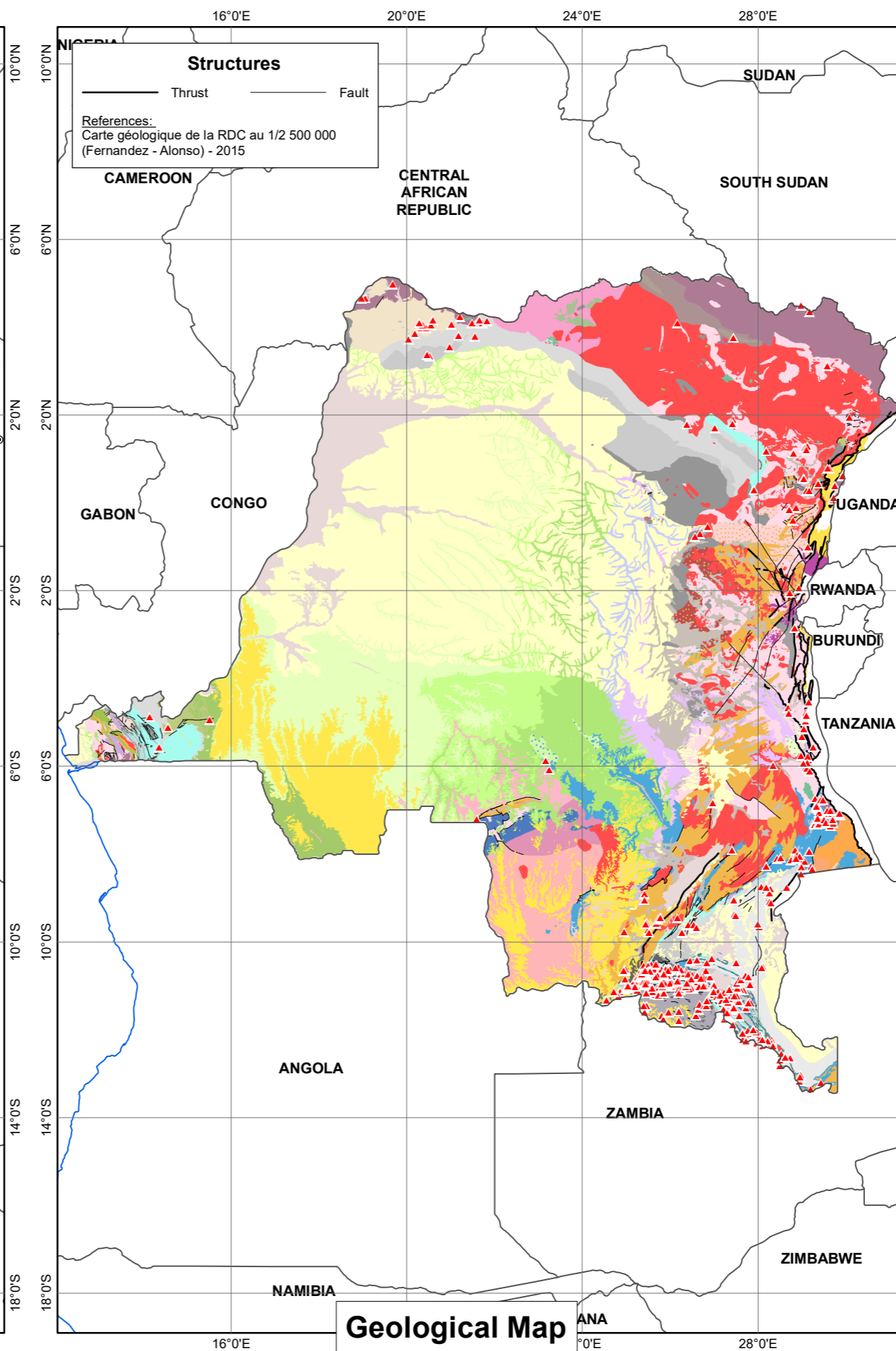
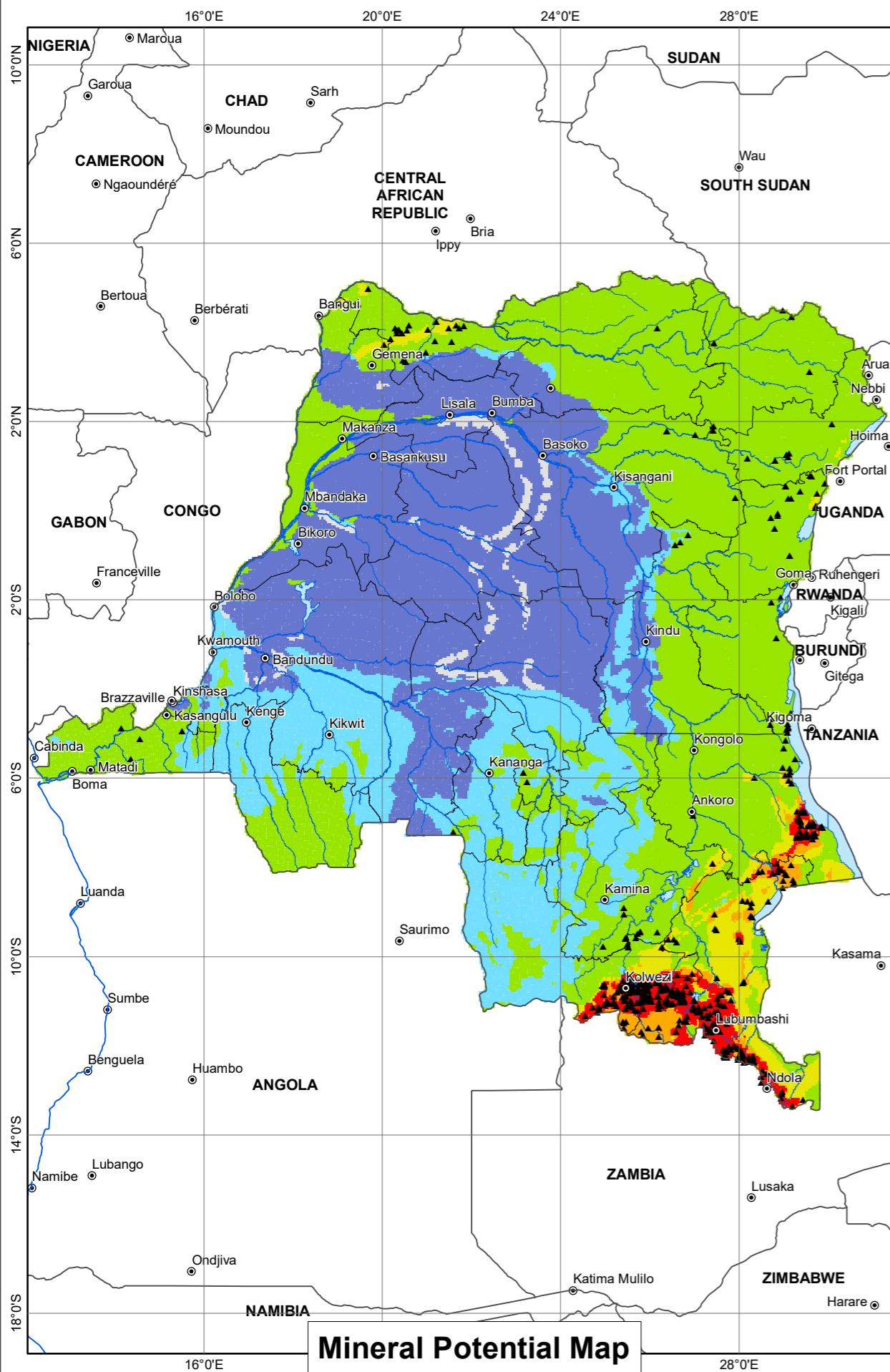
Figure 16. Geology map of the DRC showing important domains hosting the LSUs for the predictive maps as well as ECRM occurrences. Modified after Fernandez-Alonso et al. (2015).

Domain	Supergroup	Group	Sub_Group	Formation	code_caisson	code_Africamaval
Bangweulu Bloc	Complexe volcano-plutonique des Marungu	Gabbro			CPXma-gb	PP3_CFXma_gb
Bangweulu Bloc	Complexe volcano-plutonique des Marungu	Diorite de kwaile			CPXma-kw	PP3_CFXma_kw
Bangweulu Bloc	Complexe volcano-plutonique des Marungu	roche verte d'âge indifférencié			CPXma-rv	PP3_CFXma_rv
Bangweulu Bloc	Complexe volcano-plutonique des Marungu	Rhyolites			CPXma-ry	PP3_CFXma_ry
Bangweulu Bloc	Supergroupe des M'lahi				CPXma--	PP3_CFXma--
Bangweulu Bloc	Supersuite magmatique du bloc de Bangweulu	Complexe magmatique de la phase Ubendienne	Suite des granitoïdes des Dômes	Granite de Mokambo	BG-U-DO-MO	PP3_BG_UO_DO_MO
Bangweulu Bloc	Supersuite magmatique du bloc de Bangweulu	Complexe magmatique de la phase Ubendienne	Suite des granitoïdes des Dômes	Granite de Luina	BG-U-DO-LU	PP3_BG_UO_DO_LU
Bangweulu Bloc	Supersuite magmatique du bloc de Bangweulu	Complexe magmatique de la phase Ubendienne	Suite des granitoïdes des Dômes		BG-U-B-DO	PP3_BG_UO_DO_
Bangweulu Bloc	Supersuite magmatique du bloc de Bangweulu	Complexe magmatique de la phase Ubendienne			BG-U-B	PP3_BG_UO_
Bangweulu Bloc	Supersuite magmatique du bloc de Bangweulu				BG--	PP3_BG
Bomu Craton	Complexe gneissique de la Garamba				CPXga--	NA_CPXga
Bomu Craton	Complexe migmatique de Dibaya	Amphibolite		Craton Bomu	CPXdi-amp	NA_CPXdi_amp
Bomu Craton	Complexe migmatique de Dibaya				CPXdi--	NA_CPXdi
Bomu Craton	Supergroupe de Niangara	Inférieur			Ni-inf--	NA_Ni_inf
Bomu Craton	Supergroupe de Niangara	Supérieur			Ni-Sup--	NA_Ni_Sup
Bomu Craton	Supergroupe de Niangara				Ni---	NA_Ni
Bomu Craton	Supergroupe des ceintures de roches vertes archéennes	Groupe des ceintures vertes de Kilo			AGB-CVK--	A_AGB_CVK
Bomu Craton	Supergroupe des ceintures de roches vertes archéennes	Groupe de la Gangu			AGB-GN--	MA_AGB_GN
Bomu Craton	Supergroupe des ceintures de roches vertes archéennes	Groupe de Kibali			AGB-Ki--	NA_AGB_Ki
Bomu Craton	Supergroupe des ceintures de roches vertes archéennes	Complexe gneiso-amphibolitiques de la Bomu			AGB-CPXbo--	PA_AGB_CPXbo
Bomu Craton	Supergroupe des ceintures de roches vertes archéennes				AGB--	A_AGB
Bomu Craton	Supersuite magmatique de l'Uelie				MUE--	PP2_MUE
Costal basin	Supergroupe des séries du Bassin Côtier	Groupe de Quelio			CO-Que--	m_p_CO_QUE
Costal basin	Supergroupe des séries du Bassin Côtier				CO--	m_p_CO
Cuvette du Congo	Supergroupe de Kisangani				KS---	ls_KS
Cuvette du Congo	Supergroupe de la Sankuru	Loia / Bokungu			SN-LB--	C_SN_LB
Cuvette du Congo	Supergroupe de la Sankuru	Groupe de Bokungu			SN-BoK--	C_SN_BoK
Cuvette du Congo	Supergroupe de la Sankuru	Groupe de la Loia			SN-Lo--	C_SN_Lo
Cuvette du Congo	Supergroupe de la Sankuru	Groupe du Kwango			SN-Kwa--	C_SN_Kwa
Cuvette du Congo	Supergroupe de la Sankuru				SN---	C_SN
Cuvette du Congo	Supergroupe des alluvions, éluvions et colluvions (sub)modernes	Groupe de la cuvette centrale du Congo			AC-CC--	Oq_AC_CC
East African Rift	Supergroupe du Rift	Groupe des séries volcaniques du Rift	Sous-groupe de Virunga et Bukavu	trachytes	RF-SV-VB-t	m_RF-SV-VB_t
East African Rift	Supergroupe du Rift	Groupe des séries volcaniques du Rift	Sous-groupe de Virunga et Bukavu	lave basique	RF-SV-VB-b	m_RF-SV-VB_b
East African Rift	Supergroupe du Rift	Groupe des séries volcaniques du Rift	Sous-groupe de Virunga et Bukavu		RF-SV-VB-	m_RF-SV-VB
East African Rift	Supergroupe du Rift	Série du fossé tectonique africain			RF-FA--	m_RF-FA
East African Rift	Supergroupe du Rift	Groupe des séries volcaniques du Rift			RF-SV--	m_RF-SV
East African Rift	Supergroupe du Rift				NR-F--	m_NRF
Inumide belt	Supergroupe de la Muvia				MV--	MPS_MV
Kasai Craton	Complexe gabbro norotique de la Lueta				CPXu--	PP1_CPXu
Kasai Craton	Complexe granito-gneissique de Sandoa				CPXsa--	MA_CPXsa
Kasai Craton	Complexe granitique de Musefu				CPXmu--	MA_CPXmu
Kasai Craton	Complexe tonalitique de la Haute Luanyi				CPXhi--	PA_CPXhi
Kasai Craton	Supergroupe de la Lusanza	Groupe volcano-sédimentaire de Lulua	Syéno-dorites		LS-LuI-sd-	PP2_LS_LuI_sd
Kasai Craton	Supergroupe de la Lusanza	Groupe méta-sédimentaire de Luiza / Lukoshien			LS-LuI--	PP2_LS_LuI
Kasai Craton	Supergroupe de la Lusanza	Groupe volcano-sédimentaire de Lulua			LS-LuI--	PP2_LS_LuI
Kasai Craton	Supergroupe de la Lusanza				LS---	PP2_LS
Kasai Craton	Supersuite magmatique du Kasai				MKA--	PP_MKA
Kibara belt	Complexe anté kibarien du Shaba central				CPXkb--	NA_PP_CPXkb
Kibara belt	Complexe indifférencié Ruzizi Kivu				CPXrukv--	PP_MP_CPXrukv
Kibara belt	Supergroupe de l'itombwe				IT--	NPI_IT
Kibara belt	Supergroupe des Kibara				KB--	MP_KB
kibarian belt	Supersuite magmatique du Kibarian	Suite des granites du Kibarian			MKB-GK--	MP_MKB_GK
kibarian belt	Supersuite magmatique du Kibarian				MKB--	MP_MKB
Likibemban basin	Supergroupe de Lik-Bembe				LB---	MP_LB
Lindian Belt	Supergroupe de la Lindi	Groupe de la Lolo ma	Akwivo	Panga	LI-Lo-kAk-Pa	NP2_LI_Lo_kAk_Pa
Lindian Belt	Supergroupe de la Lindi	Groupe de la Lolo ma	Akwivo		LI-Lo-kAk	NP2_LI_Lo_kAk
Lindian Belt	Supergroupe de la Lindi	Groupe de l'ititi			LI-Iti--	NP2_LI_Iti
Lindian Belt	Supergroupe de la Lindi	Groupe de la Lolo ma			LI-Lo-k	NP2_LI_Lo_k
Lindian Belt	Supergroupe de la Lindi	Groupe de l'Aruwimi			LI-Arw--	NP2_LI_Arw
Lindian Belt	Supergroupe de la Lindi				LI---	NP2_LI
Lufilian Arc	Supergroupe du Katanga	Groupe du Nguba	Muombe	Mwale	KT-Ngu-Ng1-Mw	NP2_KT_Ngu_Ng1_Mw
Lufilian Arc	Supergroupe du Katanga	Groupe du Kundelungu	Ngule		KT-Kun-Ku2-	NP2_KT_Kun_Ku2-
Lufilian Arc	Supergroupe du Katanga	Groupe du Kundelungu	Go mbeia		KT-Kun-Ku1-	NP2_KT_Kun_Ku1-
Lufilian Arc	Supergroupe du Katanga	Groupe du Nguba	Muombe		KT-Ngu-Ng1-	NP2_KT_Ngu_Ng1-
Lufilian Arc	Supergroupe du Katanga	Gabbros			KT-Gab-	NP2_KT_Gab
Lufilian Arc	Supergroupe du Katanga	Syéno-dorites			KT-KTsd-	NP2_KT_KTsd
Lufilian Arc	Supergroupe du Katanga	Groupe du Roan			KT-Roa-	NP2_KT_Roa
Lufilian Arc	Supergroupe du Katanga	Groupe du Nguba			KT-Ngu-	NP2_KT_Ngu
Lufilian Arc	Supergroupe du Katanga	Groupe du Kundelungu			KT-Kun-	NP2_KT_Kun
Lufilian Arc	Supergroupe du Katanga				KT--	NP2_KT
Mbuji-Mayi Belt	Supergroupe de la Mbuji-Mayi	Mbuji-Mayi sous Sankuru			BM-MBSosa--	NP1_BM-MB50 Sa
Mbuji-Mayi Belt	Supergroupe de la Mbuji-Mayi				BM--	NP1_BM
Mezozoic Deposit	Supergroupe des alluvions, éluvions et colluvions (sub)modernes	Groupe des formations superficiels du rift			AC-rf--	m_OP_AC_rf
Mezozoic Deposit	Supergroupe des alluvions, éluvions et colluvions (sub)modernes	Alluvions et sédiments (sub)modernes			AC-hol-	Oqo_AC_hol
Mezozoic Deposit	Supergroupe des alluvions, éluvions et colluvions (sub)modernes	Alluvions et colluvions anciens			AC-ACol--	Oqo_AC_ACol
Mezozoic Deposit	Supergroupe des alluvions, éluvions et colluvions (sub)modernes				AC--	Oqo_AC
Mezozoic Deposit	Supergroupe du Karahari				KL---	P_A_KL
Qubangula belt	Complexe migmatitique de l'Ubangi				CPXub--	PP2_CPXub
Paleozoic bassin	Supergroupe de Lukula	Groupe de la Lukl			LU-Luk-	C_LU_Luk
Paleozoic bassin	Supergroupe de Lukula	Groupe de Mavuma			LU-Mav--	C_LU_Mav
Paleozoic bassin	Supergroupe de Lukula	Groupe de Bulu-Zambi			LU-Bul-	C_LU_Bul
Paleozoic bassin	Supergroupe de Lukula				LU---	/
Paleozoic bassin	Supergroupe du Karoo	Groupe de la Lukuga			KA-Luk-	HS_KA_Luk
Paleozoic bassin	Supergroupe du Karoo	Lukuga et Lueki indifférencié			KA-Luk/Lue-	HS_Tr_KA_Luk/Lue
Paleozoic bassin	Supergroupe du Karoo	Groupe de la Lueki			KA-Lue-	Tr_KA_Lue
Paleozoic bassin	Supergroupe du Karoo				KA---	HS_Tr_KA
Rwenzori/Kibara belt	Complexe indifférencié anti Burudien	anté-Ruzizi / Ruzizi			CPXrb-RU--	NA_PP_CPXrb_RU
Rwenzori/Kibara belt	Complexe indifférencié anti Burudien				CPXrb--	NA_PP_CPXrb_RU
Rwenzori/Kibara belt	Supergroupe de la Ruzizi				RU---	PP2_RU
Rwenzori/Kibara belt	Supergroupe des roches vertes du Proterozoïque	Roches vertes du Kivu			PRV-Kiv--	MP_Prv_Kiv
Rwenzori/Kibara belt	Supergroupe des roches vertes du Proterozoïque				PRV--	MP_Prv
Rwenzori/Kibara belt	Supergroupe du Kivu	Groupe de la Luhule-Bilati			KVL-B-	MP_KVL-B
Rwenzori/Kibara belt	Supergroupe du Kivu	Syérites néphéliniques du Kivu			KV-sn--	NP2_KV_sn
Rwenzori/Kibara belt	Supergroupe du Kivu				MKV--	MP_KV
West Congo Belt	Complexe migmatique de Kimeza				CPXkm--	PP2_CPXkm
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes	Haut Shilango	Diamictite inférieure	OC-Cat-HS-Dinf	NP_OC_Cat_HS_Dinf
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe de Matadi	Sous-groupe de Gangla		OC-Mat-Ga	NP_OC_Mat_Ga
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes	Ichit-o-cicare		OC-Cat-SC-	NP_OC_Cat_SC
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes	Sankiwa		OC-Cat-San-	NP_OC_Cat_San
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes	Mpoka		OC-Cat-Mp-	NP_OC_Cat_Mp
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes	Haut Shilango		OC-Cat-HS-	NP_OC_Cat_HS
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe de l'Inki			OC-ink-	Camb_OC_ink
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe des Cataractes			OC-Cat-	OC-Cat
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe de Matadi			OC-Mat--	NP1_OC_Mat
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe de Seke-Banza/Tshela			OC-SBT-	NP1_OC_SBT
West Congo Belt	Supergroupe de l'Ouest-Congo	Groupe de Tshela / Seke-Banza			OC-Tsh-	NP1_OC_Tsh
West Congo Belt	Supergroupe de l'Ouest-Congo				OC--	NP1_OC_Ts
West Congo Belt	Supersuite magmatique de l'Ouest Congo	Granite Ouest Congo			MOC-GOC--	NP1_MOC_GOC
West Congo Belt	Supersuite magmatique de l'Ouest Congo				MOC-SDOC--	NP1_MOC_SDOC
West Congo Belt	Supersuite magmatique de l'Ouest Congo	Syéno-dorites			MOC--	NP1_MOC
West Congo Belt	diorites associés aux terrains précambriens				d---	PrCB_d

Table 14. Summary table showing the location of the various lithostratigraphic units in the major geological domains of the DRC. The LSU codes used to produce the predictive maps are indicated in the code field.

Country: DEMOCRATIC REPUBLIC of CONGO

MINERAL POTENTIAL MAP - COPPER-COBALT (Cu-Co)



Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

Known occurrences

- Copper-Cobalt (Cu-Co)
- ▲ SIG Afrique - © BRGM 2023
- IPIS and S&P Global database

Confusion matrix

True negative Cells: 88538 94.31% Non-occurrence in database Non-occurrence predicted	False positive Cells: 4308 4.59% Non-occurrence in database Occurrence predicted
False negative Cells: 270 0.29% Occurrence in database Non-occurrence predicted	True positive Cells: 760 0.81% Occurrence in database Occurrence predicted

Threshold: 0.50
Cell size: 5000 m

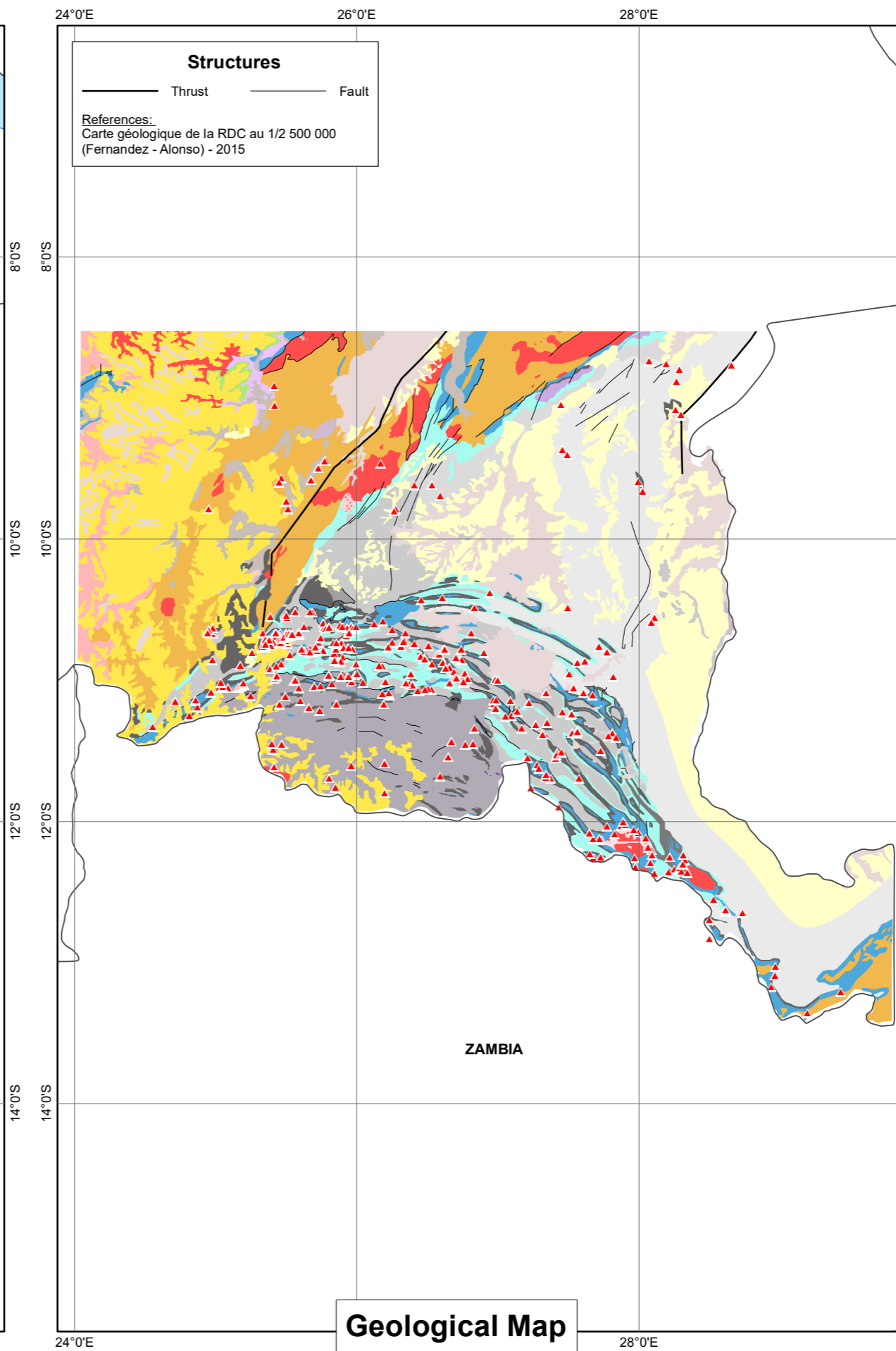
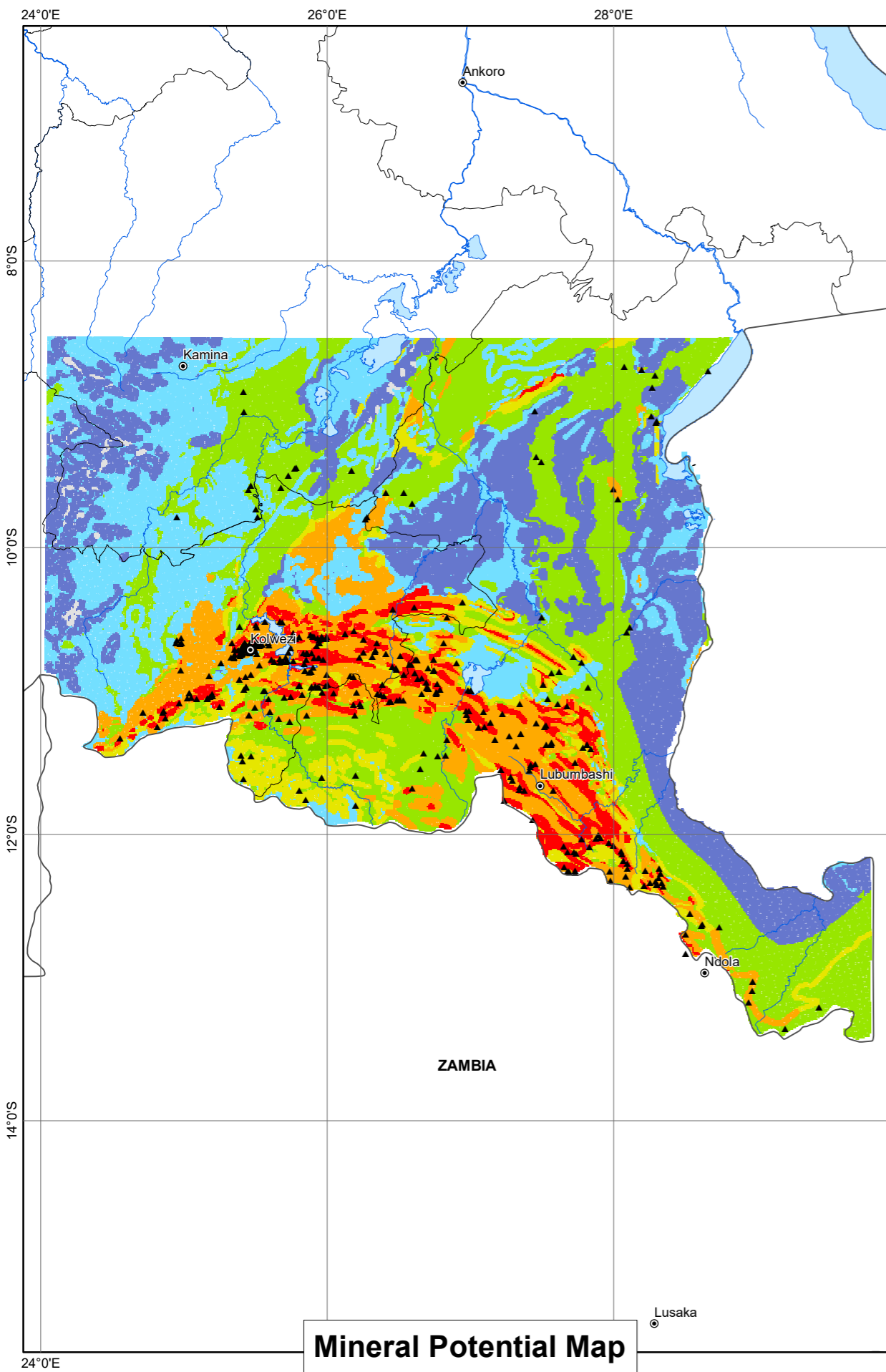
0 125 250 500 Km

Datum : WGS84 (World Geodetic System 1984)

January 2024

Country: DEMOCRATIC REPUBLIC of CONGO (Katanga)

MINERAL POTENTIAL MAP - COPPER-COBALT (Cu-Co)



Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

Known occurrences
Copper-Cobalt (Cu-Co)
▲ SIG Afrique - © BRGM 2023
IPIS and S&P Global database

Confusion matrix

True negative Cells: 152479 79.37% Non-occurrence in database Non-occurrence predicted	False positive Cells: 36077 18.78% Non-occurrence in database Occurrence predicted
False negative Cells: 757 0.39% Occurrence in database Non-occurrence predicted	True positive Cells: 2814 1.46% Occurrence in database Occurrence predicted

Threshold: 0.50
Cell size: 1000 m

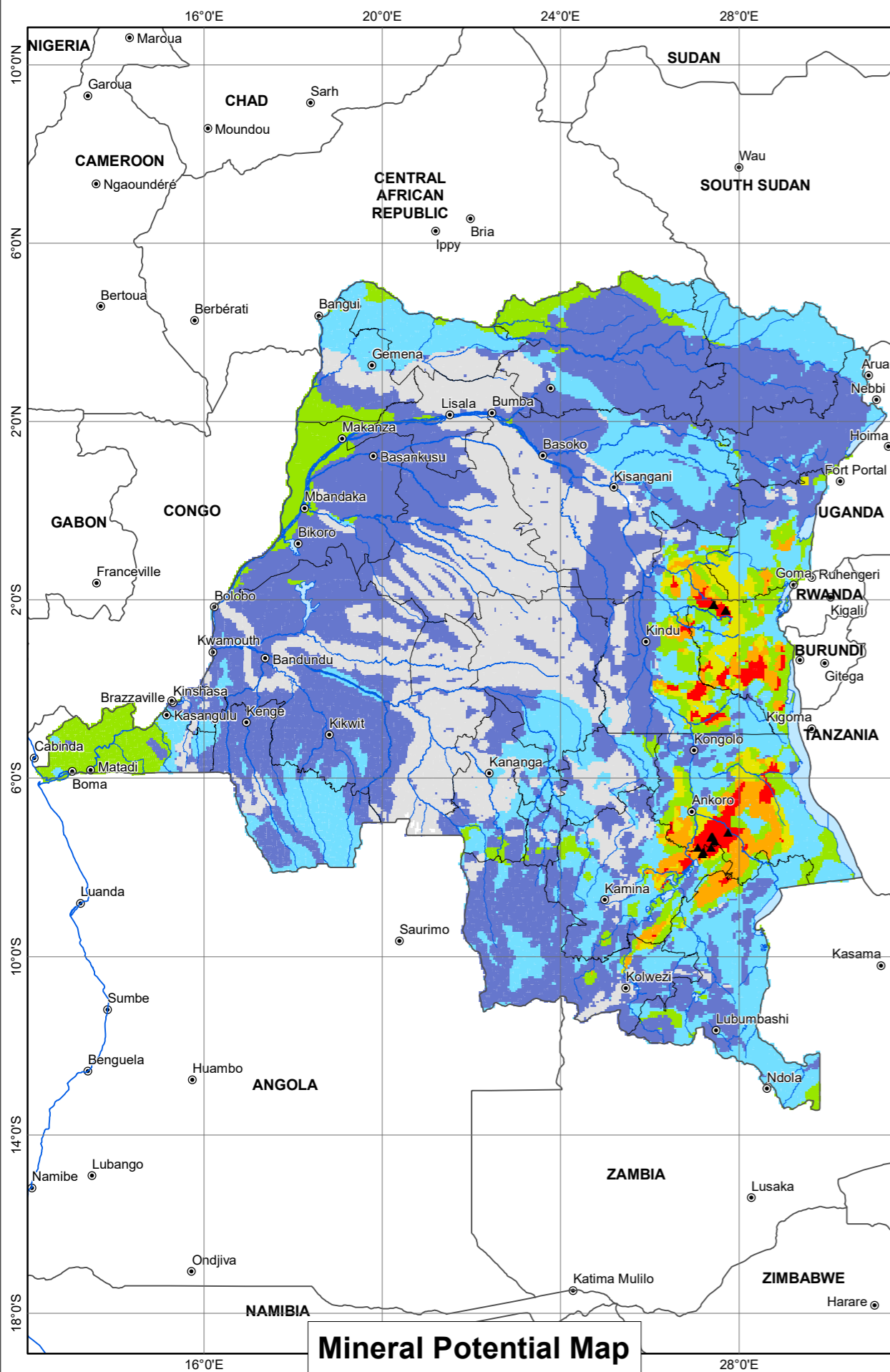
0 50 100 200 Km

Datum : WGS84 (World Geodetic System 1984)

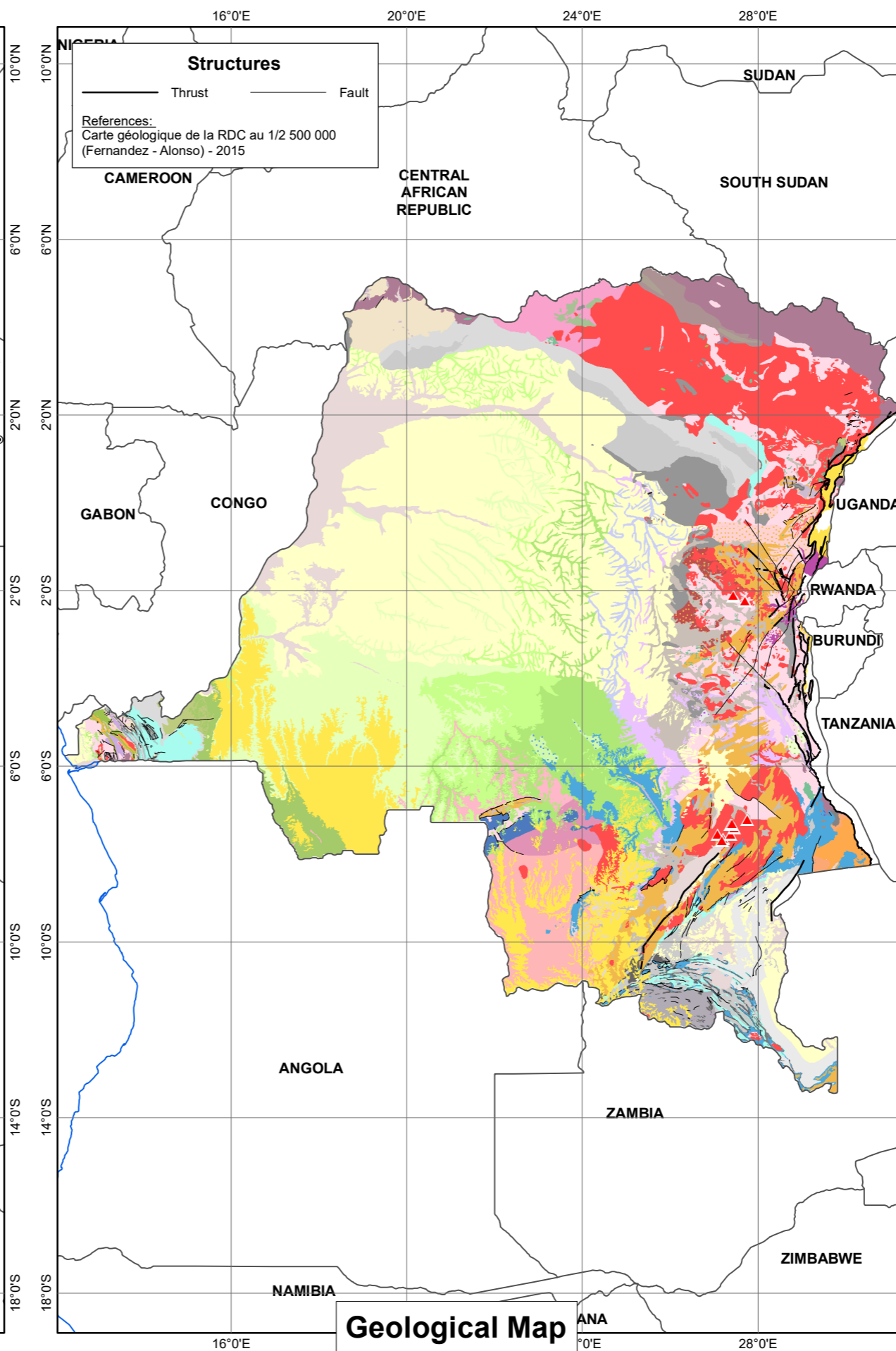
January 2024

Country: DEMOCRATIC REPUBLIC of CONGO

MINERAL POTENTIAL MAP - LITHIUM (Li)



Mineral Potential Map



Geological Map

Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

Known occurrences

Lithium (Li)
 ▲ SIG Afrique - © BRGM 2023
 ▲ IPIS and S&P Global database

Confusion matrix

True negative Cells: 91900 97.89% Non-occurrence in database Non-occurrence predicted	False positive Cells: 1951 2.08% Non-occurrence in database Occurrence predicted
False negative Cells: 0 0.00% Occurrence in database Non-occurrence predicted	True positive Cells: 25 0.03% Occurrence in database Occurrence predicted

Threshold: 0.70
 Cell size: 5000 m

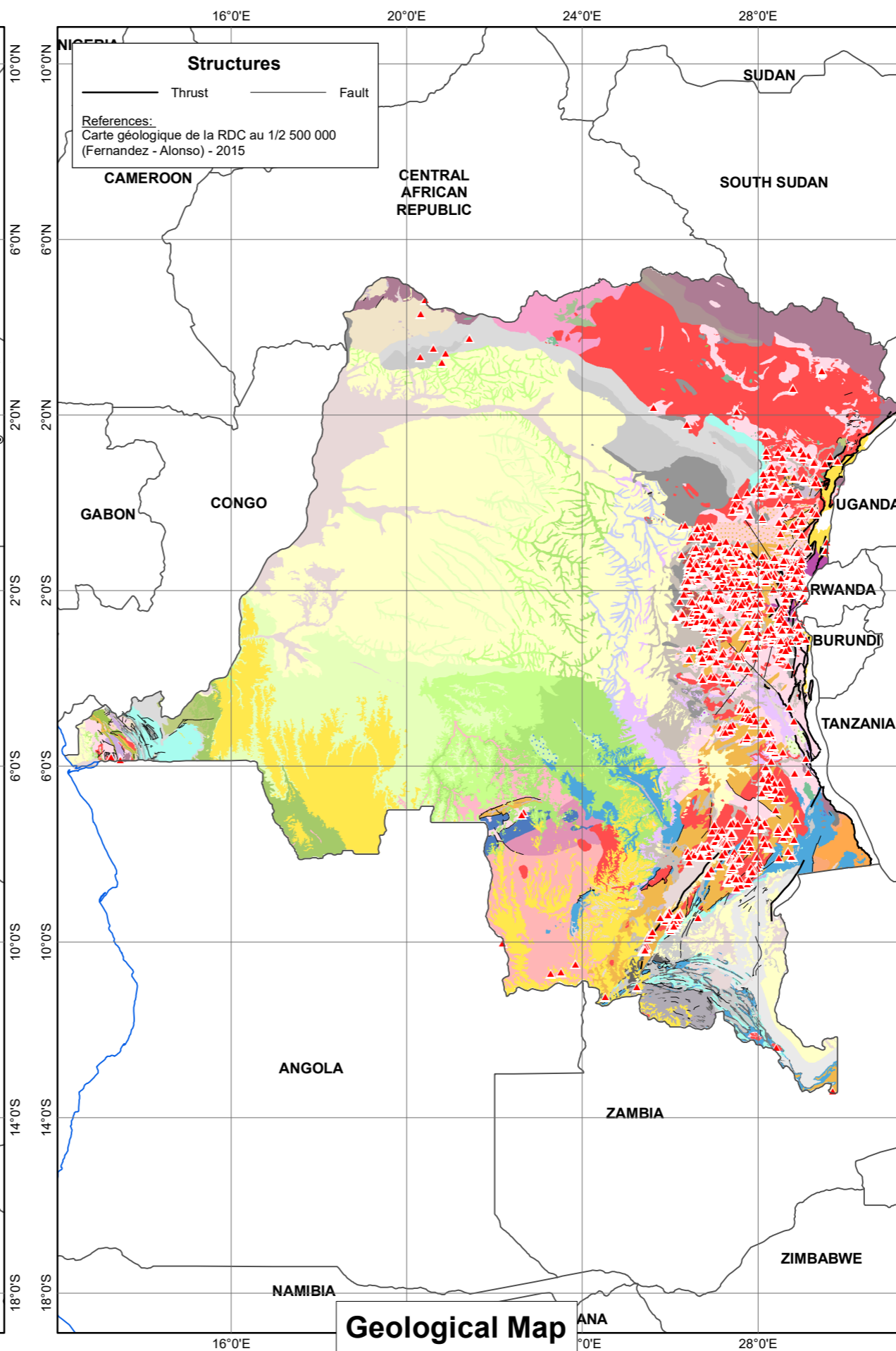
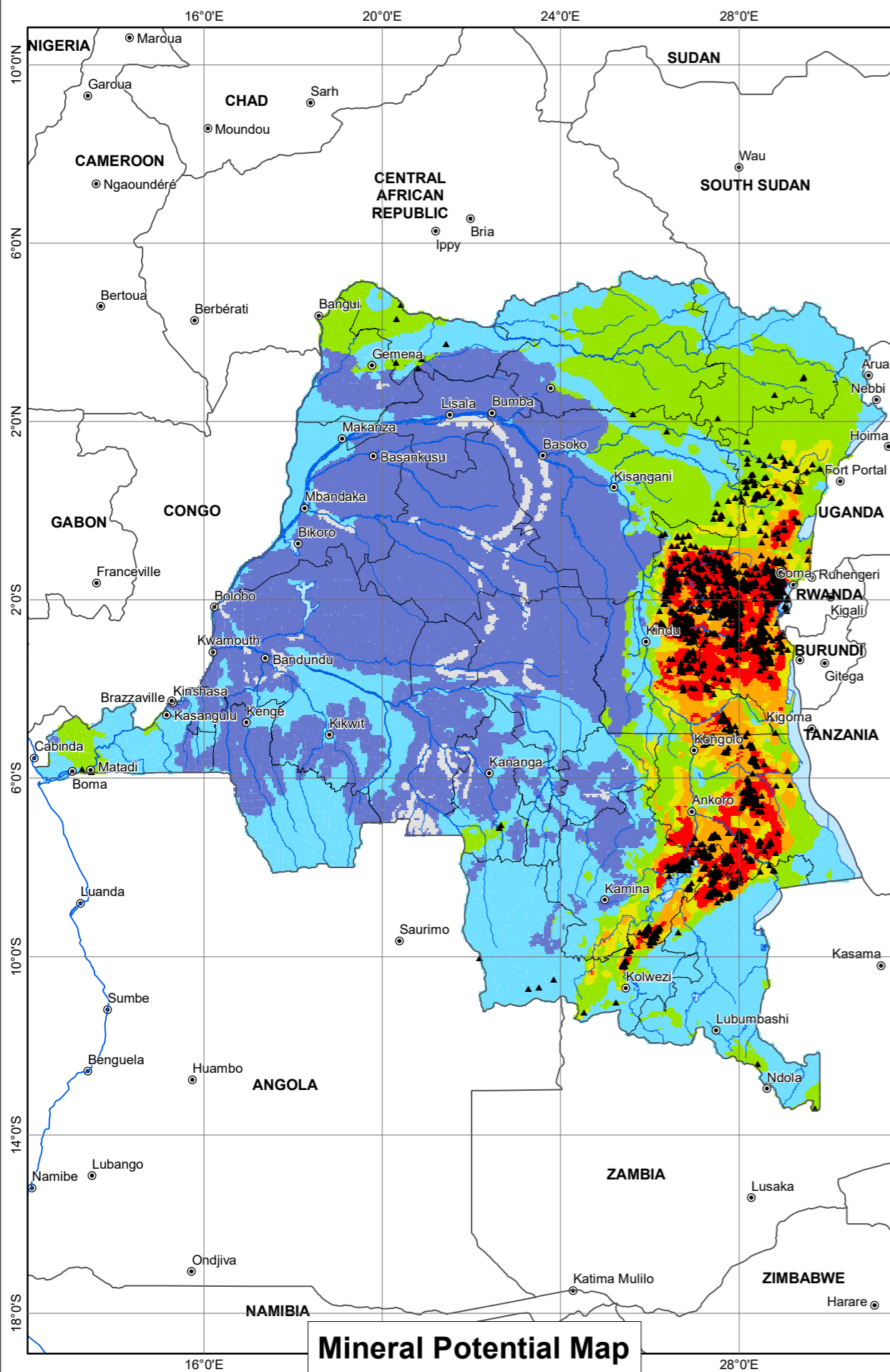
0 125 250 500 Km

Datum : WGS84 (World Geodetic System 1984)

January 2024

Country: DEMOCRATIC REPUBLIC of CONGO

MINERAL POTENTIAL MAP - TANTALUM-NIOBIUM-TIN-TUNGSTEN (Ta-Nb-Sn-W)



Legend

Score

- < 0.05
- 0.05 - 0.125
- 0.125 - 0.25
- 0.25 - 0.45
- 0.45 - 0.60
- 0.60 - 0.80
- 0.80 - 1

Known occurrences

- Tantalum-Niobium-Tin-Tungsten (Ta-Nb-Sn-W)
- ▲ SIG Afrique - © BRGM 2023
- IPIS and S&P Global database

Confusion matrix

True negative Cells: 81744 87.08% Non-occurrence in database Non-occurrence predicted	False positive Cells: 9839 10.48% Non-occurrence in database Occurrence predicted
False negative Cells: 196 0.21% Occurrence in database Non-occurrence predicted	True positive Cells: 2097 2.23% Occurrence in database Occurrence predicted

Threshold: 0.47
Cell size: 5000 m

0 125 250 500 Km

Datum : WGS84 (World Geodetic System 1984)

January 2024