

## CDE POLICY BRIEF



The main source of water for the daily needs of the local population in Toamasina (Tamatave), not far from the Ambatovy nickel and cobalt processing plant and refinery on Madagascar's east coast. Photo: Maëlle Andriambalohary

## Digging up a biodiversity hotspot: How is large-scale mining in Madagascar impacting locals?

Large-scale mining of precious minerals can play a key role in the economic development of low-income countries. If managed right, its revenues can also contribute to achievement of vital Sustainable Development Goals.<sup>1</sup> But mining also poses many risks – to the environment and human health near sites of extraction, as well as to wider society if it fuels inequality. The challenge lies in translating natural resource wealth into inclusive development that does not unduly harm local populations or violate their rights.<sup>2</sup> This policy brief examines the biodiversity hotspot of Madagascar, where mining of minerals for the global energy transition increasingly contributes to the national economy<sup>3</sup>, but comes at a steep cost to local people and habitats.

Rising demand for minerals, particularly in the global North, has led to a major increase in large-scale mining in recent decades.<sup>4</sup> Between 1970 and 2017, resource extraction more than tripled worldwide. By 2017, the equivalent of 12 tonnes of material resources were consumed per person globally.<sup>5</sup> That figure keeps growing, especially in wealthier countries. In Europe, for example, domestic material consumption reached nearly 15 tonnes per person in 2022.<sup>6</sup>

The ongoing boom in material consumption and extraction is acutely felt in Africa, which is home to two-thirds of the world's mineral reserves.<sup>7</sup> The African island nation of Madagascar is no exception. It is an increasingly important site of cobalt, ilmenite, monazite, and nickel extraction.<sup>8</sup> These minerals are highly sought after, especially for future-oriented sustainable infrastructure like renewable energy production and storage. *Cobalt and nickel*

### KEY MESSAGES

- World renowned for its natural beauty and biodiversity, Madagascar is increasingly being targeted for large-scale extraction of minerals used by wealthy countries to build "green" energy and transportation infrastructure.
- Our results suggest that the harms of large-scale mining to Malagasy communities – e.g. pollution, forest degradation, social disruption, and loss of livelihoods – currently outweigh the benefits.
- Governance of the mining sector could be improved by strengthening the independent monitoring and enforcement capacity of Madagascar's environmental regulators, increasing local people's participation in rule-making and impact assessment, and establishing just grievance and compensation mechanisms for those whose lives and livelihoods are impacted.



The research featured here is focused on Madagascar.

### Box 1. Assessing the impacts of mining on Malagasy communities

To investigate the impacts of mining sites on local communities in Madagascar, researchers (Zaehringer et al. 2024) surveyed 459 households between five case study sites (see Figure 1). People in these areas are mostly economically poor smallholder farmers and agro-pastoralists who rely on land and other natural resources for their livelihoods. The following mining areas were investigated: (1) Ambatovy Moramanga and (2) Ambatovy Toamasina/Tamatave (both sites belong to the same large-scale extractive investment; the first is the extraction site and the latter the tailings dam); (3) QIT Madagascar Minerals (QMM)/Rio Tinto; (4) Ranobe; and (5) Tantalum Rare Earth Malagasy (TREM). Of these sites, three are operational (the two Ambatovy sites and QMM/Rio Tinto) and two are still in the exploration phase (Ranobe and TREM). The Ambatovy lateritic nickel and cobalt mining project (reportedly valued at USD 8 billion)<sup>32</sup> and the QMM/Rio Tinto ilmenite and rare-earth mining project (reportedly worth over USD 1 billion)<sup>33</sup> are two of the largest mines and biggest private capital investments in Madagascar's history. Unfortunately, judging by our household surveys, the net impacts of mines on local communities are negative – causing harms to people's health and nature-based livelihoods – especially where mechanisms for just compensation remain insufficient.



Figure 1. Map of Madagascar showing locations of large-scale mining investment sites (names in yellow) investigated by researchers from CDE, ESSA-Forêts, and the Wyss Academy for Nature. Source: Zaehringer et al. 2024.

are used to produce stainless steel, batteries, and turbine components; *ilmenite* is used in everyday products like white paint and sunscreen, but also in battery and solar technology.<sup>9</sup> And *monazite* contains coveted rare-earth elements that are used in the magnets of electric cars and wind-power systems, for example.<sup>10</sup>

Given Madagascar's highly valuable mineral reserves – it now ranks among the top five exporters of ilmenite, for example<sup>11</sup> – mining could be leveraged to aid the country's economic development and especially its aims of poverty reduction.

In 2021, Madagascar's government reaffirmed its commitment to the UN 2030 Agenda for Sustainable Development,<sup>12</sup> including efforts to end extreme poverty. Indeed, with a poverty rate of around 75%, Madagascar remains one of the world's poorest countries,<sup>13</sup> underscoring its need for stable sources of revenue. To date, however, poor governance has arguably hampered the inclusive growth potential of large-scale mining in Madagascar – and amplified its risks.<sup>14</sup>

#### Large-scale mining risks

Without proper oversight, large-scale mining poses serious risks to Madagascar's people, ecosystems, and globally significant biodiversity.<sup>15</sup> It is known to pollute waters and soils and is a significant driver of deforestation, which in turn causes habitat loss, fragmentation, and degradation.<sup>16</sup> Forests and ecosystems near large-scale mines also exhibit soil erosion and sedimentation of waterbodies. And the sector's longer-term cumulative harms remain uncertain.<sup>17</sup>

Risks to human health and social stability are also evident.<sup>18,19</sup> Besides the obvious health risks of mine-related water and soil contamination, harms occur when local populations are forcibly relocated to make way for extractive activities. Impacted populations may suffer lost livelihoods, marginalization, food insecurity, and psychological trauma.<sup>20</sup> Mining-related immigration can also destabilize communities and strain public services.<sup>21</sup> Indeed, increased levels of crime, substance abuse, and teenage pregnancies have been observed in communities living near mines.<sup>22</sup>

#### Assessing impacts on Malagasy households

To learn more about the concrete impacts of large-scale mining on local people in Madagascar as well as possible transformative pathways, researchers from CDE, ESSA-Forêts, and the Wyss Academy for Nature (Zaehringer et al. 2024) applied a case-study approach at several key mining

sites – including three operational sites and two in the exploratory phase (see Figure 1). The researchers surveyed over 450 households, all of whom depend on agriculture (mainly subsistence), across the five study sites (see Box 1).<sup>23</sup>

Most of the surveyed households perceived overwhelmingly negative mine-related impacts. Pollution from operational mines reportedly *decreased people's access to clean water and fish resources*. For example, tailings-dam failures at the QIT Madagascar Minerals (QMM)/Rio Tinto mine have been linked to acidification and unsafe levels of aluminium, lead, and uranium in local waterbodies, causing fish kills and unsafe drinking water.<sup>24</sup> Pollution from operational mines also reportedly *diminished agricultural productivity*, posing a threat to local livelihoods and food security. For instance, farmers near the Ambatovy sites observed a decline in their yields of irrigated rice. And those households living closest to operating mines – especially QMM/Rio Tinto – perceived *direct harms to personal health due to increased air, water, and soil pollution*. Finally, surveyed households reported mine-related *deforestation and loss of access to forest resources*. Using satellite data, CDE researchers (Eckert et al. 2024) confirmed significant deforestation and forest degradation resulting from the Ambatovy mine and from the pressure it exerted on nearby landscapes – including landscapes around protected areas intended to offset (ecological) harms of the mine (see Box 2).<sup>25</sup>

Importantly, ecological and social harms were even reported by communities living near *exploratory* (non-operational) mining sites. For instance, the Ranobe exploratory mining project was perceived as causing social unrest, tensions, and conflict in surrounding communities, with many households feeling less safe. The community has become gradually divided between mine supporters and detractors, with protests against the mining project increasing over the years.

#### Governance gaps

The question is whether and how these large-scale mining-related harms can be prevented or reduced.

On paper, Madagascar appears to have the necessary legal structures and institutions in place to regulate the mining sector and steer it towards sustainability. The country's Mining Code, originally drawn up in 1999 and revised most recently in 2023, is the main legal document governing the sector.<sup>26</sup> This is complemented by the Water Code and the current year's



Finance Act – as well as international standards, conventions, and commitments – in building a comprehensive legal framework. The key institutions tasked with overseeing compliance with the legal framework include Madagascar’s National Office for the Environment (ONE), as well as its Ministry of Environment and Sustainable Development, and its Ministry of Mines & Strategic Resources. Ultimate enforcement power lies with Madagascar’s judiciary, including responsibility for resolving mining-related conflicts.<sup>27</sup>

In practice, however, there are several problems with Madagascar’s regulation of the mining sector:

- First, key institutions – especially ONE and the Ministry of the Environment – lack the human and financial resources to monitor and enforce the rules in place.<sup>28</sup> This is especially the case with environmental protection rules. Indeed, to carry out its work, ONE relies on fees collected from mining companies themselves, which could also be seen as a conflict of interest.<sup>29</sup> Moreover, increases in mining royalty rates do not automatically increase the budgets allocated to the Ministry of the Environment or ONE. These details are decided entirely during ministerial councils and depend on strong advocacy by the Minister of the Environment as well as the overall political will of the wider government.
- Second, key improvements made to Madagascar’s Mining Code – such as increased royalties paid to the state – are not applied to all large-scale mines or mining companies. This is partly because of a broadly worded *stabilization clause* in the code that exempts established mines from new rules. In effect, this protects the interests of investors over those of the public. Moreover,

despite positive changes, the updated Mining Code still contains gaps and areas in need of further improvement, especially as concerns public participation in processes of assessment and approval of large-scale mines.<sup>30</sup>

- Third, a fundamental problem concerns how environmental permits are handled: in particular, the evidence-based technical opinions issued by ONE – for example on mine safety – can be overridden by the separate government official (i.e. Madagascar’s Minister of Environment) who actually grants environmental permits and gives mining companies a license to operate. Companies are sometimes allowed to begin exploring sites and operating mines even *before* they receive an environmental permit, casting serious doubt on the legitimacy of the process.
- Fourth, mining companies are given too much scope to prioritize fulfilment of voluntary guidelines, such as principles of Corporate Social Responsibility (CSR), over satisfying government regulations or contract commitments to affected communities, such as payment of full compensation to those impacted, hiring local people, etc.<sup>31</sup>

### Need for effective impact assessments

To address these challenges, authorities in Madagascar should adapt their policies to ensure robust, participatory Environmental and Social Impact Assessments (ESIAs) whose findings have the power to determine whether mining projects are approved in the first place or granted extensions after periodic reviews. These ESIAs should take a holistic approach, ensuring that all social-ecological dimensions are investigated. Impacts at the *wider landscape scale* should also be

### Box 2. No net loss of rainforest?

Ambatovy, Madagascar’s biggest mine (nickel/cobalt) and contributor of a whopping 30% of the country’s foreign exchange earnings,<sup>34</sup> recently received a lot of media attention for its claim of being on track to achieve no net loss of rainforest thanks to implementation of “biodiversity offsets” – namely, protected areas.<sup>35</sup> However, a spatial assessment by CDE researchers (Eckert et al. 2024) casts serious doubt on this claim. While our results confirm that deforestation was curbed inside the protected areas, we find evidence that less-visible forest degradation continued within their boundaries. Moreover, forest degradation and loss spilled over into the surrounding landscape outside the boundaries of protected areas – damages that are largely ignored when the effectiveness of biodiversity offsets is evaluated by standard methods. In conclusion, CDE research suggests that the ecological harms of such mines are simply hidden or moved elsewhere, but not effectively balanced out (i.e. net zero) by current approaches to biodiversity offsetting. Forest degradation remains widespread, especially outside of the designated conservation zones.

evaluated, especially as we found that mining harms were perceived in villages located relatively far (5–20 km) from extraction sites. In addition, detailed assessments should be carried out *prior to exploratory activities*, as even these cause harms according to our surveys. Overall, mining permits should only be granted after an environmental permit has been issued based on the findings of a comprehensive ESIA, initiated well before local ecosystems and communities have been disturbed or damaged.



Malagasy homes near Ambatovy, Madagascar’s most valuable mining project. Photo: Fenitra Rajerison

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## Policy implications

### Improve compliance with mining rules to protect communities and nature

Our surveys of populations living near Madagascar's most important mining sites indicate that public authorities and mining companies are failing to adequately protect local people and the natural environment. One way to improve accountability, rule enforcement, and compliance would be to set up mining site monitoring committees made up of representatives of the various stakeholders involved, including the relevant ministries, mining companies, and – most importantly – civil society groups and affected communities themselves.<sup>36</sup> The concerns of the latter remain underrepresented in mining-sector governance mechanisms to date.

### Establish a just grievance and compensation system for local communities

Madagascar's operational mining sites have already caused significant harms to local communities, such as diminished access to land and natural resources, destruction of ancestral lands, forced relocation, and pollution that threatens agricultural productivity and people's health. Despite these persistent negative impacts on Malagasy communities, they are seldom fairly compensated by the (typically foreign) mining companies whose investments are worth billions.<sup>37</sup> Effective grievance and compensation systems must be created for and with local communities that protect their rights to and enjoyment of dignified, healthy, sustainable livelihoods.

### Adopt a more rigorous, holistic approach to curb and offset forest loss

In Madagascar and elsewhere, the construction of mines and related infrastructure plainly causes loss of forest. Biodiversity offset sites and other conservation measures can theoretically mitigate such harms. However, more rigorous monitoring is needed – covering larger geographic areas – to account for less-visible forest degradation and deforestation spillovers that occur as a result of mines and associated conservation schemes. Only then can a realistic assessment be made of the net effects on nature and communities.

### Facilitate robust, inclusive Environmental and Social Impact Assessments (ESIAs)

Madagascar's governance of the mining industry could be improved by facilitating effective ESIs. This means ESIs whose results have the power to prevent or pause mining activities until companies take sufficient steps to respond to concerns. Measures that could enable meaningful ESIs include: eliminating or weakening stabilization clauses; ensuring that ONE technical advice is central in the licensing process; restructuring ONE funding to eliminate dependence on fees from mining companies; making environmental permits a mandatory requirement for operating permit applications;<sup>38</sup> and strengthening inclusive public/community involvement throughout the entire ESI process.

## Suggested further reading

Eckert S, Schmid L, Messerli P, Zaehringer JG. 2024. Spatiotemporal assessment of deforestation and forest degradation indicates spillover effects from mining activities and related biodiversity offsets in Madagascar. *Remote Sensing Applications: Society and Environment* 36:101269.  
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