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# Forest and Mining Interaction in Zambia

A study of mineral sector governance, forest values and deforestation in Zambia, including recommended initiatives to improve mining-forest management

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**The Swedish Environmental Protection Agency**  
Phone: + 46 (0)10-698 10 00  
E-mail: [registrator@naturvardsverket.se](mailto:registrator@naturvardsverket.se)  
Address: Naturvårdsverket, SE-106 48 Stockholm, Sweden  
Internet: [www.naturvardsverket.se](http://www.naturvardsverket.se)

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# Preface

This study provides insights to how integration of mineral sector governance, forest values and deforestation can take place. It recommends initiatives to improve mining-forest management in Zambia. The work was conducted in 2023 and developed as an activity within the Environmental Governance Programme (EGP) together with the Ministry of Mines and Minerals Development in Zambia. The EGP is a Sida-funded programme that is jointly implemented by Swedish Environmental Protection Agency (SwEPA) and United Nations Development Programme (UNDP). The main objective of the programme is to integrate human rights and environment into the mining sector, at local, national, regional, and global levels. The EGP supports ten mineral-rich target countries in the Global South, building capacity for more integrated environmental and social governance in the mining sector.

The study is to be viewed upon as a catalyst for dialogue, collaboration, and collective action both within and beyond EGP countries.

Stockholm, 8 May 2024

Marie Uhrwing  
Head of the Sustainable Development Department  
The Swedish Environmental Protection Agency

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# List of Abbreviations

AZWIM	Women in Mining Association
CBD	Convention on Biological Diversity
CBU	Copperbelt University
CSO	Civil society organisation
DNPW	Department of National Parks and Wildlife
EGP	Environmental Governance Programme
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Regulations
EIS	Environmental Impact Statement
EMA	Environmental Management Act
EMA	Environmental Management Act
EPF	Environmental Protection Fund
ESIA	Environmental and Social Impact Assessment
EU-ACP	European Union (EU) and the countries of the African, Caribbean and Pacific Group of States (ACP) Development Cooperation
FAO	Food and Agriculture Organization of the United Nations
FD	Forest Department
FQM	First Quantum Minerals
FSSMAZ	Small-scale miners Association
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIS	Geographic information system
GMA	Game Management Area
GRZ	Government of the Republic of Zambia
GSD	Geological Survey Department
HSE	Health, Safety and Environment
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LAZ	Law Association of Zambia
MCD	Mininf Cadastre Department
MGEE	Ministry of Green Economy and Environment
MLC	Mining Licensing Committee
MMDA	Mines and Minerals Development Act
MMER	Mines and Minerals (Environmental) Regulations
MMMD	Ministry of Mines and Minerals Development
MSD	Mines Safety Department

NGO	Non-Governmental Organization
NP	National Park
NTFP	Non-Timber Forest Products
PEM	Participatory Environmental Mapping
QGIS	Quantum geographic information system
RAP	Resettlement Action Plan
REDD+	Reducing Emissions from Deforestation and Forest Degradation
ROI	Regions of Interest
SEA	Strategic Environmental Assessment
SWEPA	Swedish Environmental Protection Agency
TIZ	Transparency International Zambia
TOR	Terms of Reference
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
UNDP	United Nations Development Programme
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
UNGA	United Nations General Assembly
URS	United Research Services
USD	United States Dollar
WDPA	World Database on Protected Areas
WLCP	West Lunga Conservation Programme
WWF	World Wide Fund for Nature
ZAWA	Zambia Wildlife Authority
ZCCM	Zambia Consolidated Copper Mines
ZCM	Zambia Chamber of Mines
ZEITI	Zambia Extractive Industries Transparency Initiative
ZEMA	Zambian Environmental Management Authority
ZMW	Zambian Kwacha



# Executive Summary

The green energy and digital transitions will require more mining and new mines. Many of these new mines are likely to be situated in forested areas, including intact or otherwise ecologically valuable forests. This expansion poses a dual threat to forests – directly through land claims and mining-related impacts and indirectly through the influx of people drawn to mining areas. The consequences extend beyond deforestation, encompassing the loss of critical habitats, carbon sequestration capabilities, livelihoods dependent on forest resources, and the cultural significance embedded in these landscapes. To ensure a green and just transition, concerns over impacts to forests and linked human rights impacts must be understood, prevented, mitigated, and managed throughout the mining cycle, and in particular during its early stages.

The Environmental Governance Programme (EGP) Forest and Mining Project, conducted between January and November 2023, aims to help strengthen the governance of mining / forest interactions in Zambia. The project included a broad appraisal of mineral, environmental and forest sector policy, law and institutional responsibilities and more detailed mapping of the mining and environmental permitting process, with a specific focus on aspects that are of importance from a forest conservation perspective. This review was, furthermore, underpinned by a satellite imagery study of deforestation and a literature study of forest values. Extensive stakeholder consultations were held to gather information, discuss policy measures and verify results.

Zambia boasts a rich tapestry of forest ecosystems that span its geography, harbouring not only intrinsic forest values but also delivering a spectrum of vital ecosystem services. These are, however, threatened by a rather high rate of deforestation and forest degradation that are fundamentally driven by poverty and regional underdevelopment, population increase and a dependency on forest resources. Mining development contributes significantly to this deforestation, directly through land clearance mining-related impacts, and in-directly through the in-migration of people to mining areas searching for employment and/or other livelihood and economic opportunities. These mining-related impacts on forests have unfolded over several decades in the Copperbelt Province while it is a relatively recent experience in the North-Western Province and some other areas.

Given mining's importance to the Zambian economy and plans for expansion, there is a significant risk of further mining-induced deforestation, including in areas of pristine forest and important forest values. This risk is exacerbated by the fact that the legal and institutional regime for mineral sector governance does not provide sufficient safeguards for the conservation of forests and their diverse value. Furthermore, there is an obvious deficiency in regional development planning ahead of mine developments and associated demographic change.

The report provides a number of recommendations that can promote forest conservation during various stages of exploration and mining, in the areas of: (i) Improved support and access to forest data and information at stage of the mining cycle – the exploration license application stage; (ii) Consideration of forest impacts in the land acquisition and resettlement process; (iii) Improved consideration of

in-migration in the EIA process; (iv) Integrating forest values and forest ecosystem assessments in the permitting process; (v) Improved stakeholder consultations in the EIA process; (vi) Raised capacity for forest monitoring and surveillance; (vii) Institutional capacity and mandates; (viii) Collaborations and partnerships; and (ix) Turning policy aspirations into governance. From these recommendations, specific proposals for continued EGP programming in Zambia are provided.

For EGP countries other than Zambia, any similar forest and mining initiative should include a simple baseline assessment of forest-mining interaction and its governance, followed by a deliberation on the suitability and meaningfulness of implementing a project following the methodology of the current project. Importantly, such a study need to be tailored to the country-specific context with regards to for example the character of mining and forests in the country, the existing policy, legal and institutional framework, and the stakeholder landscape.

# 1. EGP and the Forest and Mining Project

The Environmental Governance Programme (EGP) is a joint initiative of the Swedish Environmental Protection Agency (SWEPA) and the United Nations Development Programme (UNDP) where various countries are supported in the integration of environmental management and human rights into the governance of the mining sector<sup>1</sup>.

One of the EGP projects in Zambia – the Forest and Mining Project – considers how forests are impacted by mineral sector development and how forest protection can be improved. The project was born out of the fact that the green energy and digital transitions will require more mining and new mines. Furthermore, many of these new mines are likely to be situated in forested areas, including intact or otherwise ecologically valuable forests and/or undeveloped areas<sup>2</sup>. To ensure a green and just transition and recovery, concerns over impacts on forests and associated human rights impacts must be understood, prevented, mitigated, and managed throughout the mining cycle, and particularly during the early stages of the mining cycle.

The environmental and mineral permitting processes are key levers by which new mines and the expansion of existing operations are assessed and approved. Many governments need to strengthen their capacities in this area to ensure that the environmental and mineral licensing processes serve to protect forests, linked human rights and livelihoods, and a healthy environment overall. Thus, the objective of the Forest and Mining Project is to review and assess the Zambian legal framework and in particular relevant permitting processes and consider whether these are inclusive and robust enough to mitigate risks posed by mining projects. This assessment is, furthermore, facilitated by studies of forest cover through the use of satellite imagery, and of ecosystem services and forest values of importance in Zambia.

The project has the character of a scoping study with the goal to develop a method of working with issues related to mining-forest interactions that can be used in other EGP countries. It is furthermore meant to test and formalize a method that can subsequently be promoted and utilized in any UNDP country to support programming where mining and forest interactions are gaining greater policy urgency.

After this introduction, **Section 2** provides a background on forests and mining in Zambia as well as mining-deforestation linkages with the purpose of setting the study in an overall context. **Section 3** describes the project scope and methods applied and **Section 4** provides a summary of the outputs of the different study components (these are fully presented in appendices to the report). **Section 5** presents key findings and recommendations under different topic areas and this is followed by recommendations for further EGP programming relating to forest and mining impacts (**Section 6**). As the Forest and Mining Project was in part initiated to test a method of assessing and strengthening governance in the area of forest-mining interactions, **Section 7** finally provides a brief assessment of the method.

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<sup>1</sup> [www.environmentalgovernanceprogramme.org](http://www.environmentalgovernanceprogramme.org)

<sup>2</sup> The expansion or introduction of new mines in forested areas causes degradation and fragmentation of intact forests. These forests with limited human development, are large in size; have much higher resilience, high biodiversity and ecosystem service values; and support higher carbon capture and storage than similar fragmented or disrupted forest areas.

## 2. Forests and Mining – the Zambian Context

### 2.1 Forests and Deforestation in Zambia

Forest cover in Zambia comprises 44.8 million hectares, or 60 % of the total land area (FAO, 2020a). The Miombo woodlands represent the most extensive type of woodland, covering almost the entire country. These woodlands are distinguished by the prevalence of tree species that have adapted to Zambia's seasonal rainfall patterns and typically thrive in arid regions. In the southern and western regions of Zambia, the Mopane woodlands prominently feature the mopane tree, which flourishes in hot and arid conditions, while teak woodlands are primarily situated in the drier regions of western and southern Zambia. In the southwestern expanses of Zambia, the Kalahari woodlands are specially adapted to the semi-arid conditions of the Kalahari Desert. In close proximity to major rivers, one encounters riverine forests renowned for their diverse species, including ebony, mahogany, and various types of fig trees. Riparian woodlands fringe the banks of smaller rivers, streams, and water bodies, and are typically characterized by species such as acacias, eucalyptus, and various shrubs well-suited to the damp conditions along watercourses. These forests and woodlands across Zambia house a wide range of forest values and provide for significant ecosystem services, as further described in Appendix B and summarised in Section 4.2.

Zambia has 480 forest reserves of which some two thirds are classified as Local Forest and about one third is classified as National Forest, and together they cover approximately 7.1 million ha (Turpie, Warr & Ingram, 2015). National Forests are functionally categorised as production forests which are managed for the production of forestry goods and services, and protection forests which are maintained as conservation areas (FAO, 2020b). Local Forests are principally established for community needs and use, and their management may be assigned to either community or joint forest management committees (see further below). Apart from forest reserves, Zambia has 20 National Parks and 36 Game Management Areas, in total covering some 21 million ha, where different levels of forest management and conservation apply.



Riparian forest along the Kafue River in the Copperbelt. Forests cover about 60 % of the total land area in Zambia.

The high rate of deforestation in Zambia has led to significant landscape fragmentation and loss of biodiversity value (Syampungani, Geldenhuys & Chirwa, 2016). In 1972, 48 % of Zambia was covered by primary forest and 16 % was covered by secondary forest while by 2016, primary forest had decreased by 32 % and secondary forest increased by 23 % (Phiri et al., 2019). Although forests have been recovering, these recovery rates are markedly lower than deforestation rates, estimated between 167,000 and 300,000 ha per year, and representing some 0.3–0.6 % of the total forest area (Ngoma et al., 2020). Deforestation and forest degradation also occur within forest reserves. By 2011, it was estimated that less than half of the forest reserves could be considered free from these threats, with more than 280,000 hectares of forest having been de-gazetted or excised to allow for other types of land use, including mining (GRZ, 2012).

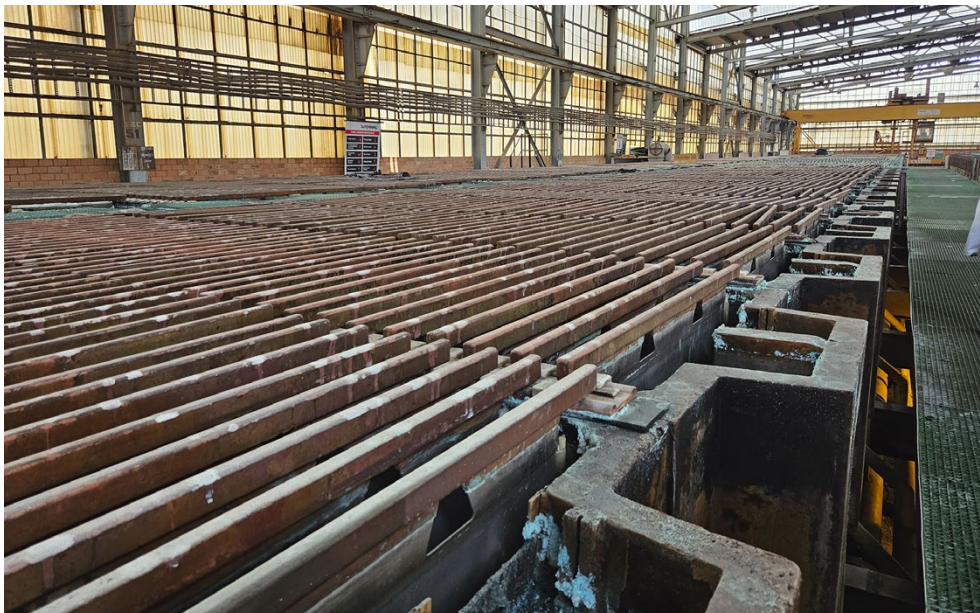
The proximal drivers of deforestation and forest degradation in Zambia include primarily agricultural expansion, charcoal production, wood fuel, timber extraction, bush fires, mining, and infrastructure development, while the underlying causes on one hand include high poverty levels, population growth and economic gain, and on the other hand weak implementation of policy and law leading to unplanned land use changes (e.g. Chomba et al., 2012; CBD, 2015a).



## 2.2 Mining in Zambia

The modern history of mining in Zambia commenced in the 1920s with the establishment of the first commercial copper mine in Luanshya on the Copperbelt. Foreign investment, mostly from the United States and South Africa, then drove major expansion in the copper industry between 1924 and 1969 (Sikamo et al., 2016). In the early 1970's, a few years after independence (in 1964), the state-owned Zambia Consolidated Copper Mines (ZCCM) was formed and the mining sector was gradually nationalised. In the late 1990's, a process of divesting the state-owned mines started and at this time the country also opened up for foreign companies to undertake exploration and mining. Today, the Zambian state retains some ownership in the larger mines through ZCCM-IH as well as full ownership of the Mopani Copper Mines on the Copperbelt since 2021<sup>3</sup>.

Zambia is the second largest copper producer in Africa and the seventh largest worldwide (International Copper Study Group, 2022) and the mining sector, and in particular copper mining, is of significant importance to the Zambian economy. In 2021 it was estimated that mining contributed about 10 % to GDP (ZEITI, 2023). The total collected revenue from the industry was ZMW 38.9 billion equivalent to 39 % of national revenue and the sector accounted on average for about 77 % of export earnings. Copper accounted for over 90 % of the sector exports. The mining sector is also an important employer with direct employment standing at about 66,500 in 2021, representing just over 2 % of the national number of employees for that year (ZEITI, 2023). Multiplier effects (indirect and induced) would furthermore raise this number significantly.



Copper export is by far the most important foreign exchange earner in Zambia accounting for some 70 % of Zambia's export by value. Electrolytic refining at Mopani Copper Mines, Mufulira.

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<sup>3</sup> After privatization, ZCCM was turned into an investment holding company (ZCCM-IH) that is now a listed company, with the Zambian state indirectly being the majority shareholder. ZCCM-IH are currently in the process of seeking investors for a takeover of MCM (e.g., [www.reuters.com/world/africa/four-firms-shortlisted-race-buy-zambias-mopani-copper-mines-sources-2023-06-20](http://www.reuters.com/world/africa/four-firms-shortlisted-race-buy-zambias-mopani-copper-mines-sources-2023-06-20)).

In 2022, the Zambian government vowed to increase copper production from the current 830,000 metric tonnes to 3,000,000 tonnes per annum in the coming decade (GRZ, 2022). This target will likely require that Zambia expands its mining activities into previously unexploited areas, which raises concerns about the potential increase in mining-related deforestation.

Apart from copper, many other minerals are mined in Zambia, including nickel, cobalt, iron, gold, manganese, a variety of gemstones, industrial minerals, as well as energy minerals such as uranium, coal, and hydrocarbons (Zambia Development Agency, 2015). Attempts to diversify the mineral sector have, however, not yet been very successful.

## 2.3 Mining-Deforestation Linkages

Deforestation is a major impact of mining on nearby ecosystems, and it is the most clearly measurable impact in terms of scale and time (Werner et al., 2019). Within the mining lease boundary, direct negative effects on forests are related to the development of open pit or underground mine sites, the development of tailing dams, waste rock dumps and processing plants, as well as infrastructure such as haul roads, power lines etc. Additional infrastructure such as buildings, railway lines, and access roads lead to further forest clearance beyond the mining lease boundary. Air pollution caused by tailings dust deposition and emissions from smelter stacks may also cause adverse effects on ecosystem health and forest surrounding a mine site (e.g., Fraser & Lungu, 2007).



Revegetation with adequate floral species, as determined through informed decision making together with post-mining land users, forms an important part of mine closure and rehabilitation. The slope of a tailings dam in the Copperbelt with recently planted seedlings.

The impacts of mining can also encompass indirect effects related to in-migration of people to mining areas in search of economic opportunities that instead, or additionally, have to rely on forest resources such as wood fuel and wood for charcoal production. In addition, forest is cleared to provide for farm land. The effects are also often exacerbated through the establishment of new roads related to mining projects that facilitate access to otherwise “undisturbed” areas. Thus, the population pull effects of mining can create significant pressure on forests through in-migrants’ need for infrastructure, housing, construction timber, fuelwood, charcoal, and land for agriculture (Mwitwa et al., 2012; Siqueira-Gay et al., 2022; World Bank, 2019a).

While agricultural expansion and charcoal production are often cited as the main driving forces for deforestation in Zambia, they are related to mining in several ways, apart from the effect of in-migration. The mining industry contributes indirectly to the demand for charcoal due to its substantial energy consumption, at 51 % of total generated electricity in the country (Ministry of Energy, n.d.). This is due to the fact that mining operations are given priority during electricity load shedding, resulting in an increased demand for charcoal elsewhere – in rural areas as well as in urban areas where most of the charcoal is consumed. Furthermore, roads constructed at mine development are often subsequently cleared for charcoal production and agriculture. Additionally, when prospecting or mining sites are abandoned, it is common for other forms of extractive land use, such as agriculture, to take place due to the previously cleared land (Elias, 2011).

Finally, mining can also result in the downgrading, downsizing, and degazetting of protected areas (Edwards et al., 2014; Golden Kroner et al., 2019). This can occur due to the issuance of mining licences, which may allow mining operations within (previously) protected areas (Edwards et al., 2014; Mwitwa et al., 2012). The combined effects of mining-induced land reclassification and population shifts pose significant challenges to the conservation and preservation of protected forests (Edwards et al., 2014; Mwitwa et al., 2012).



### 3. Project Scope

The core part of the study consists of a review of policy, legislation and regulatory processes governing mineral sector development in Zambia, with a specific focus on aspects that are of importance from a forest conservation perspective. Thus, a broad appraisal of mineral/environmental/forest sector policy, law and institutional responsibilities was performed while the mining and environmental permitting process was mapped out and assessed in greater detail (Appendix C).

The regulatory review was underpinned by a satellite imagery study of deforestation (Appendix A) and a literature study of forest values (Appendix B). The aim of the literature study was to synthesise existing research and develop a holistic understanding of forest values in the Zambian context. A systematic approach was utilised to explore forest values, encompassing economic, ecological, spiritual, cultural, livelihood, recreational, educational, historical, aesthetic, and inherent/intrinsic dimensions. Literature was sourced from multiple scholarly databases and search results underwent a screening process to arrive at a selection of relevant and credible studies aligned with the study objectives and forest value categories.

The primary aim of the satellite imagery study was to visually depict the extent of deforestation caused by mining activities, as well as to highlight spatial interactions with forest reserves. The Hansen Global Forest Change dataset provided the foundation for classifying forest cover extent and quantifying deforestation (Hansen et al., 2013). Forest reserve Shapefiles were sourced from The World Database on Protected Areas (WDPA) (The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and International Union for Conservation of Nature (IUCN), 2023). OpenStreetMap served as the base layer to establish the geographical context of Zambia and define Regions of Interest (ROI) for analysis, and Google Earth images were used to delineate active mining areas. The study's focus was on discerning spatial patterns and relationships, not establishing causal links between mining activities and deforestation.

Stakeholder consultations in the form of key informant meetings, semi-structured discussions with individuals and stakeholder groups, and multi-stakeholder workshops were held for results verification, discussion and proposals for strengthened governance (Appendix D). As stakeholder consultations were initiated at the start of the project, the report has benefitted from an iterative process of revisions and improvements based on stakeholder contributions.

Three multi-stakeholder workshops were held, each designed to serve a specific purpose and involving a diverse range of stakeholders. An initial consultative meeting was held in Lusaka in April 2023. This workshop was attended by a select group of participants representing key regulatory agencies and departments. Its primary objective was to present reviews of the policy and legal framework and the mapping of permitting processes for verification and discussion. A second workshop was held in Solwezi, North-Western Province in June 2023. The second workshop had a broader scope, bringing together representatives from regulatory agencies, mining associations, academia, and included a field trip to Ntambu to explore community forest management. A final workshop was then held in Lusaka in August 2023 with wider stakeholder participation, including regulatory agencies, mining companies, community representatives, academia and civil society representation. Its overarching goal was to present the preliminary outcomes of the project, and to further discuss causes of deforestation related to large-scale mining projects, permitting and oversight processes, gaps in legislation, and proposals for improvement.

## 4. Summary of Project Outputs

This section provides summaries of the results of the three main components of the project, including the satellite imagery analysis (Section 4.1), the literature review of forest values (Section 4.2) and the review of the policy and legal framework, including more detailed mapping of permitting processes (Section 4.3). Full accounts of these study components are provided as appendices.

### 4.1 Satellite Imagery Analysis

The satellite imagery analysis investigated the relationship between mining activities and deforestation in Zambia through a descriptive study using geographic information system (GIS) tools.

The North-Western Province is Zambia's most densely forested region, with approximately 80 % of the area covered by mature Miombo woodlands (GRZ, 2016; URS, 2012). The province hosts three of Africa's largest copper mines. Two of these mines (the Lumwana and Sentinel copper mines) present a valuable case for examining the relationship between mining and deforestation. This is largely due to the availability of satellite imagery data that predates the issuance of the mining licences for these mines, which enables the observation of the changes in the landscape over time, from the period before mining activities began to the present day. Therefore, both the direct and indirect impacts of mining on surrounding forests can be studied.

Figure 1 portrays forest loss over the time period 2002–2005, which predates the commencement of construction of both the Lumwana and Sentinel mines. This map thus serves as a baseline for understanding the extent of deforestation that has occurred in the region. Forest loss, highlighted in red, shows a scattered pattern of deforestation, likely attributed primarily to various local uses of the forests. However, the population density is relatively low and access to forests through roads is limited, leading to a relatively low level of deforestation. The nature reserve polygons in Figure 1 represent National Forest reserves, revealing that the Lumwana mine will be established in an area designated for forest conservation and that Sentinel mine will be established in close proximity to one.

Figure 2 demonstrates the deforestation that occurred during the years 2006–2009 coinciding with the initial construction of the Lumwana mine, which commenced in December 2005 and commercial copper production was achieved in April 2009. Forest loss associated with mine construction, for example open pit development, processing plant, overburden and waste rock dumps as well as access and haul roads, is clearly visible. It also becomes evident that the scattered pattern of deforestation outside of the mine area has increased slightly compared to the pre-establishment period.

Figure 3 displays the deforestation that took place during the period 2013–2016, largely overlapping with the initial/main construction phase of the Sentinel mine,

which began in June 2012 and the mine started operating in September 2015. Deforestation related to mine construction at Sentinel, including the open pit development, haul roads, processing plant etc., and the round outline of the tailings storage facility in the northern part of the mine area, is clearly visible. At Lumwana, expansion of the mine resulted in further deforestation. The lined patterns of forest loss outside of the mine areas signify the construction of power lines and roads, the latter contributing to increased access to new areas of land and forests. Once again, there is a noticeable rise in scattered deforestation outside of the mine areas.

Figure 4 reveals the forest loss in 2017–2020. Deforestation occurs within both mine areas due to mine expansion and continued production that for example requires additional ground for tailings and waste rock disposal. Additionally, a rather large increase in scattered deforestation outside of the mine areas is evident.

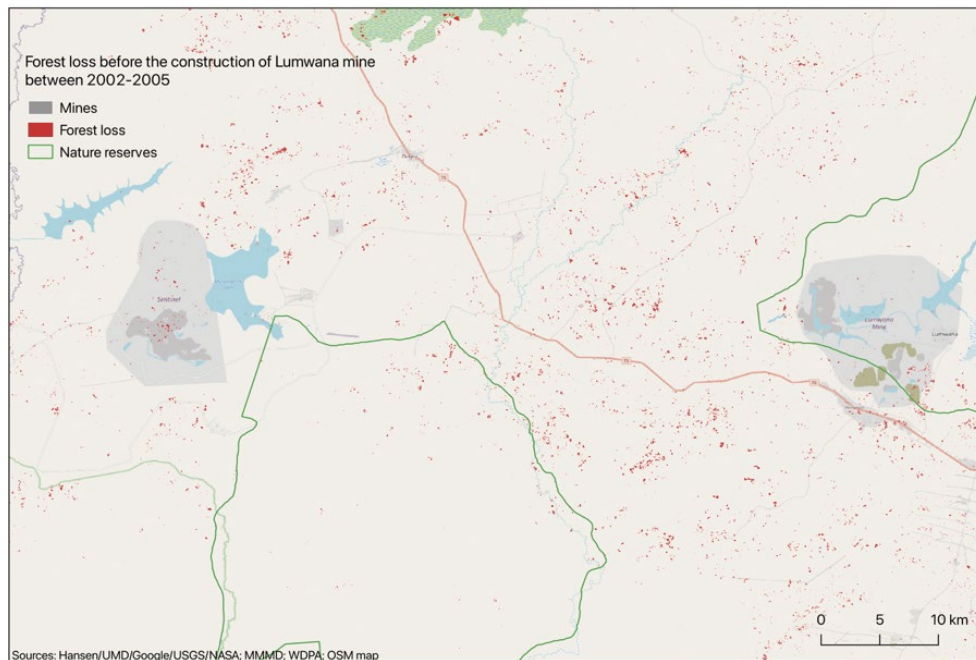


Figure 1. Forest loss in the area of the Lumwana and Sentinel mines between 2002 and 2005, i.e., prior to the construction of the mines. Grey areas indicate the approximate current outline of the mining operations, Sentinel to the west and Lumwana to the east.

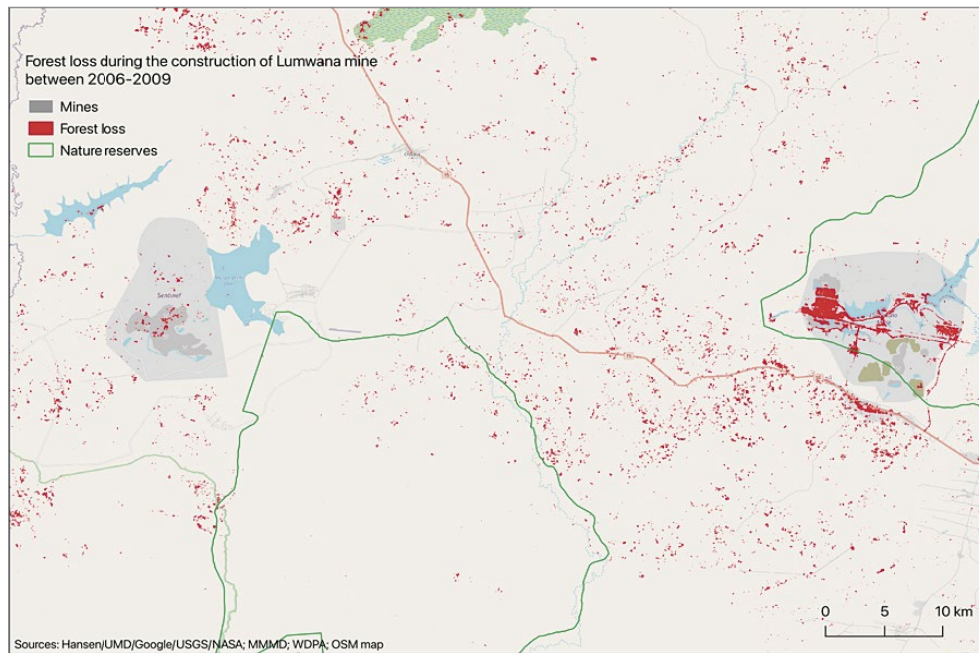


Figure 2. Forest loss between 2006 and 2009, coinciding with the initial construction of the Lumwana mine.

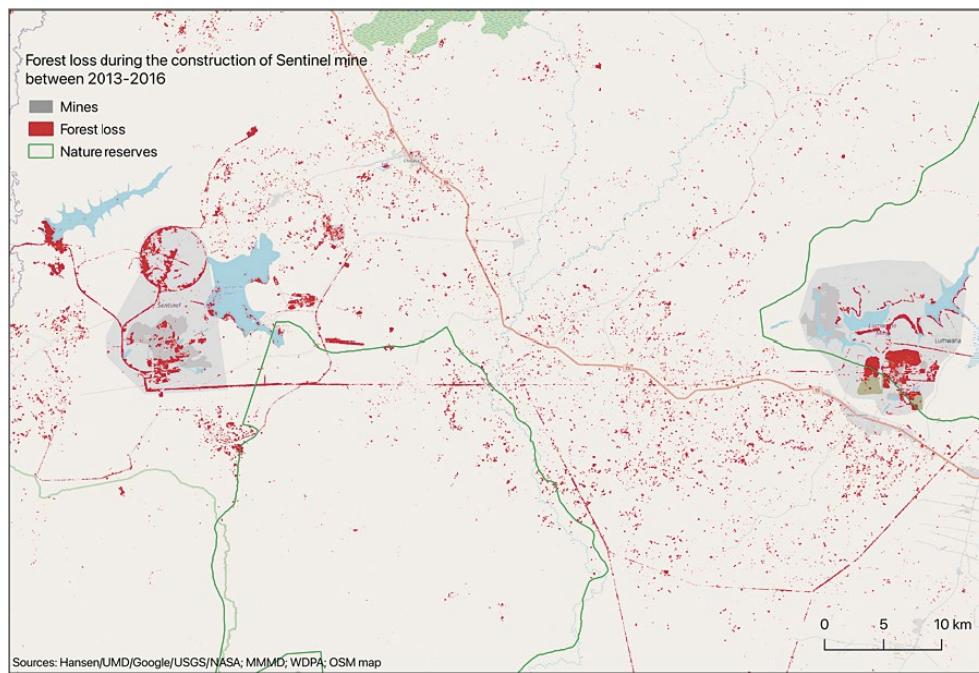


Figure 3. Forest loss between 2013 and 2016, largely overlapping with the initial construction of the Sentinel mine. Note: The forest loss (curved line and slightly larger patches) to the west-northwest of the Sentinel mine is related to the development of the Enterprise nickel deposit.



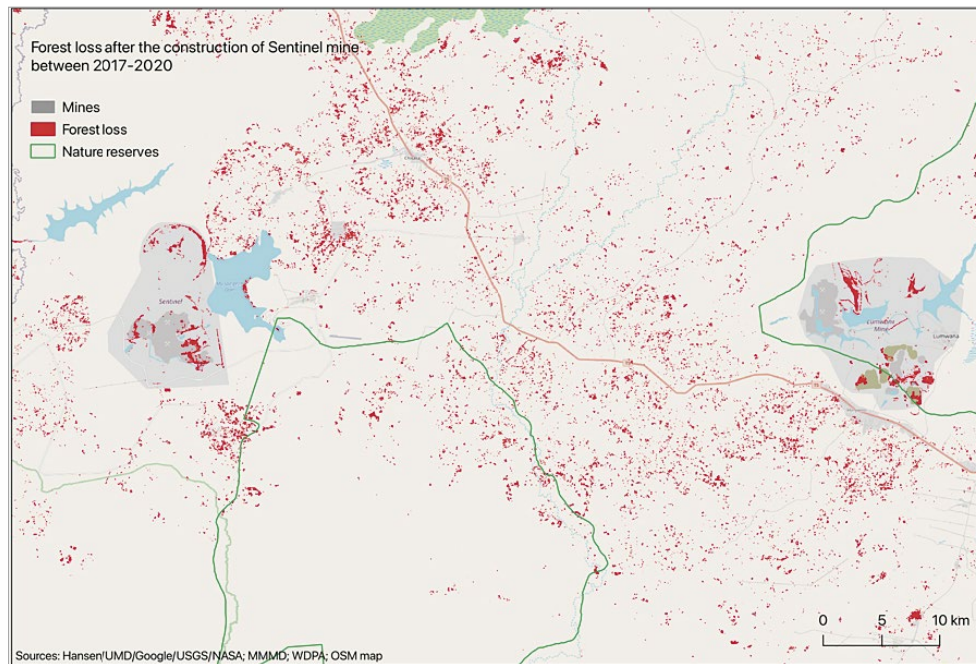


Figure 4. Forest loss from 2017, when the mines had been in production for about 7.5 years (Lumwana) and 1.5 years (Sentinel), to 2020.

By comparing the baseline map (Figure 1) with the subsequent maps (Figures 2 to 4), the influence of mining on forest loss, both directly and indirectly, becomes evident. The direct effects of mining, i.e. forest clearance within the actual mining area, can be easily verified and tied to different activities and mine components by comparison with (for example) Google Earth imagery and, to gain even more information, through on-site visits. This is also true for longer linear observations of deforestation outside of the mine areas (roads and power lines).

Direct impacts from mining in the form of forest loss within a mine area can and should be managed and mitigated as part of a company's Environmental Management Plan and Mine Closure Plan, and overseen by the relevant authority(ies) – in Zambia, the Mines Safety Department of the Ministry of Mines and Mineral Development and the Zambian Environmental Management Authority (see further below). The mitigation hierarchy<sup>4</sup> should be adhered to and even if impacts in terms of deforestation cannot be avoided or kept minimal, adequate management in combination with compensation and restoration plans can go a long way to mitigate impacts.

Assessing forest loss outside of mine areas is not as straightforward. While satellite imagery alone cannot provide a comprehensive understanding of the underlying causes driving the observed patterns, the combination of satellite imagery analysis and the existing body of knowledge allows us to make reasonable assumptions regarding the factors contributing to the observed patterns of deforestation. Thus, it is well known that large mines in rural areas result in in-migration that puts an

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<sup>4</sup> The mitigation hierarchy is a structured approach used in environmental and resource management that prioritizes actions in the following order: avoidance, minimization, remediation, and offsetting, with the goal of minimizing or compensating for the negative impacts of human activities on the environment.

increased pressure on forests and forest resources (e.g. World Bank, 2019a) and this is also acknowledged by the Zambian policy framework (see below). Furthermore, Sonter et al. (2017) found that, in general, deforestation around mining leases was 12 times more prevalent than within the leases. While a detailed quantitative or causal analysis has not been performed, with for example a reference area further away from the mine areas, the significant increase in scattered deforestation over the periods of construction and continued production of the mines suggests that increased human activity and infrastructure development are contributing significantly to deforestation in the surrounding areas and even encroaches on forest reserves.

Mitigating impacts related to in-migration (cf. Section 2.3) is more challenging because of the often significant scale (several thousand people), cultural perspectives (people migrating from other regions), and the common lack of strategic planning for the overall development of new mining areas/regions. It is also often not clear how responsibilities are divided between the developer and the Government with regards to the management of in-migration.



Infrastructure built to facilitate mine developments contribute to direct deforestation and provide easy access to previously undisturbed forest areas that in turn leads to in-direct deforestation through for example agriculture and charcoal production. Road in the North-western Province constructed to serve the mining industry.

## 4.2 Forest Values

Forests have been cherished and valued by humanity for centuries while the nature of this appreciation is far from uniform; it varies significantly across time and space. From remote ancient traditions to modern economic systems, forests have held a complex and ever-evolving significance in the eyes of humankind.



In Zambia, forests hold a multi-faceted significance that extends beyond their mere existence as collections of trees and animals. These natural landscapes are integral to the country's economic, social, and cultural development. They provide tangible benefits such as timber, non-timber forest products, and employment, while also serving as essential regulators of water cycles, carbon storage, and erosion prevention. The importance of forests in Zambia transcends material gains. They are deeply ingrained in the cultural fabric of the country, offering sustenance, medicinal resources, and materials for traditional practices and ceremonies. Forests are also home to sacred sites and ancestral spirits of important cultural and spiritual value.

This multifaceted value is categorised into various aspects. Ecologically, forests combat climate change, nurture biodiversity, regulate the water cycle, and stabilise soil (CBD, 2015b; FAO, 2021; Turpie et. al., 2015). Economically, they contribute significantly to the GDP<sup>5</sup>, and household's cash income and subsistence (Kazungu, 2021; Turpie et. al., 2015; UN-REDD, 2015; World Bank, 2019a). Moreover, forests play a vital role in sustaining communities, providing nourishment and alternative sources of protein, especially for those in need (CBD, 2015b; Dlamini & Samboko, 2017; Zulu, Ellis, & Culham, 2019; Ickowitz et al., 2021; World Bank, 2019b). Culturally, forests are repositories of tradition, housing materials for crafts, instruments, and acting as venues for gatherings (Chileshe, 2020; Kanene, 2016; Mugunga & Mugumo, 2013; TESSA, 2023). Spiritually, they are sacred places intertwined with rituals, traditions, and ancestral beliefs (Dafni, 2007; Kanene, 2016; Posey, 1998).



Forests are of essential importance for nature and climate preservation through for example the sequestering and storing of carbon, water cycle regulation, and erosion prevention. The upper parts of the Kafue River.

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<sup>5</sup> An analysis by Turpie, et al (2015) estimates that the direct and indirect values of forests (excluding the market value of carbon) make a direct contribution equivalent to about 4.7 % of gross domestic product (GDP) or US\$957.5 million (using 2010 figures).

Forests in Zambia also carry diverse values that are underrepresented in available information. Thus, they likely play an important role in shaping the country's cultural identity and hold historical significance. Additionally, these natural landscapes serve as valuable educational settings for learning about forest ecology, climate change, traditional knowledge, and livelihoods. Furthermore, Zambia's forests offer abundant recreational opportunities, including hiking and wildlife observation, and they are a source of aesthetic pleasure, contributing to well-being and happiness. Their non-use value extends to the assurance of their existence for future generations and their cultural significance (Chileshe, 2020). In summary, forests in Zambia are repositories of diverse value, encompassing economic, ecological, cultural, spiritual, historical, educational, aesthetic, recreational, and intrinsic dimensions.



Forests in Zambia carry highly diverse values of both global and local importance, from upholding resilience against climate change impacts to the provision of a range of ecosystem services.

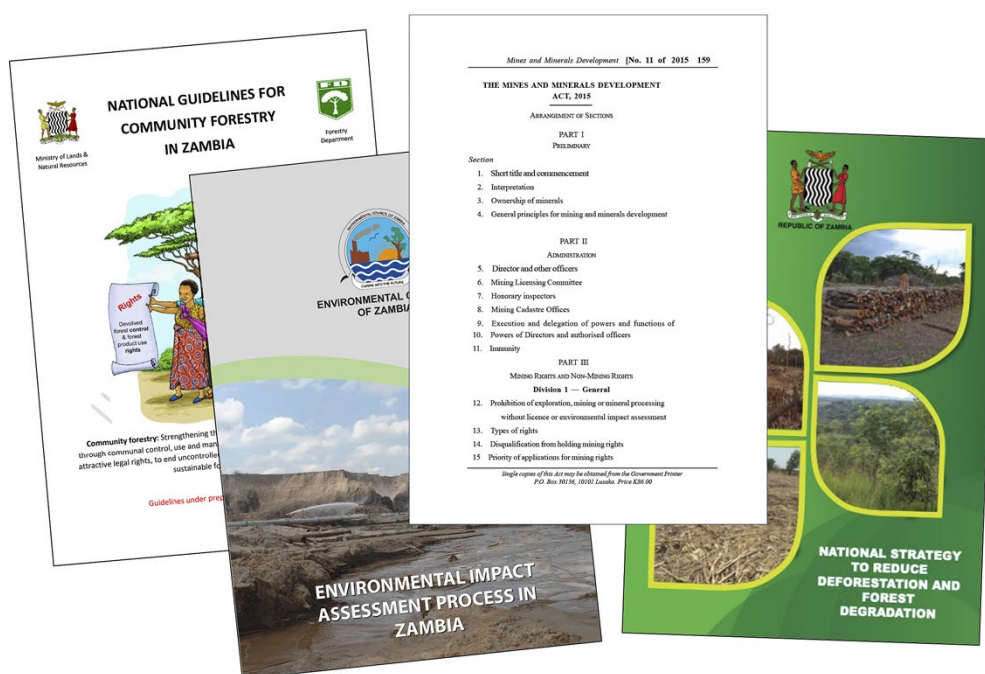
The high rate of deforestation in Zambia (cf. Section 2.1) can have profound and detrimental effects on natural forest ecosystems and their multifaceted importance, and it is well known that mining can contribute to deforestation directly, and also indirectly through in-migration of people from other regions or even countries (cf. Section 2.3). In this regard, apart from a generally increased pressure on forest resources, newcomers may not be accustomed to the local forest values and may not share the same cultural, spiritual, and historical connections to the forests as the local population, resulting in the prioritisation of short-term economic gains over the long-term sustainability of the forests. This disconnect from the forests' intrinsic and cultural values can result in, for example, the neglect of traditional conservation practices and a lack of respect for sacred sites. As a result, mining-related deforestation may pose a serious threat to the rich tapestry of forest values in Zambia, exacerbated by the complexities of in-migration.



## 4.3 Policy, Legislation and Permitting Processes

This section initially provides a review of the policy, legal and institutional framework for mineral sector governance with specific focus on forest considerations, followed by a more detailed presentation of the permitting process for large scale mining in Table 1.

Zambian mineral, environmental and forest policy development has rather comprehensively considered not only environmental protection at large, but also forest protection more specifically. For example, the previous Mineral Resources Development Policy (GRZ, 2013) specifically prescribed the gazetting of forests and the implementation of measures for better management of exploration and mining within these areas. The forest policy framework also establishes that forests are impacted by mining both through direct land claims and indirectly through in-migration to mining areas with the impact chiefly driven by poverty, population increase and forest dependency. Furthermore, the National Strategy to Reduce Deforestation and Forest Degradation (CBD, 2015a) specifically defines weak protection of the environment and forests in mineral sector governance as an issue, and defines a number of strategic interventions aimed at improving legislation and institutional performances. Thus, both causality and governance issues have been clearly defined and there exists a rather coherent policy base for legal and institutional strengthening aimed at improved governance of mining-forest interactions.



A coherent policy and legal framework with clear institutional roles and responsibilities, also guiding institutional collaboration, provides a base for successful environmental and natural resources governance.

Mineral exploration and mining are primarily governed by the Mines and Minerals Development Act of 2015 (MMDA) (GRZ, 2015a), which is implemented by the Ministry of Mines and Minerals Development (MMMD). Accordingly, the act provides for the application of *mining rights*, which includes large scale exploration and mining licenses. Applications are assessed and licenses granted by the Mining Licensing Committee<sup>6</sup>, and further sector governance is based primarily on the Mines and Minerals Development (General) Regulations, 2016 (GRZ, 2016a).

The MMDA includes some general provisions on environmental and forest protection while this is chiefly provided for through reference to the Environmental Management Act (GRZ, 2011) and the Forests Act (GRZ, 2015b). The MMDA also stipulates that approvals from both the Zambian Environmental Management Authority (ZEMA) and the Forestry Department of the Ministry of Green Economy and Tourism are required for exploration and mining to commence. Some environmental oversight, however, remains with the MMMD through the Mines and Minerals (Environmental) Regulations (GRZ, 1997a). These regulations are primarily enforced by the Mines Safety Department (MSD) of the MMMD. While these regulations are broadly aligned with the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations (GRZ, 1997b) (the EIA Regulations; see further below), they also incorporate a range of mine-specific provisions. Moreover, variations exist between the two sets of regulations in terms of content requirements, application/assessment process, and institutional responsibilities.

Forest sector policy has developed substantially in recent years in conjunction with the implementation of the REDD+ programme, which the country joined in 2009. A policy focus on decentralization of governance and an increased role of communities in forest management is reflected in the Forests Act of 2015, and further implemented through the Forests (Community Forest Management) Regulations (GRZ, 2018a).

National Forests and Local Forests, as defined in the Forest Act, both serve to secure important forest resources, protect ecosystems and biological diversity, and to improve forest resources management and utilization<sup>7</sup>. Additionally, National Forests are established to facilitate the management of major water catchments and head waters. An important purpose of Local Forests is to meet the social, cultural and economic needs of the local community. The objectives of National and Local Forests are to be achieved through the control of forest use and activities based on permits and associated conditions. Thus, National Forests, located on state-owned land and managed by the Forestry Department<sup>8</sup>, may not be entered without a licence or permit. With regards to Local Forests, a range of activities, such as land cultivation, grazing of animals, removal of forest products etc. are not allowed without relevant permits or licences. Management of Local Forests may be assigned to either a local community or joint forest management committee<sup>9</sup>.

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<sup>6</sup> Committee members include the directors of four of the ministry's departments (Mines, Geological Survey, Mines Safety and Mining Cadastre), one representative from each of four ministries (environment, land, finance and labour), the Attorney-General, the Zambia Development Agency, and the Engineering Institution of Zambia, all as appointed by the Minister of Mines.

<sup>7</sup> Other forest types are also defined in the Forests Act, including Botanical Reserves and Private Forests, while these are of lesser importance to the current project and thus not further considered.

<sup>8</sup> The Forestry Extension Branch of the Forestry Department is responsible for forest law enforcement and operates at provincial, district and in some cases sub district level.

<sup>9</sup> According to Forestry Department staff, there are several hundred registered community forest management groups in Zambia.

The Forests Act provides for the exercising of rights issued under other legislation, as long as activities do not contradict the provisions of the Forests Act. In this regard, mining is the only right/activity that is explicitly mentioned in the Forests Act to be allowed within National and Local Forest areas, which may reflect the overall importance of mining to the Zambian economy (cf. Section 2.2). Overall, national and local forests are therefore not protected areas in the sense that there is a strong restriction to activities, but the focus is instead on ensuring that any use is sustainable through adequate environmental management. While National Parks and Game Management Areas are not centrally considered within this project (cf. App III for brief information on NPs and GMAs), it is noted that the application of mineral exploration and mining licences is permitted also in these types of protected areas.

Environmental governance in Zambia is principally based on the Environmental Management Act (EMA) of 2011, an umbrella law providing for integrated environmental management and the sustainable management and use of natural resources that includes the concepts of both Environmental and Social Impact Assessment (ESIA) and Strategic Environmental Assessment (SEA). While the latter tool has not been utilised in relation to mineral sector development, the ESIA process is of central importance to the co-management of mineral and forest resources.

The EMA establishes ZEMA, which is assigned with wide ranging responsibilities to ensure the sustainable management of natural resources, protection of the environment, and the prevention and control of pollution. Thus, ZEMA oversees the implementation of the ESIA process in accordance with the Environmental Impact Assessment (EIA) Regulations of 1997. Even though the EIA Regulations were enacted some 25 years ago, they do include most of the basic components of modern ESIA processes such as both environmental and social considerations, stakeholder consultations and participation, resettlement and compensation, etc. ZEMA also assumes audit and inspection responsibilities as part of the oversight of industry environmental performances. With the MSD of the MMMD also being responsible for environmental oversight of the mineral sector (see above), institutional roles in the management and supervision with regards to the EIA process as well as environmental oversight is not clear.



Mineral sector supervision and regulation has a significant challenge in providing for the sustainable co-existence of mining, natural ecosystems and people, requiring both institutional collaboration and inclusive and informed decision making. A vegetable garden with miombo plants in the background, located next to a Copperbelt mine.

In addition to the democratically elected governments and institutional governance, traditional authorities headed by Chiefs command significant political authority, and customary law plays an important role especially in the rural areas of Zambia. Most of the land in Zambia falls under customary tenure<sup>10</sup>, where Chiefs act as trustees on behalf of communities and grant occupancy and use rights, while headpersons administer customary land at the village level on a day-to-day basis. Chiefs also play a crucial role in development in the Chiefdom, serving as the primary point of contact for the delivery of public/state resources and private investment. This means that most exploration and mining projects in Zambia will need to consider both statutory and customary law, the latter in particular when it comes to land access and land use rights.

Table 1 below shows the permitting and oversight process for large-scale mining projects based on provisions of the Mines and Mineral Development Act, the Mines and Minerals (Environmental) Regulations and the Environmental Impact Assessment Regulations, with some reference to other legislation. Similar presentations of exploration and mine closure permitting and oversight is provided in Appendix C. Key takeaways from the regulatory study are presented in Section C4, and provide much of the basis for the Key Findings and Recommendations and Proposals for Continued EGP Programming presented in Sections 5 and 6 below.

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<sup>10</sup> Estimations range between 60–94 %, depending on whether large tracts of protected areas (National Parks and National Forests) are considered to be customary land or state land.

**Table 1. Step-by-step account of the permitting/oversight process for large-scale mining. Line colouration denotes primary sector authority/stakeholder responsibility, as follows: Blue – mineral sector; Green – environmental sector; Brown – forestry sector; Yellow – land rights stakeholders.**

	Activity	Outcome	Responsible Authority	Referral/Support Authority	Time frame	Reference
1	Initial contact, supervision	Guidance on forest issues <sup>11</sup>	MCD, MSD, local authorities	FD, ZEMA	N/A	N/A
2	Mining licence application submitted	Registration	MCD	N/A	N/A	MMDA 30
3	Application assessment	Approval/rejection	MLC	N/A	90 days	MMDA 31
	<p><i>The Mining Licensing Committee (MLC) shall take into account: (i) that the proposed operation is compliant with an Environmental Project Brief or EIA decision letter approved by ZEMA (MMDA 31:1, c); and (ii) that the applicant has submitted evidence of any consent needed under any law (here the Forests Act and consent from the Forest Department) (MMDA 31:1, d)<sup>12</sup>. Thus, a Mining Licence should not be issued prior the submission of a decision letter from ZEMA and a written consent from FD to the MMD. However, in practice, mining rights (including both large-scale exploration and mining licences, see App. III for terminology details) are granted prior to evidence of such “approvals”. The licences are granted subject to those approvals being obtained after the granting of the mining right.</i></p>					MMDA 25:1(a)
4	Acquirement of land use rights	RAP, resettlement and compensation, if required, land surface rights	Traditional leadership, lease/user rights holders, communities, Disaster Mitigation and Management Unit	Local/district authorities?	N/A	MMDA 55:1; 57:1, also Constitution, Lands Act, Customary law, Local Courts Act etc.
	<p><i>The acquirement of land use rights for the purpose of mining is here treated in a very general way and the roles of various stakeholders have not been established in detail. Nevertheless, this process is largely managed by the proponent/mining company through consultations with local communities, as represented by the Chief. The process of acquiring land use rights commonly starts in parallel with the EIA process and its relationship to the main EIA process is likely to be of great importance for adequate environmental and social management, as discussed further in Section 5.</i></p> <p><i>According to MMDA 39:1, b, the MLC shall in their assessment of the application consider whether the applicant has title to land or written consent from surface right holder. Also, mining rights may not be exercised without the written consent of the chief and the local authority (MMDA 52:1, c). However, similar to the case of ZEMA and Forest Department approvals (cf. above), mining rights are in practice granted prior to the submission of evidence of land title and mentioned consents, subject to those being obtained after the granting of the mining right.</i></p>					
5	Environmental project brief submitted by proponent	Decision letter	ZEMA	MMMD (MSD)	40 days	EIAR Schedule 1 MMDA 31:1(c)

<sup>11</sup> For example, proponents may be provided with information on the presence of protected forest in the area, specific forest values, forest management plans, forest management groups for specific consultations etc. This activity is a proposal as, based on workshop discussions, it appears not to be standard procedure at initial contact. The proposal is more pertinent to mineral exploration, i.e. in the early stage of the mining cycle. Note: The (Draft) National Guidelines for Community Forestry (GRZ, 2018b) in Zambia promote awareness raising and sharing of information on community forestry groups and geographical areas with relevant (e.g., mining) authorities.

<sup>12</sup> MMDA 52(1): A holder of a mining right or mineral processing licence shall not exercise any rights under this Act without due compliance with the relevant provisions of the Forests Act, 2015 upon any land declared to be a National Forest, Local Forest, Botanical Reserve or Private Forest, as defined in that Act.

	Activity	Outcome	Responsible Authority	Referral/Support Authority	Time frame	Reference
6	Preparation of TOR for Environmental Impact Statement (EIS) <sup>13</sup> , including public consultations <sup>14</sup>	Internal approval/rejection	ZEMA	N/A	5 days	EIAR 8
7	Preparation of EIS, including public consultations <sup>15</sup>	Registration	ZEMA	N/A	N/A	EIAR 9, 10
8	EIS submission and review, including ZEMA public meetings/hearings if deemed required <sup>16</sup>	Decision letter	ZEMA	MMMD (MSD) FD	?	EIAR 14–21
9	Request for written consent submitted by proponent	Written consent	FD	N/A	N/A	MMDA 31:1(d)
10	Mining construction/activities may commence (depending on/in line with Decision letter from ZEMA and Written consent from the Forestry Department)					
11	Environmental audit by regulator <sup>17</sup>	Audit report	MSD	N/A	30 days	MMER II 8
12	Environmental audit by developer <sup>18</sup>	Audit report	ZEMA	N/A	12–36 months after start or end, or any time as required.	EIAR 28
13	Environmental inspection <sup>19</sup>	Inspection report	MSD	N/A	Any time	MMER VII 64
14	Environmental inspection <sup>20</sup>	Inspection report	ZEMA	N/A	Any time	EIAR 29
	<i>Inspection activity provided for by the Forests Act is concerned with forest activities, and there is no provision in that act requiring Forestry Department staff to carry out inspection in case of other industrial activities impacting on forests.</i>					

<sup>13</sup> The TOR shall be developed in cooperation with ZEMA and take into account issues contained in the 3rd schedule of the EIAR. These include for example biodiversity, landscape and land use/land potential but no direct reference is made to forests and forest values.

<sup>14</sup> Including Govt. agencies, local authorities, non-governmental and community-based organisations and interested and affected parties (EIAR 8:2).

<sup>15</sup> Publication of project effects and benefits for at least 15 days, followed by stakeholder meetings with communities.

<sup>16</sup> To facilitate broad review and comment, EIS copies are distributed to relevant ministries, local government units, parastatals, non-governmental and community-based organisations, interested and affected parties, and place in public buildings in the vicinity of the project site as well as newspaper notifications and radio broadcasts.

<sup>17</sup> For the purpose of checking EIS implementation and compliance, prepared by two independent competent persons; First audit within 15 months of commissioning of operation, thereafter as called upon by MSD.

<sup>18</sup> Carried out by at least two of the persons that prepared the EIS.

<sup>19</sup> To ensure that the mining operation does not have a severe impact on the environment and the records kept are in accordance with the MMDA and MMER.

<sup>20</sup> For the purpose of investigating the implementation of any measures in response to an environmental audit.



## 5. Key Findings and Recommendations

Zambia boasts a rich tapestry of forest ecosystems that span its geography, harbouring not only intrinsic and diverse forest values but also delivering a spectrum of vital ecosystem services (Sections 2.1, 4.2). These are, however, threatened by a comparatively high rate of deforestation and forest degradation that are fundamentally driven by poverty and regional underdevelopment, population increase and a dependency on forest resources (Sections 2.1, 4.3).

Mining development contributes significantly to deforestation, directly through land clearance and in-directly through the in-migration of people to mining areas searching for employment and/or other livelihood and economic opportunities (Sections 2.3, 4.1). These mining-related impacts on forests have unfolded over several decades in the Copperbelt Province (Section 2.2) while it is a relatively recent experience in the North-Western Province (Section 4.1).



Modern history copper mining commenced in the Copperbelt some 100 years ago. Today it forms a highly noticeable feature of the Copperbelt landscape and contributes to about 10 % of Zambia's GDP. Mineral waste structures and miombo forest in the Copperbelt.

Given mining's importance to the Zambian economy and plans for expansion (Section 2.2), there is a serious risk of further significant direct and in-direct deforestation related to mining, including in areas of pristine forest. This risk is

exacerbated by the fact that the legal and institutional regime for mineral sector governance does not provide sufficient safeguards for the conservation of forests and their diverse value (Section 4.3). Furthermore, there is an obvious deficiency in regional development planning ahead of mine developments and associated demographic change.

The continuation of this section presents, in more detail, some key findings and corresponding recommendations for governance strengthening that offer actionable pathways for addressing challenges and promoting sustainable practices. The recommendations are meant to, in various ways, contribute to the direct protection of forests, forest ecosystems and biodiversity. This will, in turn, also promote and protect human rights related to the importance of forest values and ecosystem services in Zambia, and serve to combat climate change and enhance climate resilience. In addition, human rights are considered more directly in recommendations aimed at promoting participation and informed decision-making among affected people as well as in the consideration of wider impacts of deforestation in areas surrounding mine establishments.

## 5.1 Early Intervention and Supervision in the Permitting Process

Mineral exploration companies commonly engage with regulatory authorities prior to submitting a licence application to inquire about for example the application procedure and its requirements. However, during this stage, or at the time of application submission, there appears to be a lack of comprehensive guidance provided to the developers in terms of the presence of protected forests in the area, forest values and the nature of forest management (e.g. community management or oversight by the forestry department). This type of information does exist in various formats, for example in Forestry Department records and in statutory instruments designating forests as protected areas. Offering developers timely access to this information, and related guidance, would facilitate the effective integration of forest management considerations into the mineral development project early in the mining cycle.

### **Recommendations**

- Compile and organize relevant information on protected forests, including coordinates, shapefiles, forest values, and forest management responsibilities.
- Establish, through institutional collaboration and communication, the most efficient way of providing this information to developers. For instance, the Mining Cadastre Department, often the first point of contact for developers, could provide data and guidance. Or this could be achieved through referral to the Forestry Department or ZEMA, or via an online portal with details about forest reserves, forest types, gazette status, forest values, management regimes etc. for viewing and/or downloading.
- Address resource limitations, such as the availability of computers and GIS competencies, especially within regional Forestry Department offices. Prioritize capacity-building initiatives to ensure that regional offices have the necessary skills and tools for effective supervision across various branches of the Forest Department.



## 5.2 Consideration of Forest Impact in the Land Acquisition and Resettlement Process

In addition to direct deforestation caused by mine establishments, the consequences of resettlement can impact forests and forest values negatively, contingent on the specific sites and scales of resettlement. According to the EIA Regulations of 1997, an Environmental Impact Statement (EIS) should describe impacts and their management/mitigation, including those associated with resettlement and its socio-economic ramifications. There are, however, no clear provisions within these regulations for evaluating the impacts on the biophysical environment and forests related to resettlement<sup>21</sup>. While such considerations should ideally be incorporated into risk-based environmental impact assessments, most EISAs predominantly assess resettlement in terms of its social, economic and cultural impacts. There is thus a risk that resettlement is not adequately considered in the ESIA process in terms of its potential impact on forests and forest values.

The direct impacts of mining on deforestation, and of a possible change in forest use related to resettlement, may be exacerbated by the fact that the land acquisition and resettlement processes principally involve the mining company and the local community, represented by the Chief<sup>22</sup>, and that the focus in negotiations tend to be on socio-economic issues.

### **Recommendations**

- Although local communities may be well aware of forests and the values associated with them, they may be less aware of values connected to forests in the resettlement area and less knowledgeable of the wider ecological impacts and long-term consequences of deforestation and changes in forest use. The provision of support to local communities and the Chief can enhance informed decision-making and facilitate the establishment of terms of agreements between developers and the local community that serve to protect both the forest ecosystem at large as well as forest values of importance to the community.
- Currently, Zambia lacks specific guidelines for resettlement and compensation associated with mining or other private sector developments. The development of guidelines, that also include environmental, forest and forest value conservation aspects may be considered.
- Ensure that, during the development of the Terms of Reference for the EIS, impacts on forest and forest values related to resettlement are comprehensively considered. In relation to this, ensure that the resettlement plan is established in a timely manner, allowing for the inclusions of forest-related effects in the EIS and ensuring that these effects can be properly considered by ZEMA in the decision-making.

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<sup>21</sup> In most ESIA's, environmental (and forest) impact assessments tend to focus only on the direct effects of the land claim for mining infrastructure, mining and mineral processing impacts, and related waste handling.

<sup>22</sup> Most mining projects in Zambia will be located on customary land.

## 5.3 Consideration of In-Migration in the EIA process

The connection between mining and deforestation is exacerbated by the occurrence of in-migration towards mining areas/regions, driven by aspirations for economic progress and improved livelihoods. This migration often triggers a chain reaction of adverse activities, such as increased deforestation due to unsustainable practices including slash-and-burn agriculture and charcoal production etc. These indirect effects of mining significantly contribute to the degradation of forest ecosystems and exacerbate the overall environmental impact.

Similar to the case of resettlement (point 2, above) the EIA Regulations require an EIS to consider in-migration, albeit with little provision of detail. Furthermore, in-migration is also typically assessed only in terms of social and socio-economic effects in ESIA's. Mitigating the impacts associated with in-migration is challenging due to the often substantial scale (involving several thousand people across extensive geographical areas, extending far beyond mining lease boundaries), diverse cultural perspectives (with people migrating from other regions), and the absence of strategic planning for the overall development of new mining areas or regions. It is also not clear how responsibilities are divided between the developer and the government with regards to minimizing negative impacts and enhancing positive impacts of in-migration.

### **Recommendations**

- The mitigation of negative impacts and the enhancement of positive impacts would benefit from the implementation of regional development planning, incorporating Strategic Environmental Assessments (SEA) and pre-emptive land use planning. The Environmental Management Act of 2011 stipulates that proponents of policies, plans or programmes with potential adverse environmental effects are obligated to conduct an SEA. SEAs are also integral to the approach to Forest Smart Mining (World Bank, 2019a). Moreover, in some other jurisdictions, SEAs are undertaken before the initiation of large-scale mining projects. While the EIA Regulations of 1997 require developers to consider the effects of in-migration, the ambiguous allocation of responsibilities and the typically large scale and complexity of in-migration, necessitate collaborative assessments and planning involving both developers and government entities. Related to this, enhanced forest monitoring and surveillance capabilities would support the implementation of SEAs (see point 7 below).
- The development of alternative livelihoods and the promotion of economic diversification are of key importance to counteract impacts on forest related to in-migration. Many larger mining companies with sufficient capacity (in Zambia and elsewhere) do implement significant programs in this regard, that are also often directly aimed at forest conservation, while other companies may have lesser capacity to implement meaningful programs. The establishment of guidelines for the development and implementation of livelihood programs could serve to enhance progress. The guidelines could leverage off the experience and networks of CSOs towards enhancing the knowledge of local communities with respect to alternative livelihoods, and also make use of "lessons learnt" by mining companies in Zambia.



Large mine developments are often associated with in-migration to mining regions resulting in forest degradation and deforestation at significant scales due to little planned and controlled livelihood developments. Kisasa town, Northwestern Province.

## 5.4 Integrating Forest Values and Forest Ecosystems Assessment in the Permitting Process

Forest values differ across time and space. In Zambia, forests hold significant and extensive values, providing essential ecosystem services throughout the country. However, a significant challenge arises in the permitting process for mining operations, where various forest values are often overlooked or inadequately addressed within the ESIA process. There is also no detailed regulation or related guidance in this regard. Forest values are often merely listed in ESIA's and, at best, subject to qualitative assessments to varying degrees. These forest values encompass cultural, economic, ecological, and social dimensions and represent an intrinsic part of the country's natural heritage. Failure to comprehensively incorporate these values into the EIA process can lead to various adverse consequences. Some examples include missed opportunities for sustainable income generation and job creation as a result of failing to account for the economic contributions of forests, such as non-timber forest products (NTFPs) and ecotourism. Another example could be the erosion of indigenous knowledge, traditions, and spiritual connections tied to these natural environments, potentially causing social tensions and disconnection from cultural roots. Addressing this issue is not only crucial for preserving the environment but also for sustaining the cultural and economic fabric of the country.

Current ESIA often oversimplify the treatment of forests and biodiversity, with assessment being limited to narrative descriptions of changes to forest cover and listings of threatened floral and faunal species in the area while the broader ecological composition, structure and function of forests are not adequately evaluated.

### **Recommendations**

- Develop or adopt established methods for both quantifying and qualifying forest values, such as economic valuation techniques and cultural impact assessments, enabling a more comprehensive understanding of their importance.
- Promote the integration of participatory mapping of forest values, involving local communities, into the ESIA process, to ensure the consideration of cultural and local knowledge related to forest values.
- Tailor ESIA requirements to the specific characteristics of an area. In regions with high cultural, economic, or ecological forest values, impose more stringent demands on mining projects to account for and mitigate their impacts on these values (see further next bullet). In this regard, promote collaboration with academia that house considerable knowledge in the area of forest values and ecosystem services.
- Establish more detailed guidelines for large-scale mining in forests. Mining in forests or ecologically sensitive areas requires significantly more comprehensive impact assessments compared to standard practices (e.g., World Bank, 2019a). Therefore, detailed guidelines could be developed to assist the industry to improve on ESIA, and for decision-makers to use as a tool in the assessment of ESIA of mining projects located in forested areas. These guidelines should incorporate Forest Smart Mining principles, addressing (i) forest ecosystems and biodiversity, (ii) the mitigation hierarchy, (iii) local knowledge and perspectives, (iv) ecosystem services valuation, and other relevant aspects.

## **5.5 Stakeholder Consultations in the EIA Process**

Stakeholder consultations in Zambia face hurdles that impact the quality of decision-making regarding mining activities, including their impact on forests and forest resources. The considerable influence of community Chiefs, along with potential language and literacy barriers, can lead to imbalanced viewpoints. Furthermore, the pursuit of economic opportunities may overshadow a comprehensive understanding of environmental and forest impacts, adding a layer of complexity to the decision-making process.

### **Recommendations**

- Integrate well-defined communication plans into the operational framework of mining projects, beginning with their inclusion in the TOR for the EIS and further elaborated in the EIS. These plans should outline strategies for transparently sharing information, addressing concerns, and fostering open and inclusive dialogues with stakeholders.
- Establish an independent body responsible for providing unbiased and comprehensive information about mining projects to local communities. This entity should ensure that information is presented in a clear, accessible, and culturally

appropriate manner. Alternatively, appoint local liaisons or intermediaries who are well-versed in mining impacts and community concerns. These liaisons can bridge the gap between technical information and local understanding, ensuring that the community's voice is accurately represented, or establish an independent monitoring mechanism that oversees stakeholder consultations. This entity can assess the fairness of the consultation process and provide recommendations for improvement.

- Establish guidelines for meaningful community consultations by developers. These guidelines could include proposals for communication methods, consultation strategies, tools to ensure effective understanding and participation for informed decision-making, and suggestions for involving CSOs/NGOs that can assist with community consultations, etc.



Tailings storage facilities may stretch across several kilometres. They may sterilize ground for decades and need to be well managed to reduce the risk of impacts on humans and the environment through for example dusting, seepage and dam failure. Stakeholder consultations should at an early stage inform mine design and planning, such as alternative locations of tailings storage facilities, also bearing forests and forest values in mind. Tailings dam in the Kitwe area.

## 5.6 Forest Monitoring and Surveillance

The challenge of inadequate forest monitoring and surveillance in Zambia arises as a significant obstacle in addressing deforestation, especially in the context of mining-related activities. Limited resources and an underutilization of readily available tools and data result in a lack of accurate and up-to-date information regarding forest changes, locations, boundaries, and types. This limitation enables illegal logging, encroachments, and unsustainable practices to go unchecked, leading to the accelerated loss of valuable forest ecosystems.

### **Recommendations**

- The current project has shown that basic-level assessment of both direct and indirect deforestation can be achieved using freely available satellite imagery analysis tools and data, such as QGIS, Google Earth Engine, The Hansen Dataset and Sentinel Hub. These tools can be used to monitor changes in forest landscapes in near real time.
- With the allocation of technical and human resources, mapping of deforestation and forest degradation can be enhanced by utilizing data with better spatial and spectral resolution. When combined with ground-truthing to verify the results of the satellite image analysis, this approach can facilitate targeted conservation efforts, sustainable forest management and land use planning.
- With time, consider establishing a national geospatial database encompassing polygon data for various forest types. This central repository can provide accurate forest boundary information to aid in monitoring and conservation efforts. Collaborative development, involving government agencies, environmental organisations, and research institutions can help consolidate efforts and minimise data duplication.
- The Forestry Department, the Ministry of Mines and Mineral Development and ZEMA could actively collaborate with the objective to use satellite imagery as a tool to monitor mining related impacts (direct and indirect) on forests.

## 5.7 Institutional Capacity and Mandates

An essential aspect in addressing deforestation linked to mining activities in Zambia involves fostering institutional capacity and refining mandates. The challenge arises from the current constraints in resource allocation to pivotal institutions, and the presence of overlaps and gaps within their respective mandates, issues that are also defined in Zambian forest policy. Insufficient funding, human resources, and technical expertise hinder these institutions' ability to carry out comprehensive monitoring, enforcement, and mitigation efforts. Due to these limitations, institutions also tend to unduly focus on their internal more detailed objectives, rather than the overall goals of sustainable development.

A more direct issue relates to the fact that there appears to be no mechanism for a central involvement of the Forestry Department in mineral and environmental permitting. While application assessments and permits issuance are the responsibility of the Mining Licensing Committee for mining rights and ZEMA for environ-

mental permits, the Forestry Department is merely involved as a reviewing institution<sup>23</sup>.

Furthermore, the mineral sector and environmental sector EIA regulations, implemented by the MSD of MMMD and ZEMA respectively, are largely overlapping but also somewhat inconsistent. In practice, ZEMA manages the ESIA process and the MSD assumes key responsibility for inspections and audits, while they rely on ZEMA for certain technical know-how regarding relevant issues. This creates room for both uncertainties around regulatory accountability and an inefficient use of resources.

### **Recommendations**

- The inclusion of the Forestry Department on the Mining Licensing Committee – rather than other institutions acting on their behalf – may be considered, depending on the project setting. In this way, forest impacts would be more efficiently addressed and evaluated in the assessment of mining rights applications and this may also provide for more constructive communication with applicants regarding forest management and conservation.
- Foster collaboration between different governmental agencies, including the Ministry of Green Economy and Environment, the Forest Department, ZEMA, and mining regulatory bodies. This is in particular relevant to MSD and ZEMA collaboration in the ESIA process as well as with regards to environmental oversight activities, and also to provide for a more inclusive and meaningful participation of the Forestry Department in the ESIA process.
- In general, there is a need for the allocation of adequate resources to relevant institutions responsible for overseeing mining activities and environmental protection and to provide training to personnel on the specific impacts of mining on forests and forest values.

## **5.8 Collaboration and Partnerships**

The issue of collaboration and partnerships surfaces as a challenge in addressing deforestation linked to mining activities in Zambia. The isolated efforts of individual stakeholders, including government bodies, mining companies, NGOs, academia and local communities, can lead to fragmented approaches to environmental conservation and an inefficient use of a wealth of knowledge.

### **Recommendations**

- Establish multi-stakeholder platforms that bring together government agencies, mining companies, environmental organisations, local communities, and researchers. These platforms encourage dialogue, information sharing, and joint decision-making.
- Foster partnerships between government bodies and mining companies to jointly address deforestation concerns. Initially, this could possibly be developed

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<sup>23</sup> In general, mining ESIA reviewing is challenging because of the often complex projects and extensive documentation. The task of performing a meaningful review is made even more difficult when human resources and capacity are insufficient and when the reviewer is not centrally involved in the permitting processes and well versed with the project.

through a framework agreement with the Zambian Chamber of Mines. Collaborative initiatives can result in shared resources and expertise.

- Facilitate collaborative research efforts among various stakeholders to collectively generate accurate data on deforestation trends, impacts, and potential solutions. Shared data enhances evidence-based decision-making.
- Collaborate with NGOs, civil society organisations, and advocacy groups to leverage their expertise, raise awareness, and hold stakeholders accountable for environmental commitments.
- Explore opportunities for international collaboration and knowledge exchange with countries – e.g., other EGP countries – that have successfully addressed similar challenges. This global perspective can offer valuable insights and solutions.

## 5.9 Turning Policy Aspirations into Governance

One of the key issues identified is the apparent gap between policy aspirations and actual regulatory enforcement. Zambia's policy framework underscores the significance of environmental conservation and sustainable development, reflecting the country's commitment to these ideals. The policy base for environmental and natural resources management appears, however, not to be efficiently implemented through updated legislation and institutional mandates, and the permitting and oversight processes are largely implemented in accordance with "older standard practice" based on the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997 (by ZEMA) and the Mines and Minerals (Environmental) Regulations, 1997 (by the Mines Safety Department). In light of Zambia's aspiration to significantly increase copper production in the near future, there is a considerable risk of increased deforestation and forest degradation due to mining development, including in areas of pristine forests.

Mineral exploration is undertaken in protected areas in Zambia, such as forest reserves, as permitted by law allow. If an economic deposit is found within a protected area, the regulatory process mandates an Environmental Impact Assessment (EIA) to evaluate potential environmental risks for mining to proceed. While an environmental permit for mining in a protected area may have conditions attached that are more stringent, it is important to acknowledge that the current regulatory framework may not possess all-encompassing mechanisms required to comprehensively analyse and sufficiently address the possible environmental consequences in sensitive and highly valuable ecosystems.

### **Recommendations**

- Bridge the gap between policy objectives and regulatory enforcement by revisiting and aligning policies with practical implementation. Establish an institutional working group consisting of representatives from the Ministry of Mines, the Ministry of Green Economy and Environment (including representation from the Forestry Department) and ZEMA to review policy goals, objectives and interventions. Assess policy (still appropriate or not), level of implementation, and plan for further implementation. Ensure that policies addressing in-migration, forest conservation, and sustainable development are integrated and aligned across



relevant government departments. This integrated approach can enhance the effectiveness of measures aimed at reducing deforestation.

- Mineral and forestry policy documents define objectives of protecting National and Local Forests and improving management practices for exploration and mining in these areas. Furthermore, there are also a policy goals of creating “no-go areas” for mining activities in sensitive and protected regions, and that the mining sector should contribute to the management of indigenous forests. Related to this, it is noted that the exclusion of certain areas, such as national parks and pristine forest areas, from exploration and mining is a common practice in many jurisdictions. In further policy development, the exclusion of mining rights from ecologically and culturally high-value forest areas may be considered to ensure that these remain off-limits to mining activities, safeguarding their integrity and long-term sustainability.
- The establishment of detailed guidelines for mining in or near forests, that are aligned with policy objectives and consider modern Forest Smart Mining practices, could facilitate a higher level of protection (cf. point 4, above).

## 6. Proposals for Continued EGP Programming

One of the objectives of the Forest and Mining Project was to develop a method of working with issues related to mining / forest interactions that can be used in other EGP countries, and overall be promoted and utilized in any EGP country to support programming where mining and forest interactions are gaining greater policy urgency.

For EGP countries other than Zambia, it is proposed that a simple baseline assessment of governance and development initiatives in the area of forest-mining interaction is performed, followed by a deliberation on the suitability and meaningfulness of implementing a project following the methodology of the current project, possibly revised and tuned to local circumstances. Any similar “forest and mining initiative” should be based on, and tailored to, the country-specific context with regards to for example the character of mining and forests in the country, the existing policy, legal and institutional framework, and the stakeholder landscape.

For Zambia, below follows proposals for areas of possible continuation of the EGP program for improved mining and forest co-governance. These proposals draw from the report’s Section 5 – Key findings and recommendations, which in turn are primarily based on the outcome of discussions held during the project’s three workshops. The implementation of the proposals may vary considerably in complexity and resources required, while this can also be controlled to some extent at the stage of project scoping and design. Nevertheless, the proposals are listed broadly in order of presumed increased complexity, starting with those for which a clear scope and tangible outcomes are considered to be more easily defined.

It is not envisaged that the EGP supports the implementation of all or even most of these proposals and, furthermore, any stakeholders including development partners are encouraged to learn from the findings of this report and consider the implementation of the proposed projects/activities.

- **Early support to Exploration and Mining Companies.** Collaboration between the Ministry of Green Economy and Environment (MGEE) and the Ministry of Mines and Minerals Development (MMMD) aimed at improved provision of information on protected forests, forest values and community forest management to exploration and mining companies early in the mining life cycle. The Forestry Department of the MGEE and the Mining Cadastre Department of the MMMD would be principally involved and drive the initiative jointly.
- **Development of Detailed Guidelines for Large-Scale Mining in Forests.** Mining in forests or ecologically sensitive areas requires significantly more comprehensive impact assessments compared to standard practices. Detailed guidelines could be developed to assist the industry in the ESIA implementation, and for decision-makers to use as a tool in the assessment of ESIA of mining projects located in or near forested areas.

- **Participatory Mapping of Forests and Forest Resources.** Promote the mapping of forests and forest values/resources jointly by mining companies and communities, as part of the ESIA baseline study<sup>24</sup>. The project can draw from the EGP's experience of implementing Participatory Environmental Monitoring (PEM) elsewhere and similar to the methodology of PEM, intermediaries from governmental authorities or civil society organisations may facilitate the process.
- **Improved Forest Monitoring and Surveillance.** Develop a plan for improved use of satellite imagery analysis tools and data, and ground truthing, in the monitoring and surveillance of land use, deforestation and forest degradation. The plan should include different time scales, for example for immediate action towards implementing free or low-cost processes, medium term development of more technically challenging and costly tools, and long-term goals of establishing a comprehensive data repository. Results may be used for a variety of purposes encompassing for example the monitoring of individual mining projects, or regional development planning ahead of mining development.
- **Consideration of Forest Conservation at Land Acquisition and Resettlement.** Development of guidelines for the consideration of forest conservation in the land acquisition process and related resettlement of affected people. As part of this, elaboration on the provision of support to local communities and Chiefs in negotiations with mining companies aimed at the conservation of forests, forest values and ecosystem services.
- **Establish a Mechanism for Improved Community Consultations during the ESIA Process.** This could be for example in the form of an independent body responsible for providing unbiased and comprehensive information about mining projects to local communities, the appointment of local liaisons or intermediaries that are well-versed in mining impacts and community concerns, or an independent monitoring mechanism that oversees stakeholder consultations. In relation to this, the development of guidelines may be considered to ensure inclusiveness and effective understanding for informed decision-making.
- **Forest and Mining Policy and Governance Review.** Although the current project initially had a narrower scope, with the key objective of assessing the implementation of the permitting and oversight process, a wider issue of concern has been noted pertaining to the seemingly inefficient implementation of rather far-reaching policy actions of relevance to forest and mining interaction. Thus, support to a multi-institutional forum for the reviewing of forest related policy provisions across the mineral, forest, and environmental sectors may be considered with the purpose of assessing the need to align policies and to assess requirements (legislative revisions, institutional capacities and collaborations etc.) for policy implementation.

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<sup>24</sup> While the ESIA baseline study usually coincides with the land acquisition/resettlement process, participatory forest mapping should be undertaken during whichever is implemented first. The (Draft) National Guidelines for Community Forestry (GRZ, 2018b) issued by the Forestry Department may serve to guide forest resources mapping and assessment.

## 7. Method Assessment

The assessment of the policy, legal and institutional framework and the mineral and environmental permitting processes, underpinned by studies of deforestation and forest values, proved to be an efficient way of realizing governance issues and arriving at meaningful proposals for governance strengthening. Both of the supporting studies were of essential importance, not the least to the successful outcome of the workshops in clearly demonstrating the wide range and importance of forest ecosystems in Zambia as well as the deforestation occurring in and around mining areas. The presentation of this type of tangible information on forest loss and forest values served to drive governance discussions into various focus areas laying the groundwork for targeted recommendations. The project also effectively facilitated productive dialogues between government agencies, local communities, and NGOs, fostering a collaborative approach to addressing the challenges of mining-forest interactions.

The original scope of the project was limited to mapping out and assessing the robustness and inclusiveness of the permitting process for mining in forested areas, and also including the abovementioned supporting studies. It was also the intention to hold one half-day workshop only, with selected representation from governmental institutions. For various reasons the project scope was revised during the period of implementation to cover a broader review of policy and legislation, a significantly increased stakeholder analysis and consultations, and a diversion to wider discussions on forest-mining interactions and governance. This was principally driven by the snowball technique employed in stakeholder mapping, and requests from various stakeholders for wider outreach and participation. This adjustment made the project more demanding and costly to implement, while it provided for a more holistic understanding of forest-mining interaction issues, enriching discussions and proposals for how governance may be strengthened. It also enabled the project to address issues that might have otherwise been overlooked. The project thus exhibited adaptability and responsiveness as it evolved from its initial design, extending to a more comprehensive approach, which allowed it to meet emerging needs and incorporate a broader scope.

Project implementation challenges included workshop program management, balancing stakeholder expectations, and improving documentation and communication. Thus, while the decision to conduct multiple workshops and expand the program was beneficial, it also posed challenges related to logistics, time management, and resource allocation. The project experienced pressure to expand its scope and even engage in a broader rollout. This indicates failure to communicate the original scope efficiently early on in the project – i.e. that the project was initially intended as a smaller scoping or test study of a method for assessing the robustness and inclusiveness of the permitting process. Nevertheless, the adjusted scope ultimately yielded a significantly enhanced outcome.

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# Appendix A.

## Satellite Imagery Analysis

### A1 Introduction

Forests cover nearly 4 billion hectares or 30 % of the Earth's land surface, and are critical for the health of the planet, sustainable development, and human well-being (United Nations General Assembly, UNGA, 2017). Approximately 1.6 billion people, or 25 % of the world's population, rely on forests to fulfil their requirements for sustenance, livelihood, employment, and income. Furthermore, they are fundamental to global ecosystems, as they host and protect 80 % of the Earth's land biodiversity, function as a natural flood barrier, recharge groundwater, and more (UNGA, 2017). Deforestation and forest degradation account for an estimated 11 % of total annual global greenhouse gas (GHG) emissions (Intergovernmental Panel on Climate Change (IPCC, 2014). These emissions contribute to rising temperatures, changes in weather and water cycles, and an increased frequency of extreme weather events (IPCC, 2021). Agricultural expansion has been identified as the main driver of deforestation and forest fragmentation, but other significant drivers of deforestation include infrastructure expansion, wood extraction, and mining (Geist & Lambin, 2002).

Mining is a significant cause of deforestation (cf. Section 2.3 of main report for details on mining-deforestation linkages), but the exact percentage varies depending on the region. According to a 2002 assessment, mining activities have driven 15 % of deforestation globally (Geist & Lambin, 2002). Although this may seem tangential, these are estimates on direct deforestation of mining, and a 2017 study found that deforestation around mining leases was 12 times more prevalent than within them (Sontter et al., 2017). As worldwide demand for minerals rises, mining areas – often located in remote, forested areas are further exploited, contributing to deforestation and forest degradation (Rademaekers, et al., 2010).

In 2022, the Zambian government vowed to increase copper production from the current 830,000 metric tonnes to 3,000,000 tonnes per annum in the coming decade (Government of the Republic of Zambia (GRZ), 2022). This target will likely require that Zambia expands its mining activities in previously unexplored areas, which raises concerns about the potential increase in deforestation rates. Current estimates of deforestation in Zambia already suggest a substantial reduction in forest cover, of between 167,000 and 300,000 ha, representing 0.3–0.6 % of total forest area, per year (Ngoma et al., 2020), and the potential effects of increased mining on these rates must be carefully considered. Understanding the drivers of deforestation, such as mining, is crucial for crafting effective conservation strategies and mitigating ecological impacts. Studying the impact of mining on deforestation can inform policymakers and guide decision-making processes to ensure sustainable development and protect vital habitats and wildlife.

## A2 Materials and Methods

### A2.1 Study Area

While Zambia has long been known for its copper mines in the Copperbelt Province, recent years have seen the opening of mines in the North-Western Province, which is sometimes referred to as the New Copperbelt (Werner, 2017). The North-Western Province in Zambia presents a valuable case for examining the relationship between mining and deforestation. This is largely due to the availability of satellite imagery data that predates the issuance of some large-scale mining licenses in the area. This data enables the observation of the changes in the landscape over time, from the period before mining activities began to the present day. Therefore, both the direct and indirect impacts of mining on surrounding forests can be studied.

The general topography North-Western Province is characterized by uplifted planation surfaces. It is Zambia's most densely forested region, with approximately 80 % of the area covered by mostly undisturbed wet miombo woodland, with the exception of areas along infrastructure corridors (GRZ, 2016b; URS, 2012; World Bank, 2019b). The western part of the province, however, is dominated by *Cryptosephalum* dry forests and Western Zambebian grasslands. Notably, this region boasts not only the highest forest coverage but also the lowest population density in the country (van Alstine et al., 2011: 6). Although wildlife populations have suffered due to years of poaching and hunting, the miombo woodland itself remains robust (World Bank, 2019b). The main challenges facing these ecosystems are widespread fires, wildlife poaching, deforestation, forest deterioration, unsustainable land practices, and the loss of a sizable, undisturbed ecosystem. Currently, the most critical threat to biodiversity in the region is habitat loss. Three major river systems – the Zambezi, Kabompo, and Kafue – have their headwaters in the watersheds of the province; these are major ecosystem service water and climate regulators in Zambia (World Bank, 2019b).

The province hosts three of Africa's largest copper mines. At the Kansanshi mine, located at Solwezi, modern time mining commenced in 2004–2005 while mineral extraction at Kansanshi dates back to the 4th century A.D. The two other mines, which are the focus of this study, include the Lumwana and Sentinel mines. The Lumwana copper mine is a conventional open pit operation owned by the Canadian mining company Barrick Gold, located about 65 km west of Solwezi (Barrick Gold, 2014). The construction of the mine began in late 2006 and the mine was officially inaugurated in April 2009 (Mining Technology, 2021). The mine produces an average of about 20 million tonnes of ore annually. Most of the project area falls within the 105 Acres National Forest, a Miombo woodland undergoing rejuvenation. The forest's protected status is primarily due to its valuable timber resource rather than conservation concerns, according to the technical report of Barrick Gold. The mine development area within the forest reserve has been excised and removed from the protected zone (Barrick Gold, 2014).

The Sentinel copper mine is a conventional open pit operation owned by the Canadian mining company First Quantum Minerals (FQM), located about 150 km west of Solwezi (FQM, 2020). Construction activities for the Sentinel project commenced in the latter half of 2012, and commercial production commenced in November 2016. The mine produces approximately 62 million tonnes of ore annually (FQM, 2020). The project area lacked essential infrastructure such as sealed roads, power supply, water supply, and services prior to the development

activities (FQM, 2020). Consequently, the company undertook various infrastructure projects, including the construction of a new town called Kalumbila town. This town comprises housing for personnel, roads, water supply and sewerage systems, electrification, schools, and a medical clinic. Additionally, a 30 km long sealed road was established to connect the project site with the Solwezi to Mwinilunga national road. In close proximity to the town site, a bitumen-surfaced airstrip was constructed to replace an older unsealed landing strip. Furthermore, a connection agreement with the national power utility (ZESCO) facilitated the construction of a 600 km long power line into the site (FQM, 2020).

The Enterprise nickel project is situated just 12 km away from the Sentinel copper mine, and shares operational and infrastructure aspects with the Sentinel mine (FQM, n.d.). The nickel processing plant was commissioned in 2016 and shares several key sections with the Sentinel process circuit. This integrated design allows for a production capacity of 28,000 tonnes of nickel in concentrate, with the potential to scale up to 60,000 tonnes. Furthermore, the plant is linked with the Sentinel copper circuit, enabling the production of additional copper concentrate during periods when nickel output is halted (FQM, n.d.). Given their close proximity and the substantial operational and infrastructure synergies between them, the Enterprise mine will be considered as part of the Sentinel mine in this report, and “Sentinel mine” will thus serve to denote both mines.

## A2.2 Methodology

The present study investigates the relationship between mining activities and deforestation in Zambia through a descriptive study using geographic information system (GIS) tools. The study utilizes the Hansen Global Forest Change dataset, a reputable source for deforestation analysis, to estimate the extent of deforestation over time from 2001 to 2021 (Hansen et al., 2013). In addition, forest reserve data was drawn from The World Database on Protected Areas (WDPA) (The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and International Union for Conservation of Nature (IUCN), 2023). The OpenStreetMap was obtained to serve as a base layer to establish the geographic context of Zambia and define Regions of Interest (ROI) for analysis, and Google Earth images were used to delineate active mining areas.

In the data processing phase, the data was restricted to the national borders of Zambia. From the Hansen dataset, the following layers were extracted: Tree canopy cover for the year 2000 and global forest cover loss from 2001 to 2021. Tree canopy cover refers to the density of tree canopy covering the land surface. Tree cover loss is defined as a significant disturbance resulting in the complete removal of tree canopy cover at the Landsat pixel scale. The forest loss data was then classified based on the chosen analysis periods, employing a colour scheme that designates forest loss areas in red. To ensure the comparability of data, three-year periods are chosen for analysis:

1. 2002–2005, predating the construction of the Lumwana and Sentinel mines.
2. 2006–2009, aligning with the initial construction of the Lumwana mine.
3. 2013–2016, substantially overlapping with the initial construction phase of the Sentinel mine.
4. 2017–2020, when the mines had been in production for approximately 7.5 years (Lumwana) and 1.5 years (Sentinel).

Similarly, forest reserve Shapefiles were imported into QGIS for visual representation of the spatial relationships between active mining licenses and protected forest areas. The subsequent analysis phase primarily involved the interpretation of maps and spatial data. Through this interpretative process, patterns and relationships between mining activities and deforestation were discerned.

### A2.3 Limitations

While satellite imagery analysis provides valuable insights, it is important to acknowledge its limitations in offering an understanding of the underlying drivers behind observed phenomena. Satellite imagery alone cannot directly reveal the intricacies of causation. However, when complemented by a comprehensive literature review, the combination of satellite imagery analysis and existing knowledge provides a basis to infer a plausible association between mining activities and deforestation in Zambia. By leveraging the existing body of knowledge and the visual evidence obtained through satellite imagery, we can draw reasonable assumptions regarding the factors contributing to the observed patterns of deforestation. Nevertheless, to pinpoint the specific drivers of deforestation in Zambia, further research and on-the-ground investigations are needed.

It is also important to bear in mind that the estimates of forest coverage provides information on the extent of deforestation caused by factors like mining, agricultural expansion and other human activities. However, they do not account for degradation, caused by activities such as the removal of fuel wood, which negatively impact the overall biomass of the remaining forests. Although there is a lack of consistent studies for accurate comparisons, available evidence suggests that significant degradation has occurred within the forested regions as well (Kalinda et al., 2008).

## A3 Results

The following collection of maps (Figure A1–A6) provides a visual representation of deforestation. By examining satellite images spanning several years, the extent and spatial patterns of deforestation from 2001 to 2021 are visually depicted, specifically highlighting the impact of mining activities on forest cover. To facilitate a more detailed exploration of each map, enlarged versions are available in the appendices (Appendices 1–6), allowing for a clearer examination of the nuances present in each depiction. These maps present valuable insights into the temporal and spatial dynamics of forest loss, showcasing deforestation on a national level as well as specific mining sites and their impact on the surrounding forests. Additionally, the overlay of forest reserve polygons reveals instances of encroachment upon designated areas for forest conservation, further emphasizing the complex interplay between mining and deforestation in Zambia.

The first map (Figure A1) displays the extent of deforestation that occurred in Zambia between 2001 and 2021. The map shows that deforestation is a widespread issue in the country, but that the most deforestation has occurred in the Copperbelt Province, which is home to several major mining operations.

The next series of maps focuses on the impact of the Lumwana and Sentinel mines on surrounding forests, shedding light on the relationship between mining and deforestation in the region. The first map (Figure A2) portrays forest loss over



the time period 2002–2005, which predates the commencement of construction of both the Lumwana and Sentinel mines. This map thus serves as a baseline for understanding the extent of deforestation that has occurred in the region. Forest loss, highlighted in red, shows a scattered pattern of deforestation, likely attributed primarily to various local uses of the forests. However, the population density is relatively low and access to forests through roads is limited, leading to a relatively low level of deforestation. The overlay of nature reserve polygons also reveals that the Lumwana mine will be established in an area designated for forest conservation and that Sentinel mine will be established in close proximity to one.

The second map (Figure A3) demonstrates the deforestation that occurred during the years 2006–2009 coinciding with the initial construction of the Lumwana mine, which commenced in December 2005 and commercial copper production was achieved in April 2009. Forest loss associated with mine construction, for example open pit development, processing plant, overburden and waste rock dumps as well as access and haul roads, is clearly visible. It also becomes evident that the scattered pattern of deforestation outside of the mine area has increased slightly compared to the pre-establishment period.

The third map (Figure A4) displays the deforestation that took place during the period 2013–2016, largely overlapping with the initial/main construction phase of the Sentinel mine, which began in June 2012 and the mine started operating in September 2015. Deforestation related to mine construction at Sentinel, including the open pit development, haul roads, processing plant etc. and the round outline of the tailings storage facility in the northern part of the mine area is clearly visible. At Lumwana, expansion of the mine has resulted in further deforestation. The lined patterns of forest loss outside of the mine areas signify the construction of power lines and roads, the latter contributing to increased access to new areas of land and forests. Once again, there is a noticeable rise in scattered deforestation outside of the mine areas.

The fourth map (Figure A5) reveals the forest loss in 2017–2020. Deforestation occurs within both mine areas due to mine expansion and continued production that for example requires additional ground for tailings and waste rock disposal. Additionally, a rather large increase in scattered deforestation outside of the mine areas is evident. Finally, the fifth map (Figure A6) demonstrates all the forest loss that has occurred since the start of Lumwana mine construction until the present (2006–2021). By comparing this map to the baseline map (Figure 2), the influence of mining on forest loss, both directly and indirectly, becomes evident.

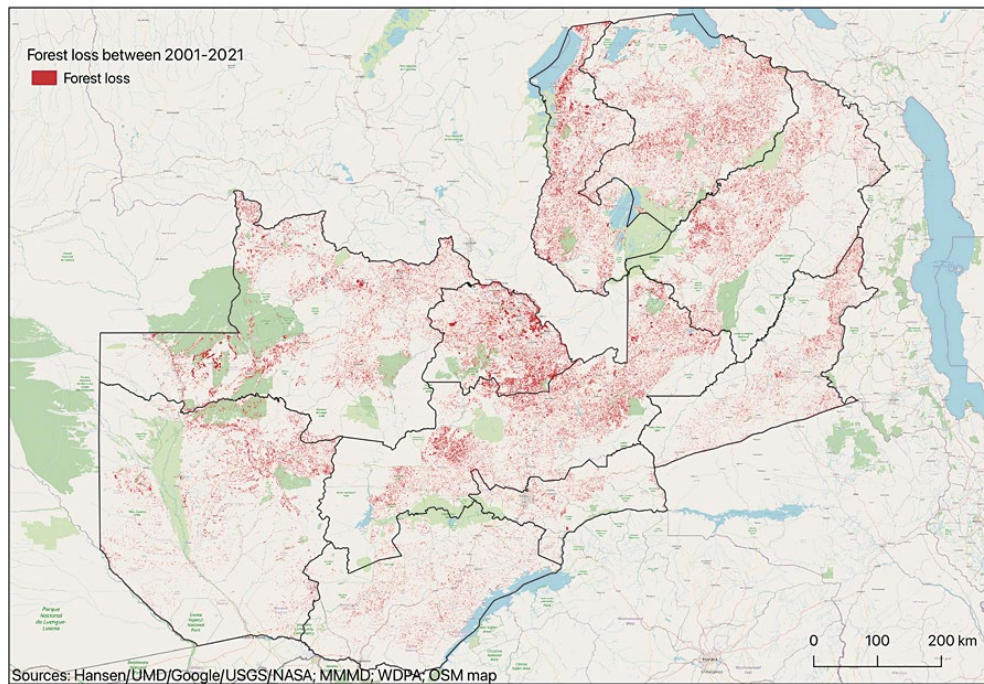


Figure A1. Map of Forest Loss in Zambia between 2001 and 2021.

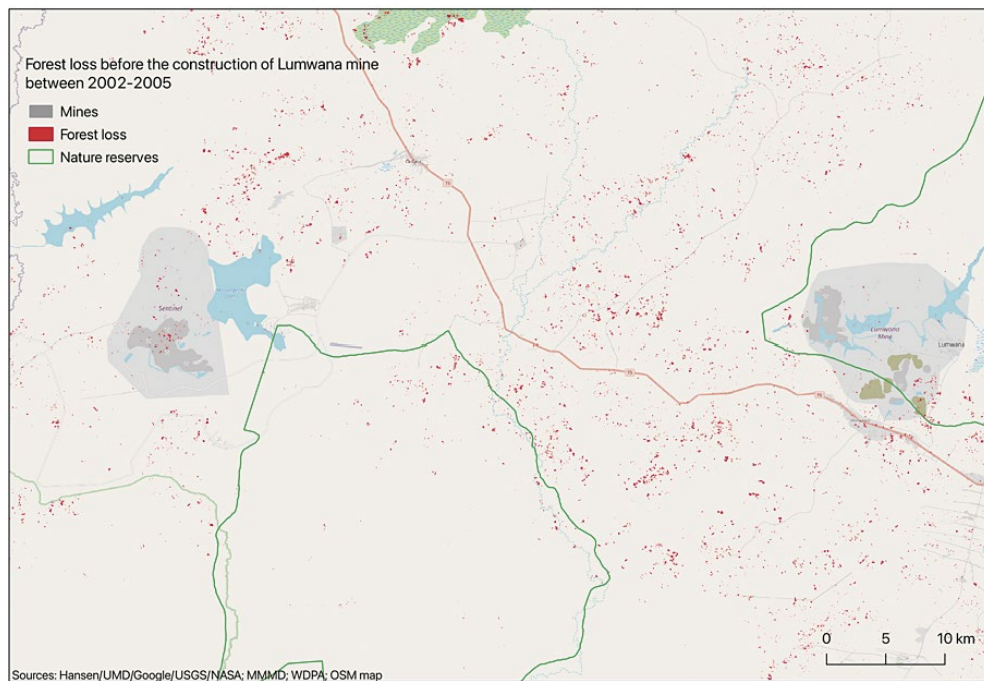


Figure A2. Forest loss in the area of the Lumwana and Sentinel mines between 2002 and 2005, i.e., prior to the construction of the mines. Grey areas indicate the approximate current outline of the mining operations, Sentinel to the west and Lumwana to the east.

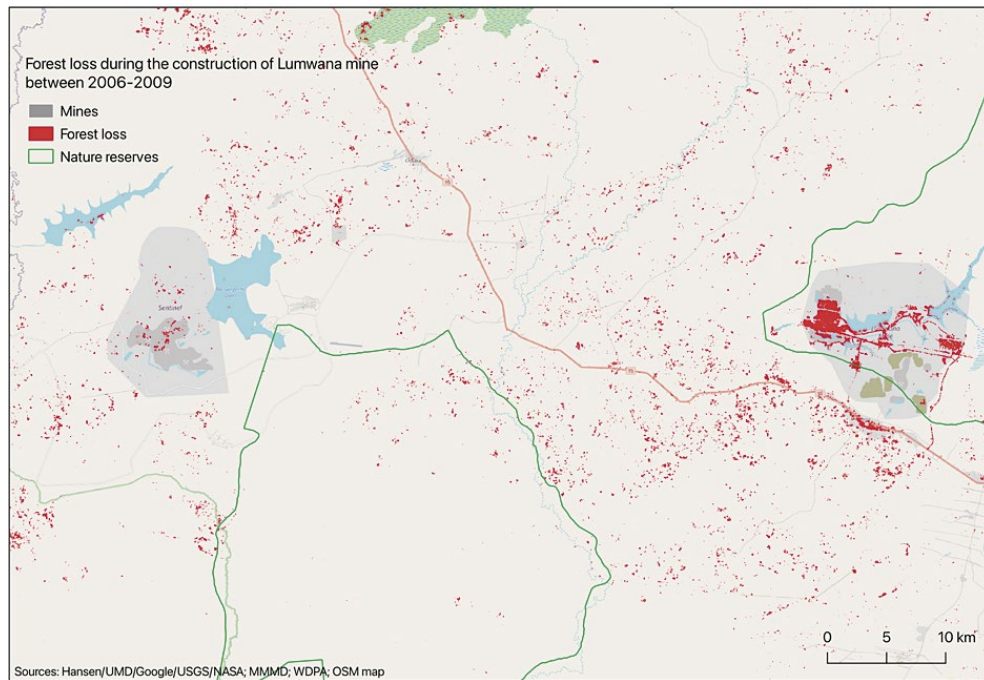


Figure A3. Forest loss between 2006 and 2009, coinciding with the initial construction of the Lumwana mine.

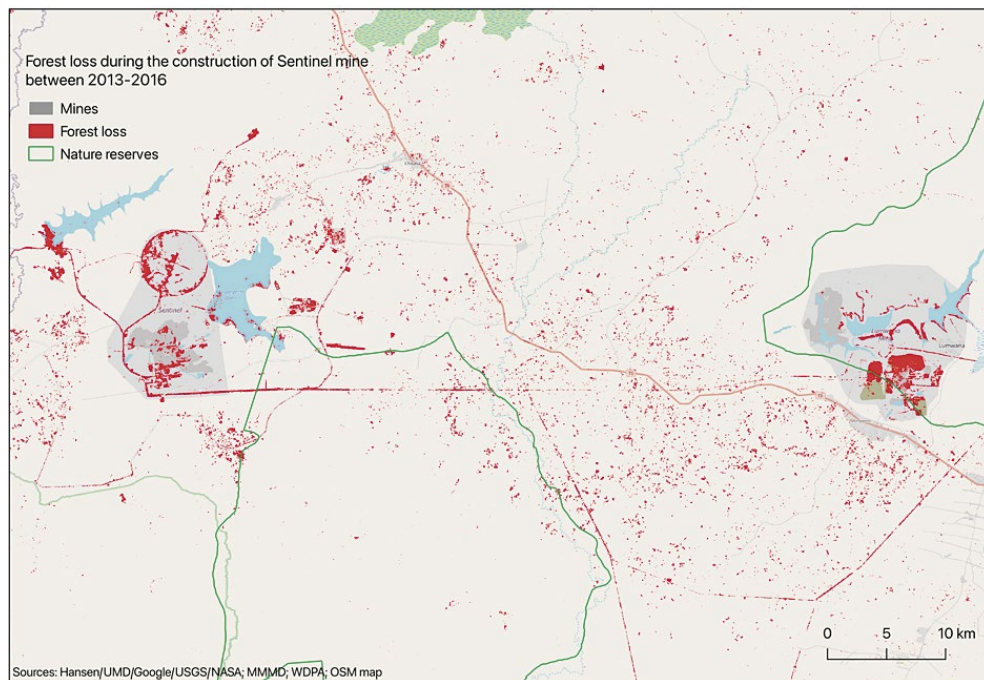


Figure A4. Forest loss between 2013 and 2016, largely overlapping with the initial construction of the Sentinel mine. Note: The forest loss (line and slightly larger patches) to the west-north-west of the Sentinel mine is related to the development of the Enterprise nickel deposit.



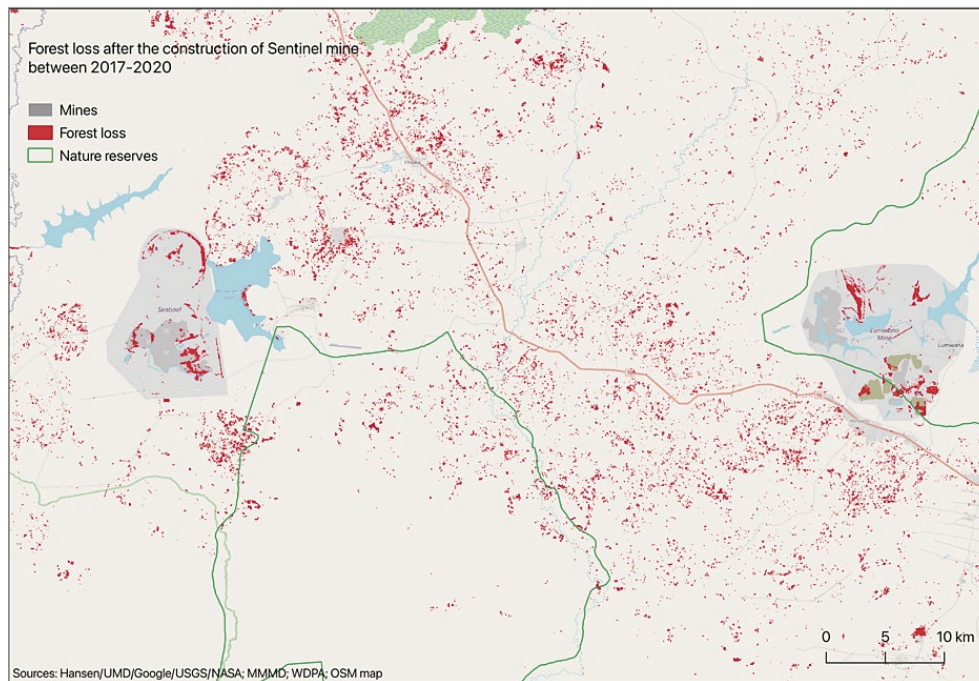


Figure A5. Forest loss from 2017, when the mines had been in production for about 7.5 years (Lumwana) and 1.5 years (Sentinel), to 2020.

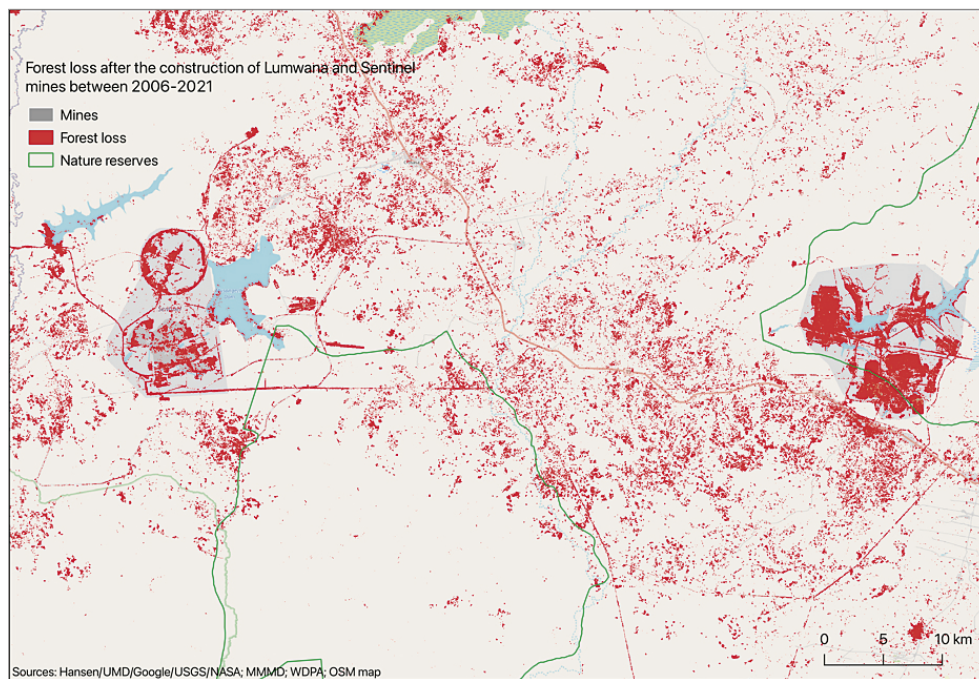


Figure A6. Forest Loss after the construction of Lumwana and Sentinel Mines between 2006 and 2021.

## A4 Discussion

The results of the analysis indicate that deforestation is a significant issue in Zambia. The overlay of time-series deforestation data with forest reserve polygons reveals a complex relationship between mining and deforestation in the North-Western Province of Zambia. While satellite imagery alone cannot provide a comprehensive understanding of the underlying causes driving the observed phenomena, our literature review supports a strong rationale to infer their association, enabling reasonable assumptions regarding contributing factors.

The literature review emphasizes that deforestation is a clear and measurable outcome of mining on nearby ecosystems (Werner, Bebbington & Gregory, 2019). Direct effects of mining are notably visible in the maps showcasing deforestation within the mining area, reflecting the extent of land clearance during the establishment of mining operations (Mwitwa et al., 2012; Werner et al., 2020). “Green site development,” characterized by the creation of open pit or deep mining sites, tailing dams, and waste dumps within the mining lease boundary, contributes significantly to this immediate deforestation. However, the reach of direct mining-related deforestation extends beyond the lease boundaries, as secondary infrastructure, including processing plants, buildings, railway lines, and access roads, necessitates further forest clearance (Bond & Weber-Fahr, 2002; Phillips, 2001; Siqueira-Gay et al., 2022).

Indirect effects of mining manifest as scattered patterns of deforestation around mining sites, signalling the influence of factors like heightened human activity and infrastructure development. While the present study has not quantified direct and indirect deforestation, visual inspection of the produced maps point at significant indirect deforestation outside of the mining areas, and Sonter et al. (2017) also found that deforestation around mining leases in general exceed that within them. The population pull effects of mining areas result in the demand for housing, timber for construction, fuel, and land for agriculture, which significantly pressures the surrounding forests (Mwitwa et al., 2012; Siqueira-Gay et al., 2022; World Bank, 2019a). Notably, the demand for charcoal, a key driver of deforestation, is perpetuated by the mining industry’s substantial energy consumption. Moreover, mining companies construct roads that provide access to forested regions, subsequently enabling local communities to clear these areas for charcoal production and agriculture. Even after prospecting or mining sites are abandoned, they often transition into other forms of land use, such as agriculture, due to the previous deforestation (Elias, 2011).

In addition to the evident deforestation, it is important to acknowledge the impact of forest degradation, which is not accounted for in the estimates of forest coverage used in this study. Activities like fuel wood removal negatively impact the overall biomass of the remaining forests, even if they do not lead to complete deforestation. While there is a lack of consistent studies for accurate comparisons, available evidence suggests that significant degradation has occurred within the forested regions of the study area as well (Kalinda et al., 2008). Lastly, mining operations can lead to the downgrading, downsizing, and degazetting of protected areas, as mining licenses may permit activities within previously safeguarded zones (Edwards et al., 2014; Golden Kroner et al., 2019). The increased population influx driven by mining activities further compounds this issue, as evidenced in the analysis, which reveals a scattered pattern of deforestation within nature reserves. The deterioration of these protected forests poses significant obstacles to their preservation and conservation efforts.

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# Appendix B.

## Forest Values

### B1 Introduction

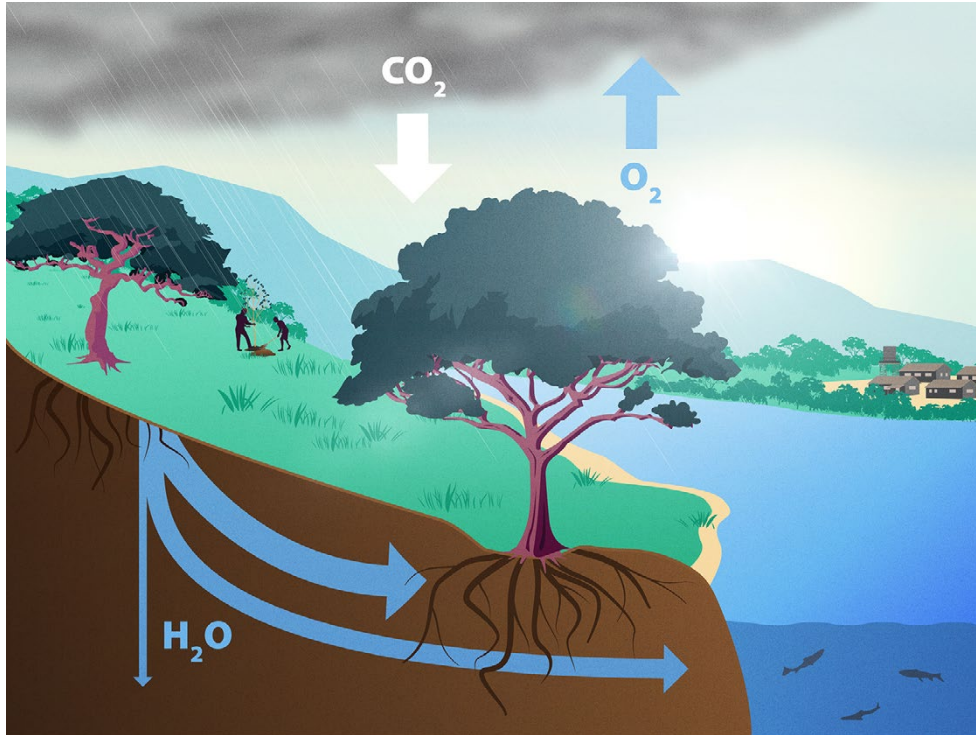
Forests are more than just a collection of trees and animals. They are also a vital natural resource that provides numerous benefits to humans and the environment. In Zambia, forests play a critical role in the country's economic, social, and cultural development. From providing timber and non-timber forest products to regulating water cycles and reducing greenhouse gas emissions, forests in Zambia are essential to the country's sustainable development. However, the value of forests extends beyond their economic and environmental benefits. For many Zambians, forests are an integral part of their culture and way of life. Forests provide food, medicine, and materials for traditional practices and ceremonies, and are home to sacred sites and ancestral spirits. As such, forests hold immense cultural and spiritual value for many communities in Zambia.

Another term for the many values connected to forests is ecosystem services. Ecosystem services are seen as nature's contribution to people, and are divided into four categories: provisioning services, regulating services, cultural services and supporting services. Provisioning services can be e.g. the supply of food, fresh/drinking water, fibre/timber and fuel. Regulating services are pollination, purification of air and water, climate regulation, water regulation and protection against weather extremes (floods, fires, erosion). Cultural services include recreational, aesthetic, spiritual, educational, natural heritage, and tourism. Finally supporting services, are the underlying processes, for example formation of soil, photosynthesis and the nutrient cycle.

This study focusses on exploring the various values, or services, associated with forests in Zambia. From the tangible to intangible, this examination sheds light on how forests contribute to the well-being of both humans and nature. By understanding the diverse values of forests in Zambia, efforts can be directed towards sustainable forest management and conservation, ensuring that these vital resources are protected for future generations.

## B2 Forest Values

### B2.1 Ecological Values



Forests in Zambia contribute to the mitigation of climate change. About 50 % of the forests' biomass comprises carbon, which gives them a key role in sequestering and storing carbon (Turpie, Warr & Ingram, 2015). Forests in Zambia are also essential for regulating the water cycle, impacting water quantity, quality, and timing (The Food and Agriculture Organization of the United Nations (FAO), 2021). Forests contribute to minimising erosion by stabilising the soil and by diverting rainfall (Turpie et al., 2015). Additionally, forests can serve as sediment barriers, effectively preventing sediment from degraded lands from entering rivers and streams. This, in turn, has a positive impact on downstream ecosystems and communities by improving water quality. Notably, in Zambia, soil erosion poses a substantial risk, primarily in terms of dam sedimentation, which can adversely affect hydropower production, agriculture, and downstream water flow, particularly during dry season. Moreover, forests contribute to soil fertility, a resource that is depleted when forests undergo degradation (Turpie et al., 2015).



Forests are also crucial for biodiversity, providing vital habitats for numerous animals, plants and insects. A single tree can provide sustenance for a diverse range of species, including fungi, microorganisms, birds, and reptiles. Among other mammals, the Zambian forests are home to antelopes, rabbits, impalas, buffalos, elephants, hyenas, warthogs, zebra, hippos, porcupines and lions. In addition, Zambia has identified 42 Important Bird Areas (IBAs) which cover about 14 % of the country's land surface (Convention on Biological Diversity (CBD), 2015). Over 28 species and subspecies in Zambia are considered threatened, vulnerable or endangered (CBD, 2023).



## B2.2 Economic Values



Forests hold an important position in Zambia's economy. A 2015 assessment of the economic value of Zambia's forest ecosystems revealed that forests contribute around 4.7 % of the gross domestic product (GDP), equivalent to approximately US\$957.5 million (Turpie et. al., 2015). When considering the multiplier effects on industries like forestry and tourism, this contribution is believed to be at least 6.3 %, around US\$1.277 million (Turpie et. al., 2015).

The primary commercial use of the forests revolves around the production and sale of timber (CBD, 2015). Trees of commercial importance for timber comprise *Pterocarpus angolensis* (Mukwa), *Azelia quanzensis*, *Khaya nyasica*, *Baikiaea plurijuga* (Zambezi teak), and various species of *Brachystegia*. Significant quantities of wood biomass are utilized for energy, primarily as firewood and charcoal, and charcoal serves both as a means of subsistence and as a commodity for sale. In 1998, the charcoal industry yielded approximately US\$30 million in revenue, with about 60,000 Zambians directly relying on charcoal production for their primary source of earnings. By 2010, an estimated number exceeding 50,000 households were actively engaged in full-time charcoal production, sustaining their livelihoods through this trade (CBD, 2015).

Nature-based tourism is the primary type of vacationing in Zambia, with forests playing a vital role in enhancing this type of tourism. Assessments suggest that forest-related tourism contributes between \$110 million to \$179 million annually in direct value added to the sector (Turpie et al., 2015).



## B2.3 Livelihood Values



Zambian forests provide livelihoods for a large portion of the country's population. According to the World Bank (2019), Zambia's forests are essential for the subsistence requirements of 60 % of the population and provide 1.5 million jobs, which constituted around 21 % of the country's total labour force in 2015. Harvested forest products make a significant contribution to incomes of the rural population, with forest contribution to rural household income estimated at 20.6 % (Puustjärvi, Mickels-Kokwe & Chakanga, 2005). Trees are also harvested for charcoal production and firewood, accounting for around 80 % of household energy needs (Turpie et al., 2015).

Based on a survey conducted by The Food and Agriculture Organization of the United Nations (FAO) across five provinces and three different ecological regions of Zambia, Zambians collect at least an estimated 84 000 metric tons of wild food from the country's forests each year (Ickowitz et al., 2021). Mushrooms, leafy greens, and fruit from trees like masuku (*Uapaca kirkiana*) and mobola plum (*Parinari curatellifolia*) are commonly consumed, along with caterpillars, nuts, oils, tubers, and small mammals such as mongooses and mice (Ickowitz et al., 2021). Wild fruits play a significant role in the diets of Zambians, comprising 80 % of the total fruit intake (Steel et al., 2022). The reported amount of wild fruits consumed from forests would be enough, on average, to meet 25 % of international recommendations on fruit intake (Steel et al., 2022).

Forests also provide local communities with traditional medicinal plants where bark, roots and leaves are used for protective and healing purposes. Traditional medicine collected in the forests are sometimes perceived to be more accessible,

practical, and cheaper in comparison to modern medical facilities as these can be scarce and costly (CBD, 2015). In Zambia, about 30–50 medicinal plants are used to treat headaches, coughs, and stomach problems (Jumbe et.al. 2008). Although medicinal herbs' role in traditional medicine has diminished due to the introduction of allopathic drugs, their role as a fundamental resource for rural healthcare remains considerable (Hamayun et al., 2006).

In addition to food and medicine, other products from forests are often collected and used as household items, raw materials, fibres, thatching, crafts, oils, waxes, and dyes. Most of these so-called Non-Timber Forest Products (NTFPs) that are harvested by rural households are for consumption whilst only about 10 % percent of households trade in them (Dlamini & Samboko, 2017), bringing an estimated overall income of around \$135.8 million per annum (Turpie et al., 2015).

## B2.4 Cultural Values



Forests in Zambia have significant cultural value for local communities, as they play an important role in various cultural customs and practices. Forests provide materials for building houses, furniture, and tools, and many traditional crafts such as basket weaving and carving are practiced in forested areas (Chileshe, 2020). Certain trees are categorized as decorative and are utilized for marking boundaries and enhancing surroundings. Other species produce foams, and offer soap for washing, or are utilized for creating cultural objects such as handles for hoes and axe handles, clubs, and walking sticks (Chileshe, 2020).

Additionally, forests have cultural significance in various forms of artistic expression, including music, dance, and storytelling. Trees are used in the making of a variety of instruments such as membranophones, or drums, (e.g. budima,

namalwa), the chordophone (kalumbu), thumb pianos (e.g. kankobela, kalandi, kangombio, chisanzhi, kalimba), and xylophone (silimba) (Teacher Education in Sub-Saharan Africa (TESSA), 2023). In addition to their musical function, instruments can also serve as a representation of authority. An example of this can be seen in the maoma royal drums of the Lozi people in Western Province, which not only serve as a symbol of authority but also communicate political stability within the chiefdom (Music in Africa, 2016).

Forests also play a role in other cultural practices, such as among life-crises rituals (Turner, 1967). Finally, the bases of big trees with a canopy for shade are commonly used for social gatherings in Zambia. These trees provide a natural and serene setting for gatherings and offer protection from the sun's heat (Kanene, 2016).

## B2.5 Spiritual Values

For many people in Zambia forests and trees hold significant spiritual value. Many trees are believed to be inhabited by ancestral spirits, and forest groves are conserved as sacred places dedicated for rituals (Posey, 1998). Shrines usually comprise stands of trees or patches of forest that local communities often preserve due to their religious significance, as well as their economic, medicinal, social, and cultural functions (Kanene, 2015).

In Zambia, rare and fruit-yielding trees are sometimes given a sacred tag and revered (Dafni, 2007). One such tree is the mofu tree (*Entandrophragma delevoiyi*), which in certain areas of Zambia is considered to have a spirit that must be appeased before it can be safely felled. To obtain permission or forgiveness from the wood gods, special prayers, ceremonies, fines, offerings, or sacrifices may in some cases be performed before cutting down a tree or extracting materials from a sacred area (Dafni, 2007).

Indigenous knowledge in Zambia also recognizes the role of trees in protecting river catchment areas and preventing erosion, leading to the prohibition of cutting trees and farming along riverbanks (Chileshe, 2020). These beliefs and practices are reinforced by stories about hostile spirits inhabiting the riverine (imishingu) and riparian forests (imishitu) that grow along riverbanks, which deter unsustainable use of trees in those areas (Chileshe, 2020).

## B2.6 Other Values of Forests

There are several values that are often attributed to nature and forest that are difficult to find information on in the context of Zambia. It is however likely to assume that forests in Zambia have been important in shaping the country's cultural identity and hold significant historical value. Forests also offer a natural setting for hands-on learning about forest ecology, climate change, and traditional knowledge and livelihoods, and may thus hold educational value as well. Zambia's forests offer abundant recreational opportunities for outdoor activities such as hiking and wildlife watching, and may be valued as such among Zambians. Finally, forests are likely to hold immense aesthetic value, with natural beauty contributing to people's health and happiness.

In addition to their utilitarian value, trees and other natural resources also have intrinsic (or inherent) and non-use value (United Kingdom National Ecosystem Assessment, 2011). The intrinsic value of nature refers to its value independent of humans, meaning that nature has the right to exist regardless of its function or

usefulness to humans. As a result, Vucetich, Bruskotter, and Nelson (2015) argue that it is ethically appropriate to conserve nature for its own sake, rather than for human interests or financial benefit. On the other hand, the non-use value of nature is its value to humans even when there is no direct use (Chileshe, 2020). For instance, humans place non-use value on knowing that nature is still present and can be passed down to future generations, possibly for future use. Thus, non-use value means that nature's value is still relevant to humans, even if it is not based on their interests (which is intrinsic value) (Chileshe, 2020).

## B3 Conclusions

In conclusion, this study has highlighted the profound and diverse values of forests in Zambia. These forests offer ecological, economic, livelihood, cultural, spiritual, and other values. They contribute to climate regulation, support the economy, sustain communities, and enrich cultural practices. Moreover, forests hold spiritual significance and offer intangible benefits that enhance the well-being of the people. Recognizing the multi-dimensional worth of Zambia's forests is crucial for informed decision-making and sustainable forest management.

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# Appendix C.

## Policy, Legislation and Permitting

### C1 Introduction

With the green energy and digital transitions, more mining and new mines will be required and many new mines are likely to be situated in forest areas, in Zambia as well as in many other countries. In order for mining to grow with due care for both forests, forest values and associated human rights, mining and forest interests need to be considered together and potential impacts on forest need to be understood and managed from the early stages of the mining cycle. This, in turn, requires that adequate policies are implemented through efficient governance, where the processes of mineral and environmental permitting and oversight are key levers.

This component of the Forest and Mining Project provides a review of policy, legislation and regulatory processes governing mineral sector development in Zambia, with a specific focus on aspects that are of importance in addressing impacts on forests. The purpose of the review is to assess the policy and legal framework, and in particular the mining and environmental permitting processes. Outputs from this component are built into the main part of the report where key findings and recommendations are presented in Section 5 and proposals for continued EGP programming are provided in Section 6.

Following after this introduction, Section C2 provides a governance overview where key aspects of policy, legislation and governmental institutions are described. This is followed by a presentation of the exploration and mining permitting process (Section C3). Finally, key takeaways are presented in Section C4.

### C2 Governance Overview

In Zambia, there are two levels of elected government, the Central Government and Local Councils, at the District, Municipality or City level depending on population distribution. In addition, Provincial Governments are appointed by the central government with the key duty to implement national policy in the provinces.

With the 2016 Constitution (amendment) (GRZ, 2016a), much of the political, social, legal and economic management and administration was devolved from the national level to Local Councils. In reality, this transfer of responsibilities has been hampered by a number of factors, e.g., legislative uncertainties, insufficient funding, and insufficient competence at the local councils (e.g., Siddle, 2019). Thus, the education, social welfare and public health services still to a large extent remain the responsibility of the Central Government.

In addition to the democratically elected governments, traditional authorities headed by Chiefs command significant political authority, and customary law plays an important role especially in the rural areas of Zambia. Most of the land

in Zambia fall under customary tenure<sup>25</sup>, where Chiefs act as trustees on behalf of communities and grant occupancy and use rights while headpersons administer customary land at the village level on a day-to-day basis. Chiefs also play a crucial role in development in the Chieftom, serving as the primary point of contact for the delivery of public/state resources and private investment. This means that most exploration and mining projects in Zambia will need to consider both statutory and customary law, the latter in particular when it comes to land access and land rights.

#### **Note on customary land**

Customary land tenure has been the focus of policy debate in Zambia for at least some 15–20 years. An earlier draft land policy advocating transfer from customary tenure to leasehold estates\* was rejected in 2018 by a coalition of chiefs as they considered it an attempt of the State to abolish the chieftaincy, and a de-watered policy was later published in 2021. While it may be argued that customary land tenure can for example better integrate cultural aspects in land management and provide for communal rights to shared resources, critics mean among other things that the system is a barrier to economic development and upholds inequalities and mistreatment of vulnerable groups (e.g. women, youth, economically disadvantaged)\*\*. In any case, the strong status of customary law and land tenure requires comprehensive permitting processes to ensure that decision-making is sufficiently informed and inclusive, also with regards to the protection of forests, forest values and ecosystem services.

\*\* Land use in Zambia is based on that statutory land is leased out for a period of up to 99 years.

\* See Umar et al. (2022) for a detailed discussion on the advantages and disadvantages of both customary tenure and leasehold systems.

Mining and environmental governance is founded on the Constitution of Zambia, which includes important land management principles around for example the ecologically sustainable development and use of natural resources, the protection of genetic resources and biological diversity, and the reclamation and rehabilitation of degraded areas. The Constitution, furthermore, stipulates that land use planning should to be undertaken in a consultative and participatory manner, and that knowledge on biodiversity and genetic resources of local communities should be protected and enhanced. Closely related to the importance of forest conservation, the Constitution also stipulates the establishment and implementation of mechanisms to address climate change.

This section continues with further elaboration of governance visions and objectives set out in policy, as well as key aspects of the legal framework and implementing institutions. The review is divided into governance/management of the mineral sector (Section C2.1), the forest sector (Section C2.2) and the environmental sector (Section C2.3).

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<sup>25</sup> Estimations range between 60–94 %, depending on whether large tracts of protected areas (national parks and national forests) are considered to be customary land or state land.



## C2.1 Exploration and Mining Management

After the privatization of the copper mining industry in Zambia in the late 1990's, mineral sector development was guided by the **Mining Policy, 1995** (GRZ, 1995a), followed by the **Mineral Resources Policy 2013** (GRZ, 2013) and, currently, the **National Mineral Resources Development Policy of 2022** (GRZ, 2022) sets the overall vision, objectives and strategies for mineral sector development. Thus, there has been a continuous policy development during and after the privatization of the mining industry with the overall objective of facilitating broad based sustainable development in the country.

Some policy content has been/is of direct relevance to environmental and forest management. In this regard, both the 2013 and 2022 policies include objectives of balancing mining and environmental interests as well as policy actions aimed at improving environmental assessments and regulation. Both the 2013 and the 2022 policies also address the need to update the Environmental Protection Fund (EPF; see further below). Furthermore, the Mineral Resources Policy of 2013 specifically prescribed the gazetting of national and local forests and the implementation of measures to ensure that exploration and mining within these areas comply with environmental regulatory frameworks.

Mineral exploration and mining are primarily governed by the **Mines and Minerals Development Act, 2015** ("*Mining Act*" or *MMDA*) (GRZ, 2015a), and the Mining Act also establishes the **Ministry of Mines and Minerals Development (MMMD)**, which assumes overall responsibility for mineral sector promotion and regulation.

The Mining Act provides for the granting of *mining rights*, which include exploration and mining licenses and these are further divided into small- and large-scale exploration licenses and artisanal, small-scale and large-scale mining licenses<sup>26,27</sup>. Mining rights management is further implemented through the **Mines and Minerals Development (General) Regulations, 2016** (GRZ, 2016b), and the **Mining Cadastre Department** of MMMD is responsible for the administration and processing of mining rights applications and for maintaining a mining rights cadastre system<sup>28</sup>.

Mining rights applications are assessed by the **Mining Licensing Committee**. Committee members include the directors of four of the ministry's departments (Mines, Geological Survey, Mines Safety and Mining Cadastre). Furthermore, it includes one representative from each of four ministries (environment, land, finance and labour) as well as of the Attorney-General, the Zambia Development Agency, and the Engineering Institution of Zambia, all as appointed by the Minister of Mines.

According to the Mining Act, the granting of mining rights should consider the need to conserve and protect the bio-physical environment and ensure the prevention of adverse socioeconomic impact, and a license holder should be held liable for

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<sup>26</sup> As described in the main part of the report, this study is mainly concerned with large scale exploration and mining activities.

<sup>27</sup> A large-scale exploration license is valid for four years and may have a maximum area of about 2,000 km<sup>2</sup> and a company may hold up to five such licenses. The license can be renewed for two further periods, each for a maximum of three years, while a minimum of 50 % of the exploration area should be relinquished with each renewal. A large-scale mining license is valid for a maximum of 25 years and may have a maximum area of about 250 km<sup>2</sup>.

<sup>28</sup> A recent audit of the licences in the cadastre system showed that some individuals held more than 50 licences, presumably for purposes of speculation, and there is a moratorium on the issuing of new mineral rights since February 2022.

damage to the environment and biodiversity and carry the cost of remediation and preventive measures. The Mining Act also provides for conditions to be attached to the Mining License aimed at protecting the environment, while conditions of rehabilitation and reforestation are limited to the mining license area. Environmental and forest regulation is, nevertheless, chiefly provided for through reference to the **Environmental Management Act, 2011** (GRZ, 2011) and the **Forests Act, 2015** (GRZ, 2015b), and the Mining Act stipulates that approvals from both ZEMA and the Forest Department are required for exploration and mining to commence (see further Section C3).

Some environmental management duties, however, remain with the MMMD through the **Mines and Minerals (Environmental) Regulations, 1997** (GRZ, 1997a). These were enacted to implement the Mines and Minerals Act of 1995 (GRZ, 1995b) and include EIA process requirements for exploration and mining projects. The stipulated process is broadly aligned with that of the **Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997** (GRZ, 1997b) (the “EIA Regulations”; see further below), while there are some differences in content requirements, application/assessment process, and institutional responsibilities. Apart from the EIA process, the Mines and Minerals (Environmental) Regulations, 1997 include a range of mine-specific provisions relating to mineral waste, air quality/emission and water standards, and hazardous material management. The implementation of the regulations is vested with the **Mines Safety Department** of MMMD that is responsible for health, safety and environmental (HSE) oversight of the mineral sector. The Mines Safety Department thus carries out environmental audits and inspections to ensure that exploration and mining is carried out in accordance with the Mines and Minerals (Environmental) Regulations, 1997.

The Mining Act also requires the developer to deposit cash into the Environmental Protection Fund (EPF), which was established through the **Mines and Minerals (EPF) Regulations, 1998** (GRZ, 1998) to ensure that mining license conditions can be met. According to the regulations, these conditions may relate to mine safety, environmental or human health risks, or to the cost of removal of infrastructure and equipment (and/or shortfall of sales) in case of inadequate cessation of operation. According to the **Mines and Minerals (Environmental) Regulations, 1997** the cash deposit can correspond to a maximum of 20 % of the estimated costs of mine closure. This cost is, in turn, based on rather simple bi-annual closure audits rather than a detailed mine rehabilitation and closure plan. Thus, the EPF cash deposits should not be confused with what is internationally referred to as an *environmental security* or *environmental bond* that according to best practice should amount to full rehabilitation and closure costs at any point in time over the mine life. The EPF is administrated by the Mines Safety Department.

In line with mineral sector policy actions, both the Mines and Minerals (Environmental) Regulations of 1997 and the Environmental Protection Fund (EPF) Regulations of 1998 are currently under review.

## C2.2 Forest Management

Zambia's forest sector policy has developed substantially in recent years in conjunction with the implementation of the REDD+ programme, which the country joined in 2009<sup>29</sup>. Key policy level documents include the **National Forest Policy, 2014** (GRZ, 2014), the **National Strategy to Reduce Deforestation and Forest Degradation, 2015** (CBD, 2015), and the associated **National Investment Plan to Reduce Deforestation and Forest Degradation (2018–2022)** (Climate Investment Funds, 2017).

Compared to previous forest policy, and in line with the overall shift in governance with the 2016 amendment to the Constitution, the current framework introduces a clear shift towards decentralization of forest governance and the concept of community and joint forest management is introduced as well as objectives of awareness creation and local capacity building.

The forest policy framework defines poverty, population increase and forest dependency as the key distal drivers to deforestation and forest degradation. With regards to the effects of mining, it is established that forests are impacted both directly through land claims and indirectly due to in-migration of people from other areas. There are also policy objectives directly aimed at lessening the impact of mining on forests – e.g., by 2020, threatened and sensitive protected areas should have been legislated as “no-go areas” for mining and infrastructure development, and by 2025, the mining industry should contribute to management of indigenous forests.

The National Strategy to Reduce Deforestation and Forest Degradation, 2015, furthermore, acknowledges that governance of the mineral sector, with regards to environmental and forest protection, suffers from segregated management and overlapping mandates. Thus, strategic interventions are defined aimed at improving legislation and institutional performances, e.g., the harmonization of legislation to address overlapping concession systems, identification of gaps and overlaps in legislation and mandates, and the development of mechanisms for collaboration including clear roles and responsibilities.

Forest management in Zambia is primarily implemented through the **Forests Act, 2015** and the overall responsibility is vested with the **Forestry Department** of the **Ministry of Green Economy and Environment**.

The Forest Act defines the overall purpose and management of different types of forests. Thus, **national forests** and **local forests** serve to secure important forest resources, protect ecosystems and biological diversity, and to improve forest resources management and utilization<sup>30</sup>. Additionally, national forests are established to facilitate the management of major water catchments and head waters. An important purpose of local forests is to meet the social, cultural and economic needs of the local community.

The above is to be achieved through the control of forest use and activities based on permits and associated conditions. National forests are located on state-owned land and may not even be entered without a license or permit. With regards to local

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<sup>29</sup> 'Reducing Emissions from Deforestation and Forest Degradation' (REDD). The plus in 'REDD+' refers to “the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries”.

<sup>30</sup> Other forest types are also defined in the Forest Act, including Botanical Reserves and Private Forests, while these are of lesser importance to the current project and thus not further considered.

forests, this restriction does not apply while the Act specifies a range of activities, such as land cultivation, grazing of animals, removal of forest products etc. that are not allowed without a permit of license.

The Forests Act provides for the exercising of rights issued under other legislation, as long as activities do not contradict the provisions of the Forests Act. In this regard, mining is the only right/activity that is explicitly mentioned in the Forests Act to be allowed within national and local forest areas, which may reflect the overall importance of mining to the Zambian economy. Overall, national and local forests are thus not protected areas in the sense that there is a strong restriction of activities that may be allowed, but the focus is instead on ensuring that any use is sustainable through adequate environmental management.

The policy focus on decentralization of governance and the role of communities in forest management is reflected in the Forests Act, and further implemented through the **Forests (Community Forest Management) Regulations, 2018** (GRZ, 2018). While national forests are controlled and managed by the Forestry Department, local forest management may be assigned to either a local community or joint forest management committee<sup>31</sup>. The **Forestry Extension Branch** of the Forestry Department is responsible for forest law enforcement and operates at provincial, district and in some cases sub district level. It is, among other things, responsible for the rehabilitation of degraded and depleted areas, community participation and public awareness on values and benefits of forests, agroforestry and extension services.

#### Note on forest management in national parks and game reserves

Zambia has 480 forest reserves of which some two thirds are classified as Local Forest and about one third is classified as National Forest, and together they cover approximately 7.1 million ha (Turpie, Warr & Ingram, 2015). In national parks, forest management falls under the jurisdiction of the Department of National Parks and Wildlife (DNPW) (GRZ, 2015a). The DNPW also manage wildlife in Game Managements Areas (GMAs), which act as buffer zones surrounding national parks and cover about 22 % of Zambia's land area (WWF, 2004; ZAWA, no date). While extraction of living resources is not permitted in national parks, game management areas are often inhabited and allow a variety of activities, such as timber extraction, mining, and small-scale farming (Turpie et al., 2015).

### C2.3 Environmental Management

Environmental governance in Zambia is principally based on the **Environmental Management Act of 2011** (GRZ, 2011), an umbrella law providing for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources.

Environmental management in Zambia was previously vested with the Environmental Council. The council continuous to exist through the Environmental Management Act, albeit with a name change to the **Zambia Environmental**

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<sup>31</sup> There are several hundred registered community forest management groups in Zambia (pers. comm. With Forestry Department staff).

**Management Agency (ZEMA)**. Thus, ZEMA is in essence established through the Environmental Management Act and assigned with wide ranging responsibilities with the overall aim to ensure the sustainable management of natural resources, protection of the environment, and the prevention and control of pollution.

ZEMA is the authority responsible for the management of the EIA process, which is implemented in accordance with the **Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997 (the “EIA Regulations”)**, and of primary importance to the current project and to the co-management of mineral and forest resources. Even though the EIA Regulations were enacted some 25 years ago, they do include most of the basic components of modern ESIA processes such as both environmental and social considerations, stakeholder consultations and participation, resettlement and compensation etc. In particular social and socioeconomic impact assessments would, however, benefit from more detailed guidance through further sub-laws or guidelines.

ZEMA also assume audit and inspection responsibilities as part of the oversight of industry environmental performances. With the MSD of the MMD being responsible for health, safety and environmental oversight of the mineral sector based on the Mines and Minerals (Environmental) Regulations, 1997 (see Section C2.1), institutional roles in the management and supervision with regards to the EIA process as well as environmental oversight is not clear.

It is interesting to note that the concept of Strategic Environmental Assessment (SEA) was introduced with the Environmental Management Act, 2011. In the perspective of the significant environmental and social impact that may results from large mining projects, and associated in-migration and regional development, SEA may be a useful tool to apply in the context of large mine establishments in rural areas.

## C3 Mapping of Permitting Processes

Sections C3.1–C3.3 describe processes for permitting, supervision and control of mineral exploration, mining and mine closure. The processes are depicted step-by-step in tables with different line colours denoting primary sector authority/stakeholder responsibility, as follows: Blue – mineral sector; Green – environmental sector; Brown – forestry sector; Yellow – land rights stakeholders.

The processes are primarily based on provisions of the Mines and Mineral Development Act (MMDA), the Mines and Minerals (Environmental) Regulations (MMER) and the Environmental Impact Assessment Regulations (EIAR), with some reference to other legislation.

## C3.1 Mineral Exploration

	Activity	Outcome	Responsible authority	Referral authority	Time frame	Reference
1	Initial contact, supervision	Guidance on forest issues <sup>32</sup>	MCD, MSD	FD	N/A	N/A
2	Exploration license application submitted by developer	Registration	MCD	N/A	N/A	MMDA 21
3	Application assessment	Approval/rejection	Mining Licensing Committee	N/A	60 days	MMDA 22, 23
	<p><i>An exploration license is granted if general conditions of the MMDA are met, but exploration works may only commence upon the submission to MMMD/MCD of either (i) an environmental project brief decision letter or a written consent from the appropriate authority.<sup>33</sup> Furthermore, for land occupied as a village or under customary tenure, written consent of the chief and the local authority is required while the Act does not require these consents to be submitted to MMMD/MCS.</i></p> <p><b>On Project Brief:</b> The EIA Regulations do not explicitly require a project brief for mineral exploration (ref Schedule 1 of EIA Regulations). However, a project brief is required for projects located in or near environmental sensitive areas, such as indigenous forests, zones of high biological diversity and areas supporting populations of rare and endangered species (EIAR Schedule 1). The EIA Regulations also provide for ZEMA to request a project brief for projects not listed in Schedule 1, if deemed required (EIAR 3:2,c). Furthermore, the 1997 Mines and Minerals (Environmental) Regulations require an Environmental Project Brief to be submitted to the Director of the Mines Safety Department (MMER 3:1).</p> <p><b>On written consent:</b> MMDA 52:1,f,2 states that mining rights (which includes exploration license) may only be exercised if compliant with relevant provisions of the Forest Act (2015) if within a National Forest, Local Forest, Botanical Reserve or Private Forest. Furthermore, the Mining Licensing Committee shall in their review of the exploration license application take into account if the applicant has obtained the necessary written consent of the appropriate department, for the purpose of this study, the Forestry Department (MMDA 22:1,c).</p>					MMDA 25:1,a MMDA 52:1
4	Acquire consent of Chief and local authority	Written consents	Traditional leadership, local authorities	N/A	N/A	MMDA 52:1
5	Environmental project brief submitted by developer	Decision letter	ZEMA	MMMD (MSD)	40 days	EIAR Schedule 1 MMDA 22(1,d) MMDA 25(1,a,i)
6	Request for written consent submitted by developer <sup>34</sup>	Written consent	Forestry Department	N/A	N/A	MMDA 22(1c) MMDA 25(1,a,ii)
7	Exploration activities may commence (depending on/in line with Decision letter from ZEMA and written consent from the Forestry Department)	N/A	N/A	N/A	N/A	
8	Environmental audit <sup>35</sup>	Audit report	MSD	N/A	30 days	MMER II 8
	<p><i>The law (MMER) provides explicitly for environmental audits of mineral exploration projects to be carried out by independent competent persons, while it does not provide for environmental inspections of exploration projects. In practice, the Mines Safety Department may, however, carry out environmental inspections. It is also assumed that ZEMA would undertake inspections of mineral exploration projects if deemed needed based on the environmental project brief, or in response to complaints.</i></p>					

<sup>32</sup> For example, proponents may be provided with information or encouraged to seek guidance elsewhere on the presence of protected forests in the area, specific forest values, forest management groups for specific consultations etc. This activity is a proposal rather than an reflection of reality as, based on workshop discussions, it appears not to be standard procedure.

<sup>33</sup> Presumably, both a decision letter from ZEMA and a written consent from the Forestry Department are required in practise.

<sup>34</sup> A written consent may be given unconditionally or be subject to conditions specified in the terms of the consent (MMDA 52:2). ZEMA may also attached conditions to the decision letter based on the environmental project brief.

<sup>35</sup> The MMER requires the auditing of exploration, prospecting and mining operations, for the purpose of checking EIS implementation and compliance, prepared by two independent competent persons. This implies that an EIS (and not only Project Brief) is required for mineral exploration while that in all likelihood has never occurred in practice.

## C3.2 Mining

	Activity	Outcome	Responsible Authority	Referral/Support Authority	Time frame	Reference
1	Initial contact, supervision	Guidance on forest issues <sup>36</sup>	Mining cadastre Department (MCD), MSD, local authorities	FD, ZEMA	N/A	N/A
2	Mining licence application submitted	Registration	MCD	N/A	N/A	MMDA 30
3	Application assessment	Approval/rejection	Mining Licensing Committee	N/A	90 days	MMDA 31
	<p><i>The Mining Licensing Committee (MLC) shall take into account: (i) that the proposed operation is compliant with an Environmental Project Brief or EIA decision letter approved by ZEMA (MMDA 31:1, c); and (ii) that the applicant has submitted evidence of any consent needed under any law (here the Forests Act and consent from the Forest Department) (MMDA 31:1, d)<sup>37</sup>. Thus, a Mining Licence should not be issued prior to a decision letter from ZEMA and a written consent from Forestry Department having been submitted to the MMDA. However, in practice, mining rights (including both large-scale exploration and mining licences) are granted prior to evidence of such “approvals”. The licences are granted subject to those approvals being obtained after the granting of the mining right.</i></p>					MMDA 25:1(a)
4	Acquirement of land use/surface rights	Resettlement Action Plan (RAP), resettlement and compensation, if needed; land surface rights	Chiefs, Communities, Land rights holders, Disaster Mitigation and Management Unit	Local/district authorities	N/A	MMDA 55:1; 57:1, Constitution, Lands Act, Local Courts Act etc.
	<p><i>The acquirement of land use rights for the purpose of mining is here treated in a very general way and the roles of various stakeholders have not been established in detail. Nevertheless, this process is largely managed by the proponent/mining company through interaction with local communities, as represented by the Chief. The process of acquiring land use rights commonly starts in parallel with the EIA process and its relationship to the main EIA process is of importance to the implementation of adequate environmental and social management, as discussed further in Section C4.</i></p> <p><i>According to MMDA 39:1, b, the MLC shall in their assessment of the application consider whether the applicant has title to land or written consent from surface right holder. Also, mining rights may not be exercised without the written consent of the Chief and the local authority (MMDA 52:1, c). However, similar to the case of ZEMA and Forest Department approvals (cf. above), mining rights are in practice granted prior to the submission of evidence of land title and mentioned consents, subject to those being obtained after the granting of the mining right.</i></p>					
5	Environmental project brief submitted	Decision letter	ZEMA	MMMD (MSD)	40 days	EIAR Schedule 1 MMDA 31:1(c)

<sup>36</sup> For example, proponents may be provided with information or encouraged to seek guidance on the presence of protected forest in the area, specific forest values, forest management plans, forest management groups for specific consultations etc. This activity is a proposal rather than a reflection of reality as, based on workshop discussions, it appears not to be standard procedure at initial contact. **Note:** The (Draft) National Guidelines for Community Forestry (GRZ, 2018b) in Zambia promote awareness raising and sharing of information on community forestry groups and geographical areas with relevant (e.g., mining) authorities.

<sup>37</sup> MMDA 52(1): A holder of a mining right or mineral processing licence shall not exercise any rights under this Act without due compliance with the relevant provisions of the Forests Act, 2015 upon any land declared to be a **National Forest, Local Forest, Botanical Reserve** or Private Forest, as defined in that Act.



	Activity	Outcome	Responsible Authority	Referral/Support Authority	Time frame	Reference
6	Preparation of TOR for EIS <sup>38</sup> , incl. public consultations <sup>39</sup>	Internal approval/rejection	ZEMA	N/A	5 days	EIAR 8
7	Preparation of EIS, incl. public consultations <sup>40</sup>	Registration	ZEMA	N/A	N/A	EIAR 9, 10
8	EIS submission and review, incl. ZEMA public meetings/hearings if deemed required <sup>41</sup>	Decision letter	ZEMA	MMMD (MSD) FD	?	EIAR 14–21
9	Request for written consent submitted by proponent	Written consent	FD	N/A	N/A	MMDA 31:1(d)
10	Mining construction/ activities may commence (depending on/in line with Decision letter from ZEMA and Written consent from the Forestry Department)					
11	Environmental audit by regulator <sup>42</sup>	Audit report	MSD	N/A	30 days	MMER II 8
12	Environmental audit by developer <sup>43</sup>	Audit report	ZEMA	N/A	12–36 months after start or end, or any time as required.	EIAR 28
13	Environmental inspection <sup>44</sup>	Inspection report	MSD	N/A	Any time	MMER VII 64
14	Environmental inspection <sup>45</sup>	Inspection report	ZEMA	N/A	Any time	EIAR 29

<sup>38</sup> The TOR shall be developed in cooperation with ZEMA and take into account issues contained in the 3rd schedule of the EIAR. These include for example biodiversity, landscape and land use/land potential but no direct reference is made to forests and forest values.

<sup>39</sup> Including public Govt. agencies, local authorities, non-governmental and community-based organisations and interested and affected parties (EIAR 8:2).

<sup>40</sup> Publication of project effects and benefits for at least 15 days, followed by stakeholder meetings held by proponent with communities.

<sup>41</sup> To facilitate broad review and comment, EIS copies are distributed to relevant ministries, local government units, parastatals, non-governmental and community-based organisations, interested and affected parties, and place in public buildings in the vicinity of the project site as well as newspaper notifications and radio broadcasts.

<sup>42</sup> For the purpose of checking EIS implementation and compliance, prepared by two independent competent persons; First audit within 15 months of commissioning of operation, thereafter as called upon by MSD.

<sup>43</sup> Carried out by at least two of the persons that prepared the EIS.

<sup>44</sup> To ensure that the mining operation does not have a severe impact on the environment and the records kept are in accordance with the MMDA and MMER.

<sup>45</sup> For the purpose of investigating the implementation of any measures in response to an environmental audit.

### C3.3 Rehabilitation and Closure

	Activity	Outcome	Responsible authority	Referral authority	Review time	Reference
1	Mine rehabilitation and closure planning	Mine closure plan	MSD	N/A		MMER 5 and Schedule 11
	<i>The MMER do not specifically stipulate that a Mine Closure Plan should form part of the EIS, and do not provide much detail as to what mine closure planning should include or be managed. However, MMER 5 requires that costs for rehabilitation, decommissioning and operational costs of protecting the environment after closure should be included in the EIS. Rehabilitation costs should be based on the form in the third schedule of the MMER, and these are limited to surface treatment activities.</i>					
2	Annual rehabilitation audits/ EPF assessment	Establishment of EPF Category 1, 2 or 3	MSD	N/A	N/A	MMER 66 and Schedule 11
	<i>While the MMER, Schedule 11 stipulate annual rehabilitation audits, these are undertaken on a bi-annual basis. The categorization is based on the level of fulfilment of various environmental management measures, e.g. from permits and plans in place for a new project (Category 3) to e.g. proven progress towards compliance with EIS (Category 1). The categorization forms the basis for the estimation of payments into the EPF. Note: See end of Section C2.1 for discussion on the EPF.</i>					
3	Mine closure application <sup>46</sup>	Closure certificate and cancellation of mining right	MSD	N/A	N/A	MMER 6 (1)
4	Mine dump closure application <sup>47</sup>	Dump closure or rejection of application	MSD	N/A	4 weeks	MMER 20
5	Post-closure plans	Ensure post mining land stability and post closure land use	MSD	N/A	N/A	MMER Schedule 2 and 11
	<i>Note: Rehabilitation, closure and post-closure issues, such as monitoring of post-closure impacts on the bio-physical environment, are considered to a very limited extent in existing mineral sector and environmental law and regulations. Nevertheless these aspects should, and are most often, included in an EIS and assessed as part of the ESIA process.</i>					

<sup>46</sup> Shall include an audit report of the environment surrounding the mine site, prepared by an independent person. A mine site shall be closed within sixty days of the application.

<sup>47</sup> Should be accompanied by an audit report on the impact of the dump on the environment prepared by an independent competent person as well as records and reports on the implementation of rehabilitation measures.

## C4 Reflections and Key Takeaways

Below follows reflections and key takeaways from the assessment of the policy, legal and institutional framework and the mapping of the permitting and oversight process. These reflections and key takeaways are built into the main report's Section 5: Key Findings and Recommendations, and Section 6: Proposals for Continued EGP Programming.

**The rather comprehensive Zambian policy base for environmental and natural resources management appears not to be efficiently implemented through updated legislation and institutional mandates.** Thus, there exists a number of policy documents with objectives and strategies aimed at improved mining, forest and environmental management while the permitting and oversight processes are largely implemented in accordance with older standard practice based on the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997 (by ZEMA) and the Mines and Minerals (Environmental) Regulations, 1997 (by the Mines Safety Department). In light of Zambia's aspiration to significantly increase copper production in the near future (cf. main report, Section 2.2), and with a general lack of governance development in line with policy guidance, there is a considerable risk of increased deforestation and forest degradation due to mining development, including in areas of pristine forests.

**Related to the above, the governance of forest-mining interactions would benefit from improved institutional collaboration, and a review of institutional mandates.** Improved institutional collaboration aimed at enhanced forest-mining governance is a key strategic intervention of the forest policy framework and there is an overall need for a detailed assessment of the policy and legal framework, and institutional roles. In this regard, forest-mining co-governance may benefit from a more central inclusion of the Forestry Department in the permitting and oversight processes. Currently, the Forestry Department appears to be principally involved through the EIS review procedure, based on which a written consent is provided to the Mining Licensing Committee, with possible conditions attached. Reviewing the often lengthy and complex EIS is a considerable and challenging task for an institution with limited capacity.<sup>48</sup> Furthermore, there is a risk that reviews against the Forest Act, which explicitly allows for mining to be undertaken in protected forests, do not consider impacts on forests and forest values at a sufficiently detailed level. Representation of the Forestry Department on the Mining Licensing Committee could potentially serve to ensure that forest management is given more weight in the permitting process and that forest impacts are more efficiently addressed and evaluated in the assessment of mining rights applications. A central involvement in the mineral permitting process would also facilitate a more informed and constructive EIS review. The inclusion of the Forestry Department on the committee may also provide for more constructive communication around forest impact and conservation with applicants.

It is, furthermore, noted that the mineral sector and environmental sector EIA regulations, implemented by the MSD of MMMD and ZEMA respectively, are largely overlapping but also somewhat inconsistent. In practice, ZEMA manages the ESIA process and the MSD assumes key responsibility for inspections and audits, while

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<sup>48</sup> This was discussed at the project's workshops but see also Day et al. (2014).

they appear to rely on ZEMA for certain technical know-how regarding relevant issues.<sup>49</sup> This creates room for both uncertainties around regulatory accountability and an inefficient use of resources. Moreover, it is noted that it is uncommon for an institution responsible for promoting the mineral sector to also play a role in its environmental regulation.

**Early intervention, already at the stage of mineral exploration license application, could serve to enhance the co-management of mineral and forest resources.** Mineral exploration companies sometimes approach authorities ahead of the submission of a license application to seek information about for example the application procedure. At this stage, or at the time of application submission, there appears to be little guidance given to developers in terms of forests, forest values, ecosystem services, and the nature of forest management in the area (e.g. community or joint forest management groups, forestry department management etc., see further next paragraph). The early provision of relevant information and related guidance to the developers could facilitate the integration of forest considerations into the mineral development project already at the initial stages of the mining cycle.

**Mining in forest areas require more stringent regulation in order to protect the remaining forest, and the ecosystem at large in the area.** The Forests Act explicitly allows for mining to be undertaken within National and Local Forest Areas as long as the activity conforms to the requirements of the act<sup>50</sup> and the degazetting of national forest reserves in Zambia has also occurred for the purpose of mining. This is somewhat contradictory to earlier versions of Zambian mineral policy directives, which included the gazetting of national and local forests and improved environmental regulation to ensure their protection. Mining in forests or ecologically sensitive areas requires significantly more comprehensive impact assessments compared to standard practices (e.g. World Bank, 2019a), which are often limited to narrative descriptions of changes in forest cover and listing of key/threatened floral and faunal species. The development of detailed guidelines for mining in forest areas would serve to assist the industry in the implementation of more comprehensive ESIA, and these would also provide for improved ESIA management and EIS assessments by decision-makers (principally ZEMA, but also reviewing institutions such as the Forestry Department and the Ministry of Mines and Mineral Development).

**There is a comprehensive framework for community and joint forest management in policy and law, and promoted by detailed guidelines, that could be leveraged off for improved mining-forest co-management.** In parallel with the decentralisation of parts of forest management, forest policy and law emphasise participatory forest management and it is seen as particularly important in the context of low state capacity and large areas of forest under customary tenure (Forest Trends, 2021). The several hundred community forest management groups, or the formation of new groups, could be leveraged off in the early stages of the mining cycle for the purpose of improved forest management and improved EIAs. Local forest authorities could play an important role in this context, not only in the promotion of the establishment of community forest management groups but also

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<sup>49</sup> The involvement of the Forestry Department in joint inspections with the Mines Safety Department, depending on the forest context of a project, may also be considered.

<sup>50</sup> Mineral exploration is not mentioned in the Forest Act but would be allowed through practice as exploration is (usually) a prerequisite to mining.

as a mediator or promoter of company-community cooperation, but their capacity would in general need to be enhanced.

**As the land acquisition and resettlement processes are largely managed by the proponent/mining company through interaction with local communities, in part represented by the Chief, there is a risk of insufficient consideration of impacts on forests and forest values.** The process of acquiring land use rights commonly starts in parallel with the EIA process. Although local communities may be well aware of local forests and the values associated with them, they may be less aware of values connected to forests in the resettlement area and less knowledgeable of the wider ecological impacts and long-term consequences of deforestation and changes in forest use. The provision of support to local communities, forest management groups, and the Chief can enhance informed decision-making and facilitate the establishment of terms of agreements between developers and the local community that serve to protect both the forest ecosystem at large as well as forest values of importance to the community. This support may be provided by relevant authorities, and any support mechanism may also consider the inclusion of academia and civil society organisations that are involved in this field in Zambia.

**Mining-related impacts on forests are to a large extent associated with in-migration to mining areas and may also be associated with resettlement of affected people, which is not adequately considered in the Environmental Impact Assessment (EIA) process.** According to the EIA Regulations, an Environmental Impact Statement (EIS) should describe impacts and mitigation relating to local communities, resettlement and in-migration. However, this tends to be discussed and evaluated mostly in terms of social, economic and cultural impacts and even though impacts on forests and forest resources related to resettlement and in-migration should theoretically be taken into account in a risk-based environmental assessment, this is seldom the case. Social, economic and cultural impacts are also the focus of law and regulations and there are no clear legal provisions or guidelines for assessing impacts on the bio-physical environment/forests related to resettlement and in-migration.

**Related to the above, mitigation of wider negative impacts and the enhancement of positive impacts could benefit from regional development planning, based on Strategic Environmental Assessments (SEA).** The Environmental Management Act, 2011 stipulates that a Strategic Environmental Assessment (SEA) should be undertaken by proponents of a policy, plan or programme with potential negative environmental effects. SEAs form part of the fundamental approach to Forest Smart Mining (World Bank, 2019a), and in some jurisdictions SEA is being introduced ahead of large scale mining development with regional impacts expected to span geographical areas far beyond the mining licence. The ambiguous allocation of responsibilities and the typically large scale and complexity of in-migration, would necessitate collaborative assessments and planning involving both developers and government entities.

**There is no financial mechanism or instrument in place in Zambia to ensure adequate environmental rehabilitation and mine closure upon the cessation of mining.** The only current instrument aimed at ensuring adequate environmental rehabilitation is the Environmental Protection Fund (EPF). As described, this instrument does not correspond to what is commonly referred to as an actual environmental bond or environmental security. This is of some concern from a forest protection perspective as mining impacts forests directly through land

clearance and may also have an in-direct impact through for example dusting from tailings dams, uncontrolled water discharges etc. Thus, there is a need to ensure that sufficient funds are available at any point in time of the life of a mine for adequate rehabilitation and closure. In this regard, both regulations that are in place for the management of the EPF and related environmental performance assessments and the estimation of required cash deposition (Mines and Minerals (EPA) Regulations, 1997; Mines and Minerals (Environmental) Regulations, 1997) are currently under review.<sup>51</sup> It is of additional concern that management of the fund is vested with the mineral development authority rather than with environmental authorities as it may be considered a conflict of interest that the institution responsible for the promotion of the mineral sector is also charged with a principle environmental oversight responsibility. In any case, updated law/regulations aimed at the implementation of a proper environmental bond need to ensure that it is aligned with the requirements and provisions of environmental law/regulations implemented by ZEMA.

## C5 Bibliography

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<sup>51</sup> Note that the lodging of cash by mining companies into the EPA is regulated through the Mines and Minerals (Environmental) Regulations of 1997 implemented by the Ministry of Mines and Mineral Resources rather than the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997 implemented by ZEMA.



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# Appendix D.

## Stakeholder Consultations

### D1 Introduction

Tackling the complex issues surrounding mining and forests necessitates active engagement with stakeholders. The project has been committed to this engagement and employed various forms of consultation, including key informant meetings and multi-stakeholder workshops. These consultations are instrumental in validating results, fostering discussions, and soliciting valuable feedback. The stakeholder base comprises individuals and groups with vested interests in addressing the identified challenges, whether they are directly affected by these issues or possess the ability to influence their resolution. Throughout all phases of stakeholder consultations, an ethos of openness, transparency, and collaboration has been maintained.

This report is the culmination of a collaborative process spanning several months, marked by in-depth discussions with stakeholders. It is organized as follows. Firstly, the stakeholder identification and analysis process is presented, shedding light on the key stakeholders identified. Secondly, the multi-stakeholder workshops are presented, first, briefly summarizing each workshop's purpose, participants, and outcomes, and then proceeding to details regarding results verification and discussion, and concluding key findings and recommendations.

### D2 Stakeholder Identification and Analysis

#### D2.1 Overview

A stakeholder identification and analysis process involved identifying primary stakeholders and intermediaries, mapping their relationships, and analysing their knowledge, attitudes, and actions related to the project's objectives.

In the initial step, stakeholders were categorized into two main groups:

- **Primary Stakeholders:** These are individuals, groups, or institutions with a direct interest or the authority to influence project outcomes. They are the key agents of change, expected to transition from one behaviour to another or from inaction to action in response to the project's objectives.
- **Intermediaries:** Intermediaries are individuals, groups, or institutions who can assist in achieving our policy and communication objectives by reaching out to other stakeholders and advocating for their support.

Following stakeholder identification, a stakeholder map was created, visually representing the stakeholder landscape and providing insights into the roles and relationships of individuals, groups, and organizations within the project. Once the most relevant stakeholders were identified and mapped, they were engaged through meetings and invited to participate in planned multi-stakeholder workshops. Stakeholder identification was an iterative process, employing a snowball

technique to discover additional stakeholders. Subsequently, an analysis of stakeholder knowledge, attitudes, and actions commenced. This process was guided by pertinent inquiries pertaining to their awareness, motivation, mandates, needs, and potential strategic partnerships. and yielded valuable insights that shaped the definition of project objectives and activities.

Stakeholder identification and analysis have inherent limitations. Some stakeholders may be inadvertently omitted, and stakeholder relationships and interests can evolve over time, requiring periodic updates. The process of stakeholder identification and analysis is ongoing, iterative, and adaptable. It involves continuous communication, engagement, and feedback with stakeholders to ensure their perspectives and needs are considered throughout the project’s lifecycle. This structured approach aims to foster productive relationships with stakeholders, align project objectives with their interests, and drive meaningful change in the context of mining/forest interactions in Zambia.

## D2.2 Key Stakeholders Involved in the Project

**Table 2. Key stakeholders consulted, listed by category.**

Type	Institution
Government and related	Ministry of Mines and Minerals Development (MMMD) MMMD – Mines Safety Department (MSD) MMMD – Cadastre Department MMMD – Geological Survey Department MMMD – Planning Department Ministry of Green Economy and Environment (MGEE) MGEE – Forestry Department MGEE – Zambia Environmental Management Authority (ZEMA) Zambia Chamber of Mines (ZCM)
Civil Society	Transparency International ZM (TIZ) Zambia Extractive Industries Transparency Initiative (ZEITI)
Private sector	First Quantum Minerals (FQM) Kobold Metals
Academia	The Copperbelt University University of Zambia
Associations	Small-scale miners Association (FSSMAZ) Women in Mining Association (AZWIM) Law Association of Zambia (LAZ) Ukwimi cooperative
Communities	Community in the vicinity of Mkushi Community in the vicinity of Solwezi

## D2.3 Key Input

During the consultation process, stakeholders were contacted with the aim of engaging at least one representative from each stakeholder category. Meetings were arranged with stakeholders, and both in-person and online meetings were conducted as necessary.

## GOVERNANCE AGENCIES

Ministry of Mines and Minerals Development (MMMD) – Cadastre Department (MCD): During the meeting with the Chief Registrar of the Cadastre Department, discussions highlighted challenges related to mineral license applications and potential conflicts with other authorities. The Cadastre Department's role in accepting and processing mineral license applications, as well as advising the Minister, was emphasized. Concerns regarding the approval process for licenses and the need for better coordination with other relevant agencies were discussed.

MMMD – Geological Survey Department (GSD): Geologists from the GSD, involved in the UNDP/EU-ACP Development Minerals Project and the EGP's Forest-Mining Project, shared insights into their work. Their engagement in these projects and their understanding of geological aspects related to mining and forests were discussed.

Ministry of Green Economy and the Environment (MGEE) – Zambian Environmental Management Agency (ZEMA): The meeting with ZEMA representatives highlighted their role in facilitating Environmental Impact Assessments (EIAs) and the environmental impact assessment process. ZEMA's collaboration with the Mines Safety Department (MSD) and their mandate in overseeing the EIA process were discussed. Issues related to Exploration Licences and their implications for forest areas were also considered.

## NGOS AND CSOS

Zambia Extractive Industries Transparency Initiative (ZEITI): During the meeting with the National Coordinator of ZEITI, the importance of forests to Zambia and the public, both environmentally and economically, was emphasized. Discussions revolved around the political significance of forest issues, allegations of corruption, and the impact on local communities.

Transparency International Zambia (TIZ): TIZ representatives highlighted the alignment of laws governing mining, environmental protection, human rights, and transparency. Challenges arising from the lack of coordination and interaction among relevant institutions were discussed. The need for more honest and less diplomatic discussions among stakeholders was emphasized.

West Lunga Conservation Programme (WLCP): The Park Manager from WLCP discussed the organization's conservation efforts, its collaboration with Community Forest Management Groups (CFMGs), and the challenges faced in promoting sustainable forest use and income generation. Concerns regarding the lack of cooperation between the FD and the unclear boundaries of forest reserves were highlighted.

## PRIVATE (MINING) SECTOR

First Quantum Minerals (FQM): FQM's Group Environmental Manager shared insights into FQM's collaboration with government agencies and local communities in managing forest areas near their mines. The Joint Forest Management Agreement (JFMA) was described as a positive collaboration initiative. The challenges associated with uncertain forest boundaries and infrastructure within forest areas were discussed. The importance of strong collaboration between mining companies and the FD at the local level was emphasized.

Kobold Metals: The Country Manager for Zambia from Kobold Metals noted that large-scale companies like Kobold generally comply with mining and forest-related legislation. They also discussed the issues with the protection of certain Forest Reserves and the challenges surrounding uncertain forest area boundaries. The conversation highlighted the project's potential to enable the publication of forest area information and boundaries.

## D3 Multi-Stakeholder Workshops

### D3.1 Overview

#### WORKSHOP 1: INITIAL CONSULTATIVE MEETING IN LUSAKA (MAY 2023)

**Purpose:** The primary objective of this workshop was to establish a foundational understanding of the project by presenting the findings of previously completed literature reviews and permit processes mapping. It aimed to engage a select group of participants representing key regulatory agencies and departments, setting the stage for discussions on the project's goals and initial findings.

**Participants:** The workshop brought together participants from various key regulatory agencies and departments, including MMMD – Geological Survey Department, EU-ACP Project, MMMD – Mines Safety Department, MMMD – Mineral Cadastre Department, and MGEE – Forestry Department.

**Outcomes:** The meeting served as a starting point for the project, providing participants with insights into the existing literature and permit processes related to mining and forests. It facilitated discussions and verification of these findings, establishing a common understanding among stakeholders.

#### WORKSHOP 2: SOLWEZI WORKSHOP IN NORTH-WESTERN PROVINCE (JUNE 2023)

**Purpose:** The second workshop had a broader scope, aiming to create a comprehensive dialogue among a diverse range of stakeholders. In addition to reviewing literature and permit processes, it sought to explore community forest management. The field trip to Ntambu was a significant component of this workshop.

**Participants:** This workshop included representatives from regulatory agencies, associations, academia, and various organizations. Participants encompassed MMMD – Geological Survey Department, EU-ACP Project, MMMD – Solwezi Regional Mining Bureau, ZEMA, CBU – School of Natural Resources (Department of Forestry), CBU – Africa Centre of Excellence for Sustainable Mining, FSSMAZ – Small-scale miners Association, AZWIM – Women in Mining Association, MGEE – Forestry Department, Trident Foundation Limited, and First Quantum Minerals.

**Outcomes:** The workshop expanded the stakeholder engagement process by involving a wider range of participants. The field trip to Ntambu provided firsthand insights into community forest management. Stakeholders discussed and shared their views on the existing challenges and opportunities in the context of mining and forest interactions.



### WORKSHOP 3: FINAL WORKSHOP IN LUSAKA (AUGUST 2023)

**Purpose:** The final workshop aimed to present the preliminary outcomes of the project and provide a platform for a comprehensive discussion on the various aspects of deforestation related to large-scale mining projects. It focused on permitting and oversight processes, gaps in legislation, and proposals for improvement in the mining/forest domain.

**Participants:** This workshop featured wide stakeholder participation, including regulatory agencies, mining companies, community representatives, academia, and civil society representation. Participants represented MMMD (Planning Department, GSD, and Cadastre Departments), UNDP (Deputy Resident Representative), MGEE (Forestry Department), communities potentially impacted by mining in or near the forest (representatives from Mkushi and Solwezi), civil society (ZEITI and TIZ), mining industry (representatives from First Quantum Minerals (FQM)/Trident and Kobold Metals), academia (representatives from the Copperbelt University), and associations (Law Association of Zambia, CEECA, Ukwimi cooperative).

**Outcomes:** The final workshop provided an opportunity to share the preliminary findings of the project with a wide range of stakeholders. Discussions revolved around the root causes of deforestation linked to large-scale mining projects, examining permitting and oversight processes, identifying legislative gaps, and proposing improvements. The workshop culminated in focus group discussions and plenary sessions, generating policy recommendations to address the identified challenges and promote responsible mining practices.

## D3.2 Results Verification and Discussion

The verification and discussion process during the workshops played a vital role in strengthening the project's findings and generating valuable insights. An overview of this process is presented below.

### VERIFICATION OF FINDINGS

During the workshops, a critical aspect was the verification of findings. Findings were presented to the stakeholders, encompassing the mapping of permitting processes and legislation, satellite imagery analysis, and forest value mapping. Stakeholders were specifically asked to verify the presented findings based on their expertise and local knowledge. The verification process involved a critical evaluation of the presented data, methodologies, and conclusions to ensure accuracy and reliability. Each presentation was followed by a group discussion, allowing stakeholders to express their feedback and concerns, fostering a comprehensive understanding of the findings.

### DISCUSSIONS

The workshops employed different discussion formats to engage participants effectively:

**Workshop 1 – Lusaka (May 2023):** This workshop featured full group discussions with a moderator posing guiding questions. It encouraged open dialogue and debate among participants, allowing them to express their perspectives on the presented findings.

Workshop 2 – Solwezi (June 2023): In this workshop, participants were divided into smaller groups, each tasked with addressing specific questions related to the presented findings. These focus group discussions allowed participants to delve into the details of the findings and their implications. Subsequently, participants reconvened to share and summarize the insights gained within their respective groups in a full group setting. This approach fostered in-depth and meaningful discussions, ensuring that participants thoroughly examined the findings.

Workshop 3 – Lusaka (August 2023): This workshop incorporated two discussion modes. Firstly, participants engaged in focus group discussions, structured around their stakeholder category. These discussions revolved around specific questions based on project findings and insights from previous workshops. On the subsequent day, participants reconvened for plenary discussions that included all attendees. These discussions resulted in policy recommendations to address identified challenges and promote responsible mining practices. Participants also had the opportunity to propose future initiatives for the Forest and Mining Project, focusing on sustainable mining and forest conservation in Zambia.

### D3.3 Key Findings and Recommendations

The workshops yielded a host of key findings and recommendations that addressed various complex challenges at the intersection of mining and forest conservation. Among these findings:

- The mapping of forest values highlighted a potential issue of in-migration, with newcomers prioritizing short-term economic gains due to their lack of cultural and historical connections to local forests.
- Resource challenges took the spotlight, emphasizing the need for capacity building and modern approaches to overcome issues like limited access to real-time data and equipment.
- Proposals for collaboration between the legal sector, academia, and regulatory bodies were put forward, aiming to identify gaps, conduct research, and ensure legal compliance. However, this collaboration hinged on the revision of environmental legislation and regulations.
- Strong support emerged for integrated systems that would overlay forest locations onto mineral rights, enhancing transparency and promoting collaboration between various agencies.
- Stakeholder engagement came into sharp focus, advocating for comprehensive education, capacity building, and sensitization. Ensuring inclusivity and meaningful participation, guided by relevant laws, became a central tenet.
- The recommendations spanned a range of areas, including detailed valuation of forest stocks, value chain mapping, reforestation, land use zoning, and conservation agriculture.
- Proposals for new or additional legislation covered aspects related to protected areas, mine site monitoring, long-term environmental bonds, and more detailed mine closure regulations.
- The necessity of revising the Mines and Minerals Development Act to include the Forestry Department in the Mining Licensing Committee found favour among participants.

- The development of guidelines for mining in forest areas emerged as a priority.
- Moreover, the discussions brought forth recommendations for public awareness campaigns and education programs aimed at enlightening local communities about the consequences of mining in forested areas.
- Promoting rigorous Environmental Impact Assessment (EIA) processes, along with regular monitoring and auditing of EIAs, was seen as pivotal for maintaining environmental compliance and effective regulation.
- Advocating for alternative energy sources to reduce reliance on charcoal production garnered significant attention as a means to mitigate deforestation.

In general, these discussions underscored the critical role of collaborative engagement and open dialogue in addressing the multifaceted challenges at the intersection of mining and forest conservation. The workshops provided a valuable platform for stakeholders to come together, fostering a rich tapestry of insights and recommendations. Ultimately, these outcomes have made a substantial contribution to the project, advancing the cause of responsible mining practices and forest preservation in Zambia.

## D4 Conclusions

This project, focused on mining and forest interactions in Zambia, involved extensive stakeholder consultations and multi-stakeholder workshops. Through this process, key findings and recommendations have emerged, addressing the intricate challenges at the crossroads of mining and forest conservation.

Stakeholder consultations played a vital role in understanding the diverse landscape of actors and issues involved. A series of multi-stakeholder workshops further enriched the project's insights. These workshops brought together various stakeholders, fostering open discussions, verification of findings, and the generation of recommendations. The key findings and recommendations span a wide spectrum of issues in this domain. They encompass topics such as in-migration, resource constraints, legal and academic collaboration, inter-agency synergy, stakeholder engagement, valuation and mapping, new legislation, environmental impact assessment, public awareness campaigns, and alternative energy sources. The workshops also provided a valuable platform for stakeholders to collaborate and collectively address these challenges. Ultimately, these outcomes have made a substantial contribution to the project, advancing the cause of responsible mining practices and forest preservation in Zambia.

# Forest and Mining Interaction in Zambia

A study of mineral sector governance, forest values and deforestation in Zambia, including recommended initiatives to improve mining-forest management

The Environmental Governance Programme (EGP) is a joint initiative of the Swedish Environmental Protection Agency (SwEPA) and the United Nations Development Programme (UNDP) where various countries are supported in the integration of environmental management and human rights into the governance of the mining sector.

One of the EGP projects in Zambia – the Forest and Mining Project – considers how forests are impacted by mineral sector development and how forest protection can be improved. The project was born out of the fact that the green energy and digital transitions will require more mining and new mines. Furthermore, many of these new mines are likely to be situated in forested areas, including intact or otherwise ecologically valuable forests and/or undeveloped areas. To ensure a green and just transition and recovery, concerns over impacts on forests and associated human rights impacts must be understood, prevented, mitigated, and managed throughout the mining cycle, and particularly during the early stages of the mining cycle.

