Linking long-term material demand scenarios to regional land use change for mining: a framework to explore future impacts of mineral development on terrestrial biodiversity and water resources

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Abstract

Primary demand for metals has been rapidly increasing due to adoption of modern technology, population growth, and the gradual transition towards an electrified and decarbonised global economy. Currently, there is limited understanding of how the massive increase in metallic mining required to fuel the growing economy will translate into land-use transformations and subsequent impacts on ecosystems. Furthermore, we have poor understanding of the potential impact in individual regions due to the conceptual difficulties in predicting where future raw material extraction may occur.

In this presentation, we provide an overview of a modelling framework capable of probing how global metal demand scenarios may drive land use change for mine development and expansion. The capability of this modelling framework addresses many of the limitations of existing scenario models for long-term metal production, and allows the incorporation of regional datasets for mineral resources, geochemistry, mine development risks, water resources and biodiversity. The outputs of this will provide new insights into the potential long-term impacts of material extraction and the leverage points for improving system wide outcomes. This may facilitate improved land-use planning and greater understanding of the role circular economy and dematerialisation strategies in improving long-term sustainable development outcomes.