

Mine Closure in the Zambian Copperbelt: Scenarios for Sustainable Development

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Extended Abstract



Figure 1. Location of Zambia and the Copperbelt.

In the 1930s industrial mining and processing of copper commenced in the upper Kafue River catchment, near a watershed that now marks the international boundary between the Republic of Zambia and the Democratic Republic of Congo. The new mines, and the towns that arose around them, were seen as a celebration of an industrial triumph over the wilderness. In these early days, the clearing of woodland was seen as advancement and the extension of colonial power as a blessing to Lamba people who had long lived in the region.

In that age, it is not surprising that no assessment of the impact on biophysical and social systems was undertaken. Zambia today bears this legacy; cities have been created around vast mining-industrial complexes which are no longer profitable. Population density in the Copperbelt is now ten times greater than the concentration of people sustainable by traditional agricultural systems (Limpitlaw, 2003). After more than sixty years of copper production by private companies, and later the Zambian State, the mines of the Copperbelt are nearing the end of their lives. Some, such as the Nchanga open pit, a 400 m deep, 4 km by 3 km excavation, have less than five years life left. When these mines close, the Copperbelt cities will lose their economic life-blood. They will still have hundreds of hectares of unstabilised tailings impoundments and rock dumps, sedimentation in the rivers and contaminated sites. With so little time left to plan for closure and so few resources to finance it, the priorities for the one million inhabitants of the Copperbelt and the woodland ecosystem that supports them must be determined. This paper contrasts some of the major threats to sustainability that are present in the Zambian Copperbelt and attempts to provide a basis for prioritisation.

1. Planning for Closure: the area surrounding the mine

Closure plans for a large mining area need to incorporate the areas surrounding the mines as well as the mining lease areas. This greatly increases the complexity of the closure process, but has the potential to improve the sustainability of areas previously dependent on mining.

The mining lease area of the former Nkana Division of Zambia Consolidated Copper Mines (ZCCM)¹ lies near the city of Kitwe in the Zambian Copperbelt. Although Kitwe's economy is diversified by Zambian standards, the city is still highly dependent on copper mining and will be significantly affected by mine closure. The map of Nkana in figure 3 shows mine installations in the lease area. These would traditionally have been the focus of a closure planning exercise. Figure 4 shows the section of the upper Kafue River catchment in which the Nkana Division lies. This

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¹ This division has been privatised and is now owned by Mopani Copper Mines plc.

map shows land cover classes and indicates the extent of agricultural land use around the principal cities in this part of the Copperbelt.

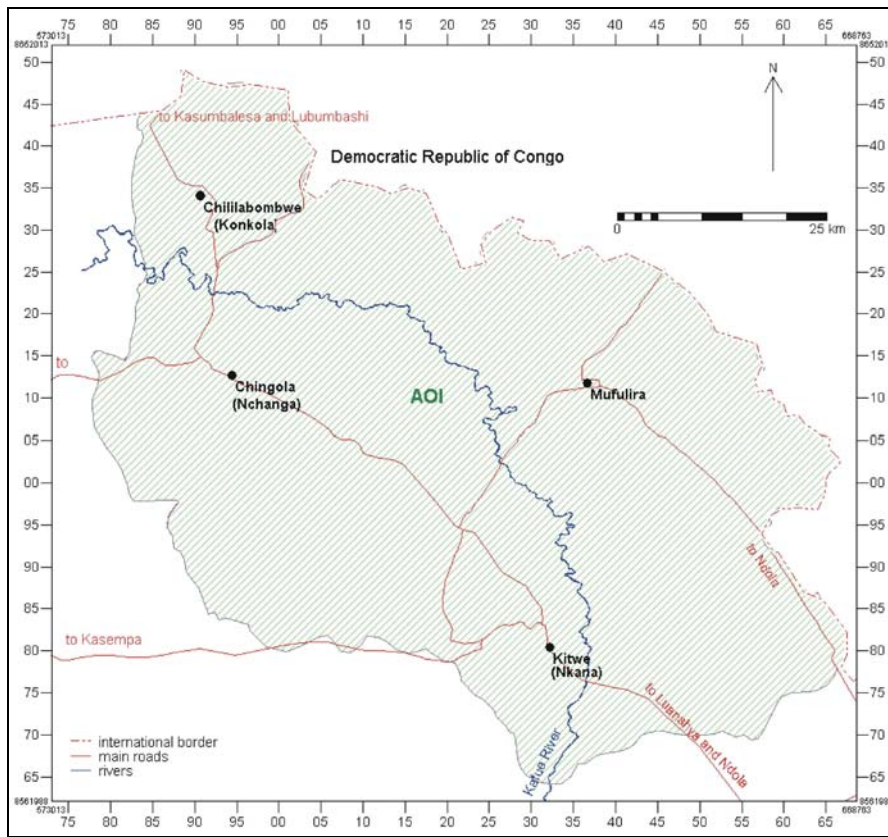


Figure 2. Major Copperbelt towns in the upper Kafue (the area of interest – AOI) (mines indicated in parenthesis). The Universal Transverse Mercator (UTM) coordinate system is used for all maps (zone 35L with the Clarke 1880 spheroid).

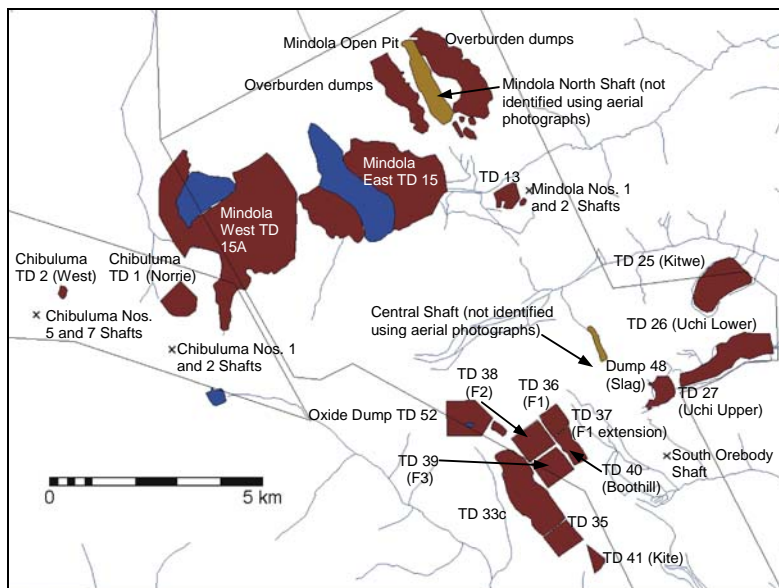


Figure 3. Mining infrastructure at Nkana and Chibuluma (excluding Chibuluma South) in 2000.

From figure 4 it is apparent that agriculture, mostly at a subsistence level, extends into the woodlands surrounding the mining towns for tens of kilometres. The extent of the clearing of woodlands has increased in recent years as the mines have become less viable and have retrenched workers (Limpitlaw, 2002).

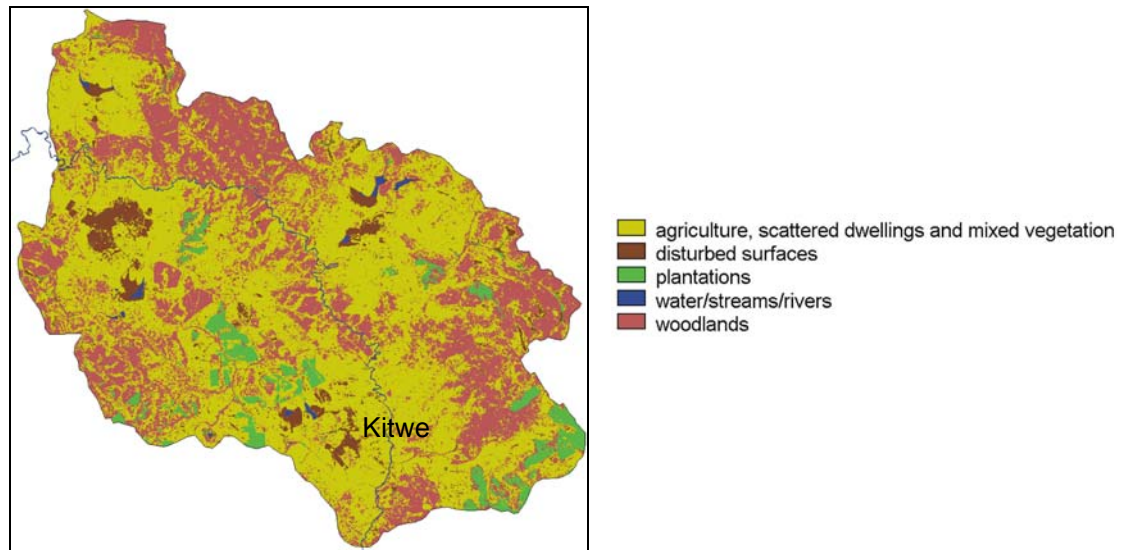


Figure 4. Land cover in the upper Kafue in the year 2000.

The population in the Copperbelt is dependent on copper mining. Without mining, the livelihoods of the communities in areas surrounding the mines are threatened. The environment surrounding the mines is also likely to suffer increased levels of degradation as increasing numbers of people turn to subsistence agriculture to survive.

2. Planning for Closure: identifying priority sites in the lease area

Mine installations need to be assessed for current and future pollution potential. To facilitate this, a simple method of mapping chemical contamination over a large mining lease has been developed. Samples of water, soils and vegetation were collected and analysed for metal concentrations. The results were examined statistically. Samples are either drawn from populations that are associated with pollution or from samples associated with natural background conditions. Using these two classifications, pollution maps can be plotted for each sampling medium. The map shown in figure 5 integrates the three media sampled at Nkana and provides an overview of pollution in the mining area.

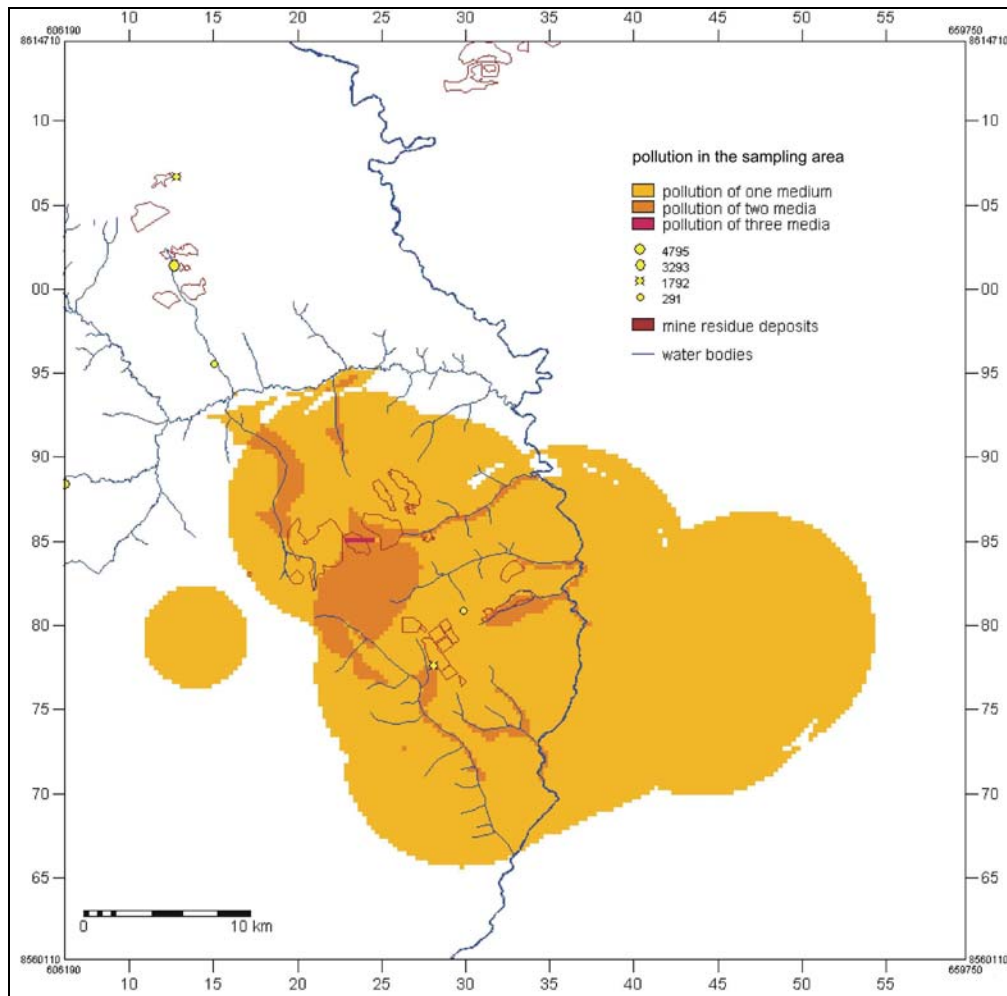


Figure 5. The integrated pollution map. Areas that are undefined are white. Yellow circles represent groundwater sulphate concentrations.

Planning for mine closure must integrate the requirements for on-site environmental rehabilitation and off-site sustainable development. This paper discusses the trade off that must be considered in this process.

References

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