DISCUSSION PAPER / 2021.07

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December 2021

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Abstract

This article contributes to the literature on commodity frontiers by providing evidence from locales where two different frontiers overlap. We focus on intersecting commodity frontiers produced through biodiversity conservation and mineral extraction that increasingly compete for control over land and resources. We frame commodity frontiers as organised through the territorialisation of rural landscapes via different types of protected areas (strict, flexible) and various scales of mining activity (artisanal, semi-industrial, industrial). With reference to case studies from eastern Democratic Republic of Congo and northern Madagascar, we disaggregate the processes of territorialisation both at and between conservation and mining frontiers. It is argued that flexible approaches to protected area management and artisanal and semi-industrial modes of mining can be viewed as territorial adaptations to enable frontiers to co-exist where strict conservation and large-scale mining would otherwise exclude one-another. We conclude that contexts where state power is limited, and the boundaries between legal and illegal become blurred, are likely to be especially conducive to the emergence of double frontiers.

Key words

Commodity frontiers, territorialisation, mining, conservation, Madagascar, DRCongo.

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1. Introduction

There is considerable overlap between mining activities and conservation efforts across the world. A global study by Durán, Rauch, and Gaston (2013, 272) found seven per cent of legal mining sites associated with four key metals (aluminium, copper, iron, zinc) coincided with the boundaries of protected areas. A report by Villegas et al. (2012, 10) found artisanal mining took place in 96 out of the 147 protected areas included in a study of seven World Heritage Sites and twelve of the World Wildlife Fund's priority landscapes. The drive to designate land to protected areas is also accelerating. Under the United Nation Convention of Biological Diversity, 30 percent of the global surface area is currently planned to be allocated to conservation by 2030. In conjunction with this, mining activities have also undergone a significant period of expansion or 'boom' since the early 2000s (Arsel, Hogenboom, and Pellegrini 2016; Ayelazuno 2014). The extent of the overlap between mining and conservation could therefore be expected to increase in the future.

Overlaps between mining and conservation activities are likely to be particularly significant in countries that are heavily dependent on natural resource sectors, foreign development assistance and environmental financing. In these settings, we may expect heightened competition between the two sectors, partly due to the influence of powerful foreign actors and the weakened territorial authority of the nation-state. Here our aim is to examine the overlaps of mining and conservation in weak states by utilising the framework of 'double frontier' (Vuola, in print). This framework highlights the similarities between conservation and mining by characterising both as types of commodity frontier, or regions where new resources are being incorporated into the global capitalist system (Rasmussen and Lund 2018). Though ostensibly opposed in terms of what they set-out to achieve, processes of territorialisation at mining and conservation frontiers have similar consequences for local, predominantly rural communities (Büscher and Davidov 2013b). These include land grabbing, the vilification of local livelihoods, the disruption of existing land-ownership structures and socio-ecological relations, but also opportunities for order-making, economic gain and development (Titeca et al. 2020; Kelly 2015; Fairhead, Leach, and Scoones 2012; Hall et al. 2015; Simpson and Pellegrini 2022). Like most products of the market mechanism, the advancement of mining and conservation frontiers is constructive of both winners and losers. Despite the considerable overlap between mining and conservation frontiers globally, the two have rarely been considered together (Büscher and Davidov 2013b). As a consequence, the literature about the dynamics and interactions that take place at double frontiers is limited in scope.

This discussion paper makes an original contribution to the literature on commodity frontiers by empirically examining 'double frontier' contexts where mining activities and conservation efforts intersect. We begin by proposing processes of territorialisation at mining and conservation frontiers can be disaggregated, thereby making it possible for multiple dynamics to take place in the spaces in-between conservation and mining, even within the same locations. Territorialisation for mining occurs at artisanal, semi-industrial and industrial scales, while territorialisation for conservation is enacted on a continuum from consensual, flexible approaches to strictly enforced and militarised methods. Despite the conceptual differences between strict fortress and flexible community conservation, the two methods are often used simultaneously within the same landscape to territorialise frontier regions through a 'sticks' and 'carrots' approach, thus combining both incentives and enforcement mechanisms (Verweijen and Marijnen 2018; Titeca et al. 2020). To illustrate the multifaceted interactions taking place at double frontiers, we present cases from landscapes where multiple forms territorialisation driven by mining and conservation activities intersect: in eastern Democratic Republic of Congo (DRC) and northern Madagascar. These diverse territorialisations in turn produce a range of consequences for the people living in their vicinity. Our objective is to analyse how territorialisations at conservation and mining frontiers overlap, intertwine, and contradict in contexts where the state authority is weak: countries and sub-national regions where a degree of regulatory ambiguity exists, the boundary between legal and illegal is blurred, and states struggle to maintain a monopoly over the means of violence.

Madagascar and DRC have attracted the attention of frontier actors from the colonial era up to the present day. Both nations have undergone severe political and economic crises acutely weakening the state: two civil wars in the DRC and economic collapse generated by the socialist government in Madagascar, followed by a debt crisis and waves of political turbulence. Both countries have long been the targets of international conservation NGOs, and count the mining sector as an important source of foreign investment and local employment. In terms of specific case study sites, we opted for eastern DRC's Itombwe Nature Reserve and Madagascar's Loky Manambato New Protected Area. These protected areas represent conservation frontiers that are being territorialised through flexible or 'zoned' approaches – incorporating core, buffer and multiple-use zones. In addition, they overlap with mining frontiers undergoing territorialising processes at three different (though interacting) scales – artisanal, semi-industrial and industrial. Our cases thus facilitate an exploration of the overlaps and interactions between different types of territorialisation taking place at both mining and conservation frontiers.

The first author spent seven months in Madagascar during the years 2014 and 2018-2019, during which she conducted two weeks' field research in villages in Loky Manambato. The second author was in eastern DRC's South Kivu Province for six months between August 2019 to February 2020, from where he conducted multiple field visits to communities in and around Itombwe Nature Reserve. In terms of data collection, both authors relied on qualitative research methods, including focus groups, semi-structured interviews, participant observations, extensive field notes and transect walks. We triangulated the data through an extensive review of NGO reports, decrees, traditional and social media, and correspondence via WhatsApp. To analyse the data, we used an approach which combined induction and deduction, iteratively weaving back and forth between the theory and the data to develop codes and categories.

The paper proceeds as follows. We begin by introducing the notion of commodity frontiers, placing particular emphasis on the forms of territorialisation that surround both conservation and mining frontiers in sub-Saharan Africa, the geographical region in which both our case studies are located. Following that, we provide a general overview of mining and conservation frontiers in DRC and Madagascar, demonstrating the ways in which the various forms of territorialisation on these frontiers both collide and converge. We then provide an in-depth analysis of the interactions between multi-scalar mining and multi-layered conservation frontiers in our specific case study sites, Itombwe Nature Reserve and Loky Manambato New Protected Area. Finally, we reflect on the implications of our empirical findings for the broader literature on conservation and mining commodity frontiers. We make the case that flexible approaches to conservation and artisanal and semi-industrial forms of mining can be viewed as territorial adaptations that enable frontiers to co-exist where strict conservation and industrial mining would otherwise be incompatible. Rather than arguing that territorialising processes upon frontiers lead to the consolidation of state power, as previous authors have done (Vandergeest and Peluso 1995; Käkönen and Thuon 2019), we conclude that it is the absence of state control that likely generated the double frontier dynamics we observed.

2. Conceptualising 'double frontiers'

2.1. Commodity frontiers of conservation and mining

The notion of the 'frontier' is used to understand socio-environmental transformations that occur through the expansion of capital accumulating activities into new and under-exploited regions (Rasmussen and Lund 2018). Specifically, our analysis focuses on the commodification of resources in frontier zones; a process arising from attempts to derive returns from large-scale production of goods and services for commercial markets (Kröger and Nygren 2020).

Frontier expansion starts with an innovation, such as a new mode of production or commodification of nature, designed to enable new avenues for wealth accumulation (Rasmussen and Lund 2018; Moore 2000; Barney 2009). This typically sets off dramatic shifts in socio-environ-

mental relations, bringing to life new systems of resource access, the exclusion of previous land and resource uses, and the displacement of local communities. In other words, frontiers bear witness to the re-organisation and transformation of socio-ecological systems and structures via the medium of global capitalism (Moore 2015). Frontiers can thus be considered temporal configurations in which relations of authority, ownership and production are continually contested through the establishment of new enclosures and property regimes (Peluso and Lund 2011).

In this article, we specifically examine conservation and mining commodity frontiers. However, not all conservation or even mining practices produce commodities for global markets, nor do they expand in the rapid and destructive fashion often observed at commodity frontiers. Territories conserved by indigenous peoples and ancestral mining practices are locally owned and sustained through traditional knowledge systems that can maintain biodiversity and cultural values over long-term (Kothari, Camill, and Brown 2013; Weitzner 2017). However, these are excluded from this analysis, which specifically examines conservation and mining practices rooted in the extractivist logic of global capitalism. The capitalist commodity frontiers we examine are driven by the production of commodities for external buyers, the accumulation wealth among elites, and often leave few benefits for local communities (Gudynas 2010). In turn, mining and conservation are not the only types of commodity frontiers to intersect. For example, Käkönen and Thuon (2019, 1192) describe a complex constellation of water, forest and carbon commodities, and new dynamics of state control, that has emerged in Cambodia. These frontiers interact and reinforce one another at the local-level.

That said, mining has a central role in the frontier literature. The frontier concept was first applied to describe the westward movement of European settlers in North America in the 19th century (Geiger 2008). The role of mining was central to this movement, not only as a means capital accumulation, but also due to its contributions toward 'civilising' new lands and incorporating them into the state system. Today, mining commodity frontiers continue to expand, drawing raw minerals, metals and precious stones into world markets, producing new frictions with local resource users (Conde, Gamu, and Le Billon 2017). When it comes to conservation, the commodities it produces for the global market place are perhaps less tangible. They include conservation 'success stories', nature spectacles and ecosystem services that are sold to philanthropic organisations, tourists and governments (Igoe and Brockington 2007; Castree 2008). In order to produce idealised natures 'to be saved' in line with the Western conservation thought, new biodiversity-rich areas are being territorialised, often to the exclusion of local communities and their livelihoods (Büscher et al. 2012).

Private and non-state actors are expanding conservation and mining commodity frontiers into peripheral regions of the world, colonising and reconfiguring local natures, absorbing their inhabitants in the commodity production as low-wage labour (Geiger 2008; Rasmussen and Lund 2018; Moore 2015). This expansion results in contestation over authority and legitimacy of land control as well as 'encounters between knowledge practices, jurisdictions, and visions of modernity, development, and progress' (Rasmussen and Lund 2018: 392). Concretely, our analysis focuses on spaces where conservation and mining frontiers overlap to produce 'double frontiers'. We argue that analysing both activities through the lens of commodity frontiers allows us to identify dynamics similar to both frontiers, thus facilitating comparison and the explanation of their interactions. In particular, we focus on processes of territorialisation and the interactions that result when actors operating on two different frontiers attempt to territorialise land within the same geographical space.

2.2. Territorialisations at multiple scales

Territorialisation has been defined as activities aimed to consolidate control over space, resources and people (Rasmussen and Lund 2018). It is central to understanding the geographical and political changes that occur in frontier regions.

The concept has its roots in Sack's (1983:55) pioneering work on 'human territoriality', defined as 'the attempt to affect, influence, or control actions, interactions, or access by asserting and attempting to enforce control over a specific geographic area.' Over a decade after Sack, Vandergeest and Peluso (1995:388) developed the related concept of 'internal territorialisation', described as state-led attempts to exclude or include 'people within particular geographic boundaries' and controlling what activities and resource uses are permitted within those boundaries. The fact that the concept can account for territorial processes at both the national and sub-national level makes it relevant in the context of our analysis, which seeks to understand interactions surrounding mining and conservation territories located within the bounds of single nation states.

Territorialisation for conservation or mining rarely occurs on a blank slate. Protected areas and mines are almost always nested within and on top of both lower- and higher-order territorial structures. These range from nation states, sub-national regions to customary land-arrangements. As such, both protected areas and mines must be 'configured in relation to existing territories' (Bluwstein and Lund 2018:2). Regarding the multi-scalar nature of territorialisation, Vandergeest and Peluso (1995:388) describe how the 'construction of [abstract space] permits the location or nesting of an area in a larger abstract space. The territory of a national park is nested in national territory, which is nested in a global territorial grid.' Thus, lower-level territorial structures can exist before the imposition of conservation or mining projects, or come into being after a protected area or mine have been established. The result is kind of 'layering' of territorial regimes.

Although states are generally considered the principal actors engaged in the territorialisation of sovereign space (Vandergeest and Peluso 1995), non-state actors also exercise considerable territorial control in frontier zones (Eilenberg 2014). International NGOs, private businesses and non-state armed groups have all played a role in the creation and violent contestation of mining territories and protected areas (Corson 2011; Verweijen and Marijnen 2018; Verweijen 2017; Geenen and Verweijen 2017; Lombard 2016).

The territorialisation of space can lead to conflict when it disrupts or overturns 'pre-existing resource claimants who defend their legitimate rights to resources' (Bassett and Gautier, 2014:5). According to Peluso (2005:2), state-led territorialisation(s) are therefore forced to 'wrestle with contending demands and actions of individuals, communities, and other sub-state groups who want authority, jurisdiction, or control over land and resources and not simply access for use.' While Roth (2008: 373) argues, when different state and local resource management systems intersect in a particular location – such as around a protected area or mine – they can either conflict, converge or correspond: thus, clashes are not inevitable.

According to this logic, territorialisation for mining or conservation can be considered moments of spatial reconfiguration, with some people gaining and others losing out as a result of the new territorial structures that emerge. In turn, the 'different spatialities associated with local and state management are neither fixed nor inherent; they can change and evolve as the [social and environmental] processes that produce them also change (Roth 2008: 388).' This is particularly true in contexts characterised by legal or normative heterogeneity, such as in post-colonial and post-socialist societies (Sikor and Lund 2009).

2.3. Adaptations in the global mining frontier

Before the 1980s, mining companies typically focussed their activities on commercially viable deposits in Latin America, Canada and Australia. Sub-Saharan Africa's contribution to global mineral production was relatively minor up until that point (Kumar 1990). This was the result of political instability and unattractive investment policies. Yet starting in the mid-1980s, the World Bank initiated a process of mining sector reform, redrafting national mining codes and investment policies across sub-Saharan Africa. The aim was to foster economic development through foreign direct investment in mining activities (Bebbington et al. 2008b). As a result, resource enclaves emerged across the continent, where states effectively handed territorial control over to transnational mining corporations (Ferguson 2005).

Mining frontiers are generally characterised by two main scales of production, ranging from large-scale corporate mines to artisanal production (Hilson, Sauerwein, and Owen 2020; Aubynn 2009). In large-scale mining projects territorialisation is typically driven by private actors and authorised and enforced by states (Hilson, Sauerwein, and Owen 2020). Territorialisations at the industrial scale are, however, challenged by extra-legal regulatory arrangements including systems of customary land-ownership as well as shadow state networks (Côte and Korf 2018). The presence of the predominantly informal ASM in and around large-scale mining sites is an example of how regulatory pluralism enables multiple scales of mining to take place in the same spaces. Furthermore, often working outside the formal bounds of state regulation and control, artisanal miners represent a cheap and mobile labour force that can facilitate the expansion of the mining frontier into areas large-scale mining has failed to reach (Verbrugge and Geenen 2019). The sector employs tens of millions of people in the sub-Saharan Africa, playing a constructive role in poverty alleviation, especially as a source of disposable incomes for small-holder farmers (Hilson and Garforth 2012).

While the literature on mining frontiers often presents artisanal and industrial-scale mining as dichotomous (e.g. Bebbington et al. 2008; Gamu, Le Billon, and Spiegel 2015; Fisher 2007; Hilson and Garforth 2012), a wide variety of activities and scales of production exist between these categories. In this analysis, we distinguish between artisanal and industrial mining, and add a third category of 'semi-industrial' mining. The latter can be considered a mid-point on the continuum between the first two categories. Semi-industrial mines can emerge as a development upon artisanal mining, when artisanal miners increase the scale and intensity of extraction through the introduction of new production processes and technologies, such as through cyanidation (Verbrugge, Lanzano, and Libassi 2021). Semi-industrial mining operations are also introduced externally by junior or mid-tier mining companies, typically willing to take greater risks than fully industrialised firms (Dougherty 2013). For example, a number of Chinese-backed semi-industrial gold mining operations have emerged over recent years in Madagascar, Ghana, the Philippines and DRC (Verbrugge and Geenen 2020; Global Witness 2016; Geenen and Marijsse 2020). Chinese companies are generally not exposed to the same level of scrutiny as European or North American businesses. Under conditions of regulatory pluralism, where the law of the state is malleable and open to corruption, this has enabled the expansion of more intensive forms of mining into regions where full-scale industrial extraction would likely be difficult for Western companies to establish – including at the boundary of and inside protected areas.

2.4. An evolving global conservation frontier

The first protected areas were established by European colonial administrations, which thereby initiated territorialisation of landscapes across the Global South through the exclusionary conservation model, later termed 'fortress conservation' (Brockington 2002; Peluso 2005; Neumann 1998). This model was based on an idealized vision of nature as threatened and degraded by local people, a wilderness which could only be restored by separating humans from it (Brockington 2002). Protected areas established according to this paradigm prioritised tourism and hunting over local land uses. As a result, millions of indigenous peoples were forcefully expelled from their lands, many of whom intimately relied on the environment for their livelihoods (Dowie 2011).

Since the late twentieth century, conservation practitioners started to promote discourses that local communities must benefit economically from conservation if protected areas are to succeed in the long-run (Hutton and Leader-Williams 2003). This led to the emergence of community-based and more participatory approaches to conservation and natural resource management in the 1980s (Roe 2008). Protected areas established based on these approaches were meant to allow local populations to continue to access resources and land inside protected areas – as well as a say in how those areas are managed. Simultaneously, within the overarching neoliberal agenda, new governance structures for conservation have been promoted based on global markets,

which subsequently opened the sector to increased participation by private actors (Büscher and Fletcher 2014; Igoe, Neves, and Brockington 2010). This is manifest in the growth of the ecotourism industry and the arrival of millions of tourists who spend billions of dollars every year visiting the national parks and reserves across the world (Brockington 2002; Devine 2014). It has been accompanied by the growing corporate sponsorship of conservation organisations and the privatisation of protected area management (Igoe and Brockington 2007).

Under this framework, we identify a global conservation commodity frontier dominated by powerful international NGOs (including World Wildlife Fund, Conservation International and Wildlife Conservation Society) and their private sponsors, which continues to expand into rural landscapes (Anyango-van Zwieten, Lamers, and van der Duim 2019). This is embedded in a modernist vision of private land-ownership and an imperative to 'make conservation pay' in order to fund protect areas and incentivise local populations to accept restrictions imposed on their lives. As a result, the expansion of the conservation frontier gradually reorganises local socio-ecological realities through territorialising processes of enclosure, dispossession, the accumulation of private profit, and in some cases, the eradication of common pool resources and indigenous lands (Kelly 2011). Yet such frontier advancement and its concurrent territorialisations can also deliver benefits to local populations in the form of improved security, small economic incentives and opportunities for development and employment (West 2006; Titeca et al. 2020; Balint 2006; Kelly 2015; Beazley 2009; Simpson and Pellegrini 2022).

2.5. The emergence of 'Double Frontiers'

While both mining and conservation frontiers continue to expand, and in so doing bring more commodities into the global marketplace, the global overlap between mining and conservation is also expected to increase (Sonter, Ali, and Watson 2018). As the cases of eastern DRC and Madagascar demonstrate, this has the potential to dramatically change local land uses, with corresponding impacts on the functioning of socio-ecological systems.

Although seemingly contradictory in their fundamental aims, a closer examination of mining and conservation frontiers reveals similarities in terms of the strategies of territorialisation employed, the impacts on local communities, and even regarding the actors who participate in their expansion. Our analysis of double frontiers reveals a range of territorialising processes that may not be captured when examining individual frontiers in isolation. Thus double frontier dynamics cannot be properly explained as interactions between either mining and people or parks and people. A plethora of actors, systems and processes come together to influence the intricate socio-ecological dynamics which emerge at the mining/conservation nexus. Double frontiers thus bring into focus the ontological and material entanglements that occur when different flows of capital (for mining and conservation) simultaneously come into contact with micro-level socio-ecological realities (Büscher and Davidov 2013).

When considering multi-scalar territorialisations at mining frontiers alongside the plurality of conservation models which exist under neoliberalism, the manifold interactions at double frontiers should come as no surprise. Double frontier interactions can take very different forms ranging from synergy, competition and conflict, to forms of co-ignorance (Vuola, in print). These interactions have a number of effects on peoples livelihoods as well as on wider structures of power and control (Büscher and Davidov 2013b). For example, past research has established how the emergence of 'frontier constellations', i.e. where multiple resource frontiers and zones of inclusion intersect, serve to enhance state power and control (Käkönen and Thuon 2019). However, more empirical research is needed to understand how double (or multiple) frontiers both influence and are influenced by political economic conditions at the local level: in other words, the intricate ways in which two streams of global capital accumulation – i.e. conservation and mining – touch ground. This contribution provides a tentative first step toward addressing this 'gap' in the literature.

3. Double frontiers in DRCongo and Madagascar

In this section, we provide an overview of the evolution of mining and conservation frontiers in northern Madagascar and eastern DRC from before the colonial era up until the present day. In both countries, we elaborate on how mining frontiers have expanded and contracted over time in response to wider political and economic developments, through processes of territorialisation occurring at various scales. We also demonstrate how during the colonial era protected areas were territorialised in both Madagascar and DRC through exclusionary fortress conservation practices. Yet in recent decades the expansion of their respective conservation frontiers has been facilitated by a move toward more consensual, community-based forms of territorialisation – which local populations and the international community are more likely to deem acceptable. Despite it being illegal to mine in protected areas in DRC and Madagascar, this process of dual frontier expansion has led to a situation in which there is considerable overlap between land designated for the conservation of biodiversity and mining activities.

3.1. Democratic Republic of Congo

3.1.1. The conservation frontier

The DRC is home to the second largest tropical rainforest in the world with a wealth of unique biodiversity. The DRC's forests alone contain over 1,000 species of birds, 421 types of mammals and 302 reptile species (cited in Trefon 2016, 17). The United Nations Educational, Scientific and Cultural Organisation has listed five of its national parks as World Heritage Sites. A study of goods and services produced by protected areas in the wider Congo basin estimates their total economic value to be an enormous US$ 603,468,014,907 (Hugues 2011, 130), suggesting the potential for capital accumulation through expansion of the conservation frontier is recognised.

Although the practice of customary conservation is ancient in DRC, Congolese landscapes have been territorialised through the establishment of protected areas since the colonial era. King Leopold II created the Albert National Park in 1889, which happened to be Africa's first protected area, renamed Virunga National Park in 1925. Several other national parks were created over the decades that followed. In the Province of Haut-Uele, Garamba National Park was established by the Belgian administration in 1938. In South Kivu, the Zoological Reserve of Mount Kahuzi was created by the Belgium Colonial Administration in 1937, later renamed Kahuzi-Biega National Park by President Mobutu in 1970. The Belgian colonial administration established the Bakumu Hunting Reserve in 1949, which Mobutu later transformed into Maiko National Park in 1970. In the latter two cases, although it was the colonial regime which first territorialised the landscapes for conservation purposes, it was the post-independence government which consolidated the state's territorial control over the protected areas through the change in status from 'reserve' to 'national park'. Concretely, this meant local populations would no longer be able to access to land or resources within their boundaries, and the imposition of more coercive conservation practices.

For the most part, the DRC's protected areas have been territorialised through top-down approaches in the form of IUCN's category 1 'national parks' – with limited local participation, benefit sharing or consent (Verweijen and Marijnen 2018; Simpson and Geenen 2021; Titeca et al. 2020). As a result, conservation has often been met by local resistance, both in the form of everyday and overt types of political contestation (Hochleithner 2017; Simpson and Geenen 2021). This is true in Virunga and Kahuzi-Biega National Parks which have been racked by violent conflicts with local populations. Other protected areas, including Garamba National Park, have at times enjoyed a greater degree of community acceptance (Inogwabini, Ilambu, and Gbanzi 2005), but have also experienced considerable park–community conflict over recent years (Titeca et al. 2020). This resistance has led the Congolese conservation agency *L'Institut Congolais pour la Conservation de la Nature* (ICCN) and its NGO partners to experiment with more flexible, community-oriented forms of conservation governance. Such approaches are intended to reduce conflict with local popula-

tions as well as to avoid the international opprobrium militarised approaches to conservation have received over recent years.

Established in 2006, Itombwe Nature Reserve takes a zoned approach, whereby populations surrounding the reserve can still access and use resources within its boundaries, and have some say over how the protected area is managed through devolved governance structures. Other nature reserves established since the turn of the new millennium include Lomako and Ngiri (between Equateur and Tumba-Lediima), Luki (Bas-Congo) and Tayna (North Kivu). The fact that these new protected areas are all flexible reserves – as opposed to strict national parks – indicates that ICCN and its international partners believe the most effective way to expand the conservation frontier in DRC might be through an approach that tries to minimise conflict with local populations. Addressing these concerns and incorporating them into the new conservation model opens up new regions for frontier expansion by decreasing local resistance and international pressure. There have also been calls to downgrade some of the DRC's national park's to enable communities to access resources within their boundaries. In addition, several 'community forests' have been established across South Kivu Province which aim to enhance conservation outcomes by giving communities full legal rights to their customary lands.

Since the DRC gained its independence in 1960, a variety of international NGOs and donors have stepped in to fund conservation efforts. These include Conservation International, the Diane Fossey Gorilla Foundation, World Conservation Society, World Wildlife Fund, the German Agency for Technical Cooperation (GIZ), African Parks – and many others. Although never reaching the dizzying heights of tourist sectors in other sub-Saharan African nations due to political and social insecurity, some of the DRC's parks have brought in significant tourist revenues over certain periods. For example, Kahuzi-Biega National Park's annual revenues from gorilla tourism were about US$201,000 from 1989-93 (Yamagiwa 2008, 117). The arrival of payment for ecosystem service schemes, such as Reducing Emissions from Deforestation and Forest Degradation 'Plus' (REDD+) initiatives, is likely set in motion further expansion of the conservation commodity frontier in DRC (Windey and Hecken 2019).

The Congolese Wars had a severe impact on the territorial integrity of the DRC's protected areas, and led to widespread poaching and resource extraction, including artisanal mining, within their boundaries (D'Souza 2003). After the Rwandan genocide of 1994, refugees camped out at the edge of protected areas caused widespread deforestation as displaced persons cut trees for firewood (Yamagiwa 2008). The forests of eastern DRC's became a hideout for armed groups and bandits to extract resources during this period. Many protected area staff were killed. Virunga National Park alone is reported to have lost 86 park staff between 1996 and 2003 (Inogwabini 2014). Tourism was brought to an abrupt halt, along with the revenues derived from it. Many foreign aid agencies left or suspended their activities. As a result, government budgets for conservation were slashed (Inogwabini, Ilambu, and Gbanzi 2005). Payments to civil servants and other public sector workers were delayed or reduced, with many park guards not receiving their salaries during this period (Yamagiwa 2008). The fact that the four World Heritage Sites in DRC were included in the category of World Heritage Sites in Danger by 2002 is testament to the severity of the conflict's impact on environmental conservation (Inogwabini 2014).

3.1.2. The mining frontier

DRC is one of the richest places in the world in terms of mineral wealth. The country was once described as a geological scandal because of its large deposits of various globally significant mineral resources (Trefon 2016). According to one estimate the country contains $24 trillion in unexploited mineral reserves.[1]

Gold mining goes to pre-colonial times in North Kivu province where gold would be mined for customary chiefs to wear as jewellery (Vwakyanakazi 1992). When the Belgians arrived

[1] http://faircongo.com/2017/08/23/24-trillion/

in the 19th century, private companies started to gravitate toward the central African state to tap value from its abiotic resource wealth (Trefon 2016). Alluvial gold deposits were identified in South Kivu province from the early 20th century, with panning and skimming taking place from the early 1920s (Bakonzi 1982, 115). From the 1920s to the 1960s, the Belgian company *Minière des Grands Lacs* (MGL) exploited minerals in various sites across the region. These included the gold sites of Kamituga (1937), Twangiza (1957), Lugushwa (1959); the cassiterite sites of Nzombe, Mwana and Miki in Mwenga territory and Kadubu (1960s); beryl in Kabokobo and wolfram in Etactu, North Kivu (Geenen 2014, 101). The wealth that was accumulated during this period contributed to the development of Belgium as well as the rise of international business tycoons including John D. Rockefeller. In the 1930s, an economic crisis restricted growth of Congo's mineral economy. It accelerated again at the time of and after the Second World War, but then slowed once more in 1958 with the move toward decolonisation in DRC, and the flight of capital which accompanied it (Buelens and Marysse 2009).

During the 1970s, the DRC's industrial mining frontier contracted as a result of lack of investment in prospection and production, and after President Mobutu's decision to renationalise the mining sector in 1976 (Geenen and Radley 2013). In the years that followed, several international mining companies pulled out of the country completely. Along with several other companies, MGL was integrated into the part state-owned company, SOMINKI (*Société Minière et Industrielle du Kivu*). This company allowed informal miners to access several mines thus sparking off a process of territorialisation at an artisanal scale. ASM effectively proliferated as industrial mining decreased – especially after Mobutu liberalised the mining sector in 1982 (Geenen and Radley 2013). Political unrest, hyperinflation and war constrained expansion of the industrial mining sector during the 1990s. When he took power in 1997, President Laurent Kabila denationalised the sector in the hope of attracting private investors and growing the industry once again. However, his vision was put on hold with the resurgence of violence and instability that accompanied the Second Congo War (1998-2003). Industrial mining was once again brought to a virtual standstill. As a result, two companies which had signed contracts with both Mobutu and Laruent Kabila, AngloGold Ashanti and Banro Corporation, had to suspend their operations (Verbrugge and Geenen 2019).

While industrial mining became impractical under conditions of conflict, ASM continued to proliferate. This acceleration was partly also driven by a global 'coltan boom' (2000-2002) as demand for electronic appliances and games consoles increased (Nest 2011). In turn, conflict rendered farming untenable in many regions of eastern DRC, leading more and more people to look to informal mining as a source of stability and security (Kelly 2014). In the Kivu Provinces alone, estimates taken from 2007 and 2010 suggest there could be between 200,000 to 300,000 miners, which equates to about 1.75 million people dependent on mining or 9-7 percent of the total population (Geenen and Radley 2013). During the Second Congo War in particular, both foreign and Congolese armed groups came to play a central role in the extraction and trade in minerals. This was particularly prevalent in Congo's eastern Kivu Provinces at the borders of Rwanda, Burundi and Uganda, which are rich in a variety of rare earth minerals. In effect, expansion of DRC's mining frontier was maintained through an adaptation toward ASM (Verbrugge and Geenen 2019).

After the second war officially ended in 2003, industrial mining began to undergo something of a resurgence in eastern DRC (Geenen and Radley 2013). President Joseph Kabila took over after his father was assassinated and implemented a series of reforms to stimulate private investment and improve governance of the mining sector. These reforms enabled him to further consolidate power and accumulate a veritable personal fortune. Private investments began to increase once again since 2005 and mining once again became the main driver of national-level growth (Trefon 2016). During this period, industrial mining also started to creep back into South Kivu, most notably with the arrival of Banro Corporation, which established two functional gold mines: one in Twangiza in 2012 and another in Namoya in 2015, as well as mineral prospection in several other sites. However, industrial mining appeared once again to be on the decline in 2016 and 2017 (Geenen and Verweijen 2017), with large companies once again facing numerous difficulties in the

region, not least due to resistance from ASM operators as well as repeated attacks from armed groups (Verweijen 2017). For example, Banro decided to pull out of South Kivu altogether in 2019 as a result of ongoing resistance and insecurity around its mining sites.

In recent years, expansion of the DRC's mining frontier has been occurring at a semi-industrial scale, driven by investments from a number of small Chinese companies. These companies secure mining sites with local power brokers through less than licit channels, and often occupy artisanal mining sites previously owned by local communities. For example, between 2014-2016 the Chinese company 'Kun Ho' established 'four fully automated bucket chain dredges' to mine gold in a part of the Ulindi River in Shabunda territory, South Kivu (Geenen and Marijsse 2020, 275). Since 2018, several semi-industrial mines have been set-up by Chinese companies in the territory South Kivu, Ituri and Haut-Uele provinces. On multiple occasions Chinese workers have been kidnapped for ransom at these sites, with any gold or money they were carrying stolen from them. In several cases this has led the Chinese miners to temporarily shut down their operations, or to secure protection from the government army before they continue mining once again.

3.1.3. Intersecting mining and conservation frontiers

In DRC, the expansion of conservation and mining frontiers over the last century has led to a situation where there is now considerable overlap between protected areas, mining sites and mining permits. Hundreds of thousands of people are affected by the interactions that take place between these frontiers despite the fact three laws contain articles which could be interpreted to forbid mining activities inside protected areas (Simpson and Fikiri Zirhumana 2020). Javelle and Veit (2012) found 629 mining permits coincide with 3.5 million hectares of protected areas, including Maiko National Park, Sankuru Nature Reserve, Upemba National Park, the Lufira Biosphere Reserve and two World Heritage Sites, Kahuzi-Biega National Park, Okapi Reserve and Itombwe Nature Reserve (Figure 1). There are also two high-profile cases, in Virunga and Salonga National Parks, where oil extraction permits overlap with protected areas. This overlap is enabled by the fact mining permits are often allocated by officials in Kinshasa without due process or adherence to the law; but also because there is limited communication between the different ministries, including those responsible for mining and conservation, which results in contradictory regulations and inconsistent information regarding the boundaries of protected areas and mining permits (Javelle and Veit 2012).

According to ICCN's website, the DRC comprises nine national parks and 63 related reserves (hunting areas and wildlife reserves) which represents approximately nine percent of the country (± 215,000 km ²).[2] The degree of overlap between protected areas and mining concessions is likely to increase as the country moves closer to its target to have seventeen percent of the country under formal protected status (Javelle and Veit 2012). If the security situation in the east of the country improves, it is possible industrial mining activities will also begin to increase in scale and scope both inside and outside of protected areas. Between 2008 and 2011, the number of mining permits allocated by the Congolese government increased by 35 percent, equivalent to fourteen million hectares (Javelle and Veit 2012, 1). Tens of thousands of artisanal miners already operate – mostly illegally – inside DRC's protected areas with between 16,000-20,000 miners inside Garamba National Park alone. This is enabled by the fact that the neither ICCN nor the government army have much control over protected areas, and in many cases are themselves implicated in illegal mineral extraction from inside of them. Semi-industrial mining companies also appear to be starting mining operations inside and at the edge of protected areas: for example inside Garamba National Park, the Okapi Wildlife Reserve and Itombwe Nature Reserve. These companies often establish operations through shadowy connections with local power-brokers and by forming protection-relationships with members of the government police and military. The growing overlap between mining and conservation activities highlights the need to understand the interactions that take place in such double frontiers, which are examined next through the specific cases of Kahuzi-Biega National Park and Itombwe Nature Reserve.

[2] See ICCN's website: https://www.iccnrdc.org/parcs.html

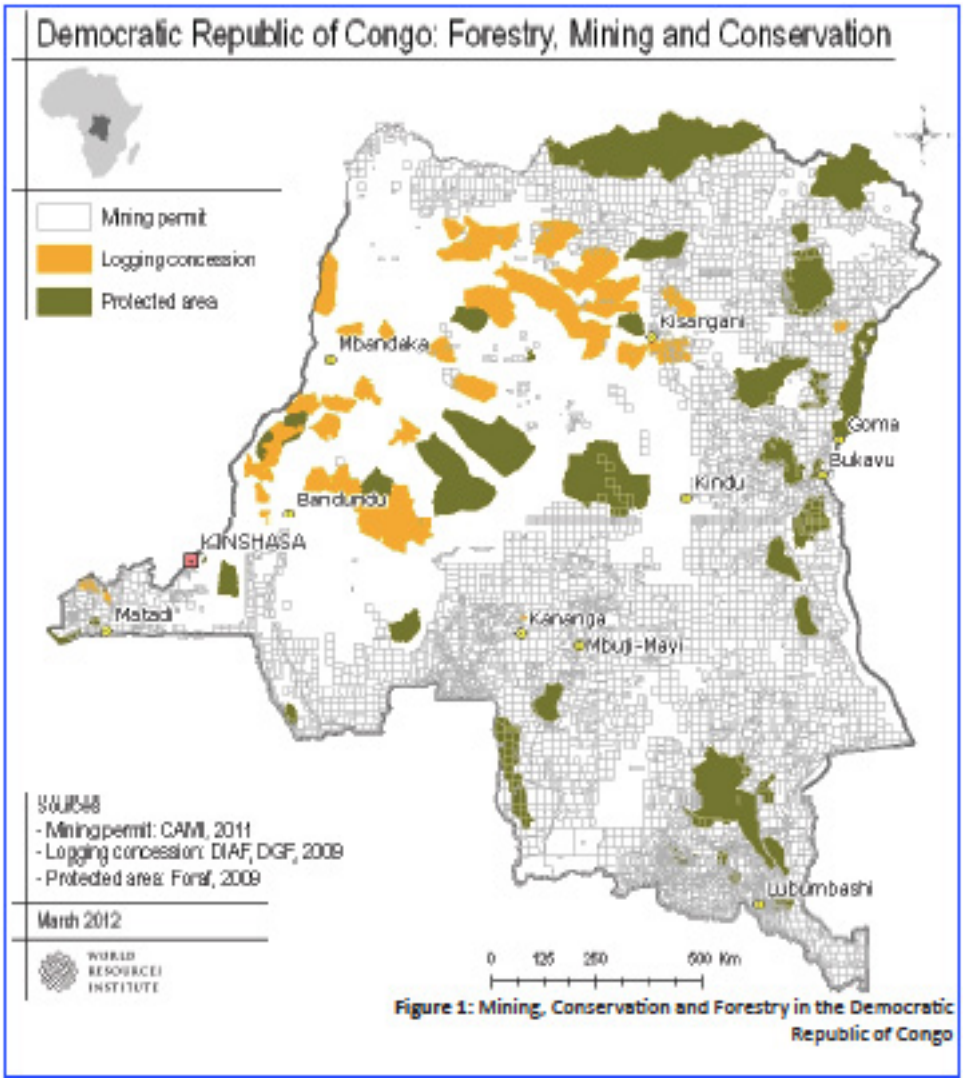

Figure 1: Mining permits, protected areas and forestry concessions in the Democratic Republic of Congo (Javelle and Veit 2012, 2).

3.2. Madagascar

3.2.1. The mining frontier

Mineral production in Madagascar has historically been based on the artisanal and small-scale extraction of gold as well as precious and semi-precious stones scattered across the island (Sarrasin 2004). Europeans first searched for gold in the 1500s, even though gold prospecting and exploitation was already regulated by both the rival Sakalava and Merina monarchs (Campbell 1988). Rushes of both gold and gemstones have produced distinct mining territories across the island. For example, the famous sapphire and ruby mining towns of Ilakaka and Sakaraha in Southern Madagascar were formed in mining rushes during the 1990s (World Bank Group 2015).

Madagascar's industrial mining frontier first opened up in 1968 when the *Compagnie Minière d'Andriamena* (COMINA) established a medium-scale cromite mine in central Madagascar, Betsiboka region (World Bank Group 2015). Madagascar experienced a socialist era under president Ratsiraka since the 1970s during which the company was nationalised. By the 1980s, the country had plunged into a severe economic recession, with political instability widespread and its socialist model beginning to falter (Randrianja and Ellis 2009). The influence of the World Bank,

the largest single lender to Madagascar, grew since the 1980s with the implementation of structural adjustment programs (SAPs) and sectoral legislative reforms (Sarrasin 2006). Liberalisation of trade and imports and the fragmentation of the state's regulative institutions, marked a shift of the national economy towards a form of export-oriented, investment-led capitalism (Sarrasin 2006). This led to further expansion of Madagascar's mining frontier and the state-led territorialisation of landscapes into mining concession of international mining companies. The sector was liberalised through two main reforms: the 1999 Mining Code and the weakening of the mandate of the Office of National Mines and Strategic Industries that eliminated direct state intervention in the sector (Huff 2016; Sarrasin 2006). Consequently, the largest foreign investments in Madagascar's history were in two large-scale mines in the early 2000s: Ambatovy nickel and cobalt mine and QIT Minerals Madagascar ilmenite mine (Huff 2016). Also during 2003-2005, the number of mining grid squares granted for mining exploration, exploitation and small exploitation increased sevenfold compared to previous years (Cardiff and Andriamanalina 2011).

In 2009, following a political transition that Western countries generally viewed as a *coup d'état*, the initial development of the mining sector was brought to a sudden halt. Both foreign investment and mineral exploration shrunk (World Bank Group 2015). Within the past decade, Madagascar's mining frontier has started to gradually expand once again, with a few large-scale mining projects territorialising new areas through exploration permits. Such territorialisations have been contested, at times successfully, by local communities, environmental NGOs and human rights organisations. While the growth of the extractive sector[3] has been slower than might otherwise have been expected, it nonetheless produces almost a quarter of the country's exports (EITI 2021).

The presence of Chinese mining companies has increased in Madagascar since the early 2000's in tandem with the growing rates of foreign investment from China (Jean, Wang, and Suntu 2020). Chinese companies have started semi-industrial mining operations in various locations across the island such as in Soamahamanina in Central Madagascar and Vohilava at the Eastern coast. Such territorialisation has been facilitated by the local authorities despite the lack of mining permits as well as local resistance, particularly in Vohilava (United States Department of State 2018, 10-11).

While large-scale mining projects have faced major obstacles, Madagascar's artisanal mining frontier has expanded rapidly over the past decade. Two factors in particular have catalysed this development. Firstly, after the political crisis of 2009 the withdrawal of foreign businesses and donors pushed the already impoverished country into a steep economic decline. Unemployment and poverty rates rose. Secondly, the 2008 global economic crisis raised the market price of gold, making the exploitation of the small, shallow and scattered deposits more profitable. 2012 was a peak-year for artisanal gold mining: the official rates of production, which are considered to be only a fraction of the total production, grew ten-fold (World Bank Group 2015). Gemstone production peaked in the same year (World Bank Group 2015). Most gemstones and gold are trafficked through illegal chains. For example, the United Arab Emirates reported US$ 141 million in 2016 and US$ 98.4 million in 2018 worth of gold imports from Madagascar (OEC 2021). According to other estimates gold production in Madagascar ranges between 8 and 14 tons annually, with a total value of US$ 400-600 million[4].

3.2.2. The conservation frontier

In addition to its mineral wealth, Madagascar is one of the world's most ecologically diverse countries. Due to geographical isolation of the island, over 90 per cent of its plant, amphibian and mammal species are endemic – a fact which justifies its nickname as the 'eight continent' (Tyson 2013). As a result of its biological richness, the country has become a focal point for development and conservation NGOs, philanthropists and private funders – which has consequences for

[3] Mainly constituted by mining projects given oil and gas exploration remains limited.
[4] Personal communication with an anonymous mining sector consultant in Antananarivo in 2018.

the territorial control of rural Malagasy landscapes (Sarrasin 2006).

Madagascar's first protected areas were territorialised by the French colonial administration in the 1920s through the model of strict nature reserves. The exclusionary 'fortress' approach to conservation that was applied during this period was also adopted for the national parks and reserves founded by the Republic of Madagascar after independence in 1960 and continued practically unchanged throughout the 1960s and 70s (Raik 2007; Kull 2002; Scales 2014). The end of the socialist era and the opening of the economy to foreign actors in the 1980s and 90s brought a fresh wave of foreign researchers, conservation organisations and conservation funding to Madagascar (Raik 2007). With USAID and World Bank as leading funders and Conservation International, Wildlife Conservation Society and World Wildlife Fund as some of the biggest and most powerful conservation NGOs in Madagascar, the Malagasy conservation policy became dominated by the interests of the global North (Andriamahefazafy, Méral, and Rakotoarijaona 2007).

In 2003, in the World Parks Congress in Durban, the Malagasy president Ravalomanana pledged to triple the cover of protected areas in Madagascar in only five years' time. This resulted in the rapid opening of the neoliberal conservation frontier in Madagascar and a new form of conservation territorialisation over the Malagasy lands. To deliver on Ravalomanana's promise, the SAPM (*Système d'Aires Protégées de Madagascar*) framework was established, under which a new category usually referred to as the 'New Protected Areas' was introduced in Madagascar. New Protected Areas correspond with the International Union for Conservation of Nature (IUCN) protected area categories V and VI, which acknowledge and allow some local livelihoods to take place in the areas (Corson 2011). Conservation International, World Wildlife Fund, World Conservation Society and a Malagasy NGO Fanamby worked closely with the Ministry of Environment, Waters and Forests in writing the legislation defining the protection status of the 'New Protected Areas' (Fanamby 2003). The creation of the new category can be seen as an adaptation of Malagasy conservation actors and their international funders to the growing international awareness and condemnation of the harmful impacts of exclusionary conservation approaches on local communities. Addressing these concerns and incorporating them into the new conservation model opened new areas of land for conservation frontier expansion by decreasing local resistance and international pressure.

Foreign-led conservation territorialisation has been resisted by Malagasy peasants since the inception of protected areas a century ago, leading to cycles of local resistance and deforestation (Raik 2007). Reflecting shifts in international conservation discourse, integrated conservation and development projects (ICDPs) in the 1980s and 90s, and the creation of legal structures for community-based forest management and the New Protected Area model, aimed to include local communities in conservation projects. Despite these shifts, local communities' position in the face of new conservation territorialisations has not strengthened; in most cases the paradigm of conservation remains unchanged, systematically excluding local communities from decision-making and viewing them primarily as a threat to conservation (Scales 2014).

Even if the New Protected Area framework did not radically change relations between protected areas and people, it entailed one crucial difference compared to the previous conservation models: under this framework the management rights of New Protected Areas were extended to private entities, domestic and foreign NGOs and local community associations (Corson 2011). This opened vast areas of land to foreign and private actors, which then engaged in forms of territorialisation to enable accumulation via the establishment of private conservation areas and ecotourism projects (Corson 2011; Huff and Orengo 2020). Madagascar's protected area cover was tripled primarily through the establishment of New Protected Areas (Waeber et al. 2019). The target was met despite the 2009 political crisis, which led to significant cuts in conservation and development funding. Today, the protected area network in the country covers 6.5 million hectares and consists of more than 100 National Parks, Reserves and New Protected Areas (Waeber et al. 2019).

3.2.3. The overlap between mining and conservation frontiers

Both mining and conservation frontiers have expanded in Madagascar during the past decades, territorialising and restructuring rural Malagasy landscapes. As a result, the overlap between the two has also grown, as has the number of people affected by the interactions between these frontiers. Several of the large-scale mining projects compete of the same land areas with protected areas (Figure 2). The two largest – Ambatovy and QMM – have justified their expansion with biodiversity offsets thereby also facilitating conservation frontier expansion (Huff and Orengo 2020). President Ravalomanana's Durban speech drove mining companies to claim concessions in Madagascar's forests in 2003-2005, in anticipation that the expansion of the protected area network would block their activities (Corson 2011; Cardiff and Andriamanalina 2011).

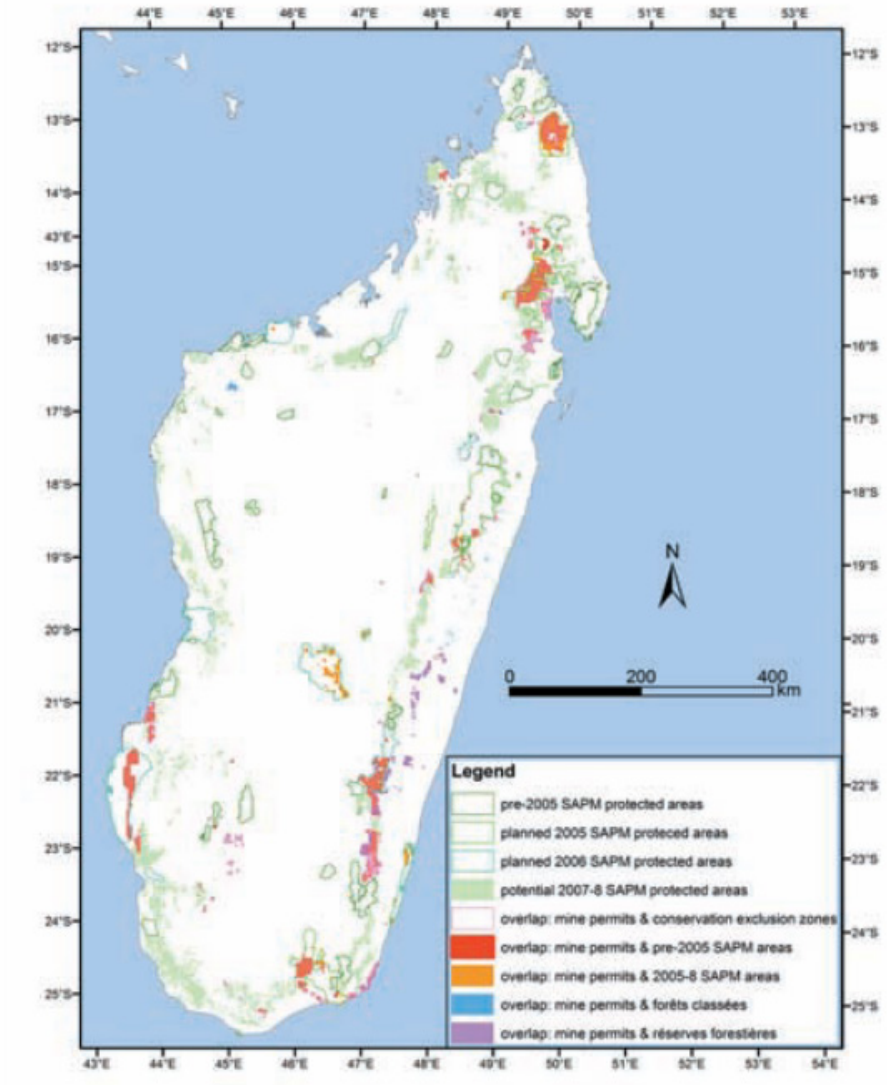

Figure 2. Overlap of mining permits (on 9 June 2006) with all areas of conservation importance, including pre-existing and planned protected areas (Cardiff and Andriamanalina 2011). The majority of the overlap can be found in Madagascar's rainforest belt running from North to South in the Eastern side of the island.

Yet mining permits continued to be issued within conservation zones even af-

ter 2004 when mining in protected areas was officially forbidden with a decree published by the Interministerial Mines–Forests Commission (*Comité Interministériel des Mines et des Forêts*) (Cardiff and Andriamanalina 2011). As a consequence, the overlap between all types of mining permits with protected areas and planned protected areas has increased; for example, areas protected in 2005 overlapped with 33 percent with mining concessions, and areas protected in 2006 with 21 percent of mining concessions (Cardiff and Andriamanalina 2011). ASM activities have proliferated in Madagascar's protected areas and the sector has become a pressing threat to conservation in Madagascar (Cook and Healy 2012). There are no reliable estimates of the number of artisanal miners or semi-industrial companies working in protected areas, but it is safe to say that the problem concerns protected areas in all parts of the island in smaller or larger volumes, with cases of tens of thousands of artisanal miners working inside conserved forests (e.g. Jones 2016). The next section provides empirical evidence on the interactions that take place within such various intersections of mining and conservation.

4. 'Zooming in' on double frontier interactions

In this section, we take a closer look at the interactions taking place at the nexus of mining and conservation frontiers in eastern DRC's Itombwe Nature Reserve and Madagascar's Loky Manambato New Protected Area. We begin both case studies by examining the different forms of territorialisation through which conservation has been established. Then we analyse different scales of territorialistion for mining, with a special focus on the ways in which they attempt to establish access to and control of land and resources in the conservation territories. Throughout the analysis, we observe how different actors and context-specific factors influence the emergent interactions between the mining and conservation frontiers, thus enabling or disabling double frontier conditions.

4.1. Itombwe Nature Reserve

Located in eastern DRCongo's South Kivu Province, the Itombwe Massif is the most biologically rich region of the Albertine Rift (Kujirakwinja et al. 2019). Despite attracting the attention of naturalists and biologists since the Colonial era, it was not until the 1990s that discussions commenced over whether a protected area should be established in the region. The government expressed interest in the conservation of Itombwe Massif with a decree published in 1998. However, plans were put on pause with the onset of the DRCongo's two consecutive wars (1996-1997 and 1998-2003).

After the end of the Second Congolese War in 2003, a ministerial decree was signed in 2006 to establish Itombwe Nature Reserve. However, the reserve's boundaries were unclear and communities were not consulted in advance, leading to widespread confusion and anger. AfriCapacity, a Congolese NGO, even took action to get the entire reserve legally degazetted (Kujirakwinja et al. 2019). Some communities would not allow representatives of the reserve onto their lands.[5] The fact that multiple armed groups continued to operate from bases inside the reserve posed a further challenge to top-down, exclusionary protected area as a way to expand the conservation frontier in the region. As a result of these pressures, the organisations involved in the creation of the reserve – including World Wildlife Fund, World Conservation Society, AfriCapacity, Rainforest Foundation Norway and ICCN – decided to adopt a radically different approach to territorialise this emerging conservation commodity frontier.

It was agreed that the reserve would be territorialised using a participatory, consensual approach, meaning communities had a choice in whether or not they wanted to allocate forests to the protected area. In turn, the reserve would be disaggregated into three zones, each of which involved different territorial arrangements: a multiple use zone, where communities could still live and extract resources; a core ecological zone,

[5] Interview with director of local NGO, Bukavu, 23 February 2019.

strictly for conservation and scientific research; and a buffer zone to provide a link between the two former zones. In this regard, the reserve would encompass a multi-layered territorialisation of the conservation frontier, with the reserve's outer layer resembling a flexible community conservation area and the inner layer more of an inflexible fortress-style protected area. As ICCN and its NGO partners are still in the 'sensitisation' phase of establishing the reserve, conservation regulations are not yet enforced. If one of the reserve's small battalion of 30 or so eco-guards (see figure 3) capture someone extracting resources illegally within the reserve, they are asked to explain the importance of the laws surrounding conservation, then to let the culprit go free.[6] This has limited the degree of conflict between communities and reserve managers to date. However, this is likely to change if conservation regulations are properly enforced in the future.

Figure 3: an image of ICCN's patrol post for ecoguards in Kalundu village, Basile chiefdom (left), and a picture of signposts to be placed at the external boundary of Itombwe Nature Reserve in Basile chiefdom.

Since its inception, funding has been injected into this new conservation frontier by several different international NGOs and development agencies. The World Wildlife Fund worked with finance from the Swedish International Development Agency (SIDA) and USAID; World Conservation Society worked with finance from USAID, the Critical Ecosystem Partnership Fund and the International Union for the Conservation of Nature (IUCN); AfriCapacity worked with funding from Rainforest Foundation Norway, Rainforest Foundation UK and *Fondation Prince Albert II de Monaco*; and both the Gorilla Organisation and Berggorrila also provided limited financial support to ICCN over more recent years. Despite the wide array of organisations involved in financing the conservation project over the years, the reserve is currently having major financial difficulties. For the moment, ICCN's conservation activities are being maintained with limited contributions from Berggorrila and AfriCapacity, which is supported by Rainforest Foundation Norway. The conservation frontier therefore does not have access to a consistent stream of capital, and remains dependant on the ability of international NGOs and their funders to maintain processes of territorialisation that take place on it.

One way in which the Congolese government and NGOs involved in the consolidation of the conservation frontier in Itombwe Nature Reserve secured local consent was through the promise of small economic incentives and development opportunities. When they initially approached villages both inside the outside of the reserve, they would ask for the population to provide a list of their key development needs.[7] In various communities in which the second author conducted research, he was often presented with accounts of the '*cahier de charge*' the population had presented conservation actors with. This almost always included a road linking the community in question to main transport routes, the rehabilitation of health centres and schools, antennae to improve network connection, and

[6] Interviews conducted with eco-guards for Itombwe Nature Reserve, October-November 2019.
[7] Interviews conducted in villages in and around Itombwe Nature Reserve, October 2019-January 2020.

agricultural and breeding projects. Although these promises may have been an effective means of expanding the conservation frontier into previously unexploited zones, they were not realistic in terms of the funding opportunities made available to the organisations supporting the reserve. People's expectations were thus raised as a means of securing consent, but then left unrealised when the reified conservation frontier came into contact with material reality (Simpson and Pellegrini 2022). The danger here is that when the reserve transitions from the current sensitisation phase to enforcement, the communities concerned will respond with resistance given their interlocutors' side of the conservation bargain has not been upheld.

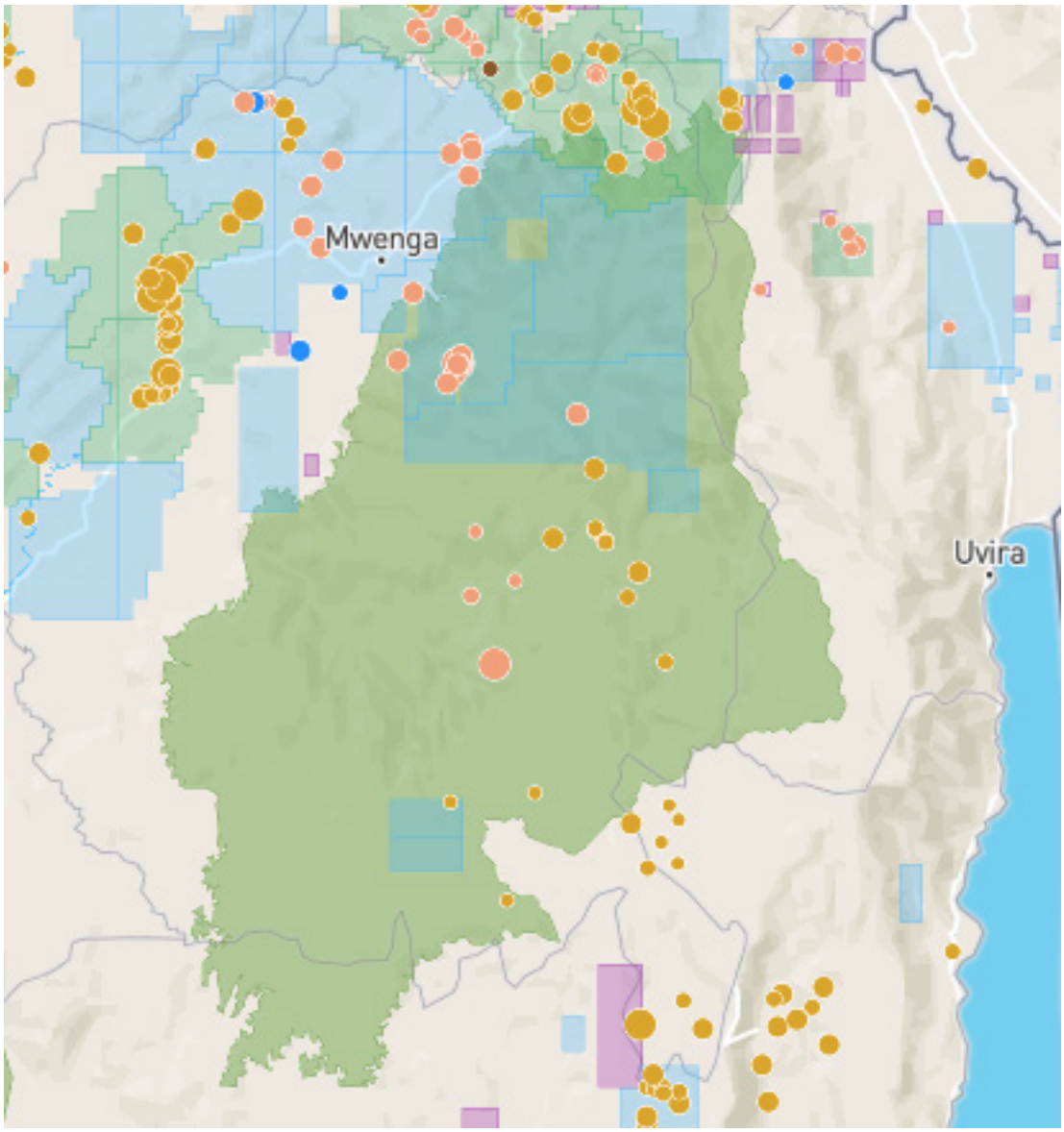

Figure 4: Map of the 2006 boundaries of Itombwe Nature Reserve (green) overlaid with mining permits (blue squares) and artisanal mining sites (pink and gold).[8] *Note that this greatly under presents the extent of artisanal mining inside the reserve because most of the sites have not been mapped.*

This conservation frontier coincides with a mining frontier which is also being territorialised at industrial, semi-industrial and artisanal scales (Figure 4). The mining frontier existed

[8] Map taken from the International Peace Information Service website: https://ipisresearch.be/home/maps-data/maps-of-drc/

long before the reserve was established, expanding and contracting over different time periods. Its interactions with the conservation frontier are several. From 2012 onward, the Canadian mining company Banro established industrial mining operations surrounding the territory on which the reserve is now located, and had mineral exploration permits which overlap with all three of the reserve's zones even before that time (Figure 5). Looking to expand its business in eastern Congo, the company conducted mineral prospection in several sites inside the part of reserve which overlaps with Luindi chiefdom (Simpson and Fikiri 2020). Banro set up six installations during 2017-2018. Three of these installations overlap with the core conservation zone, two with the buffer zone and one with the multiple-use zone (see Figure 5).

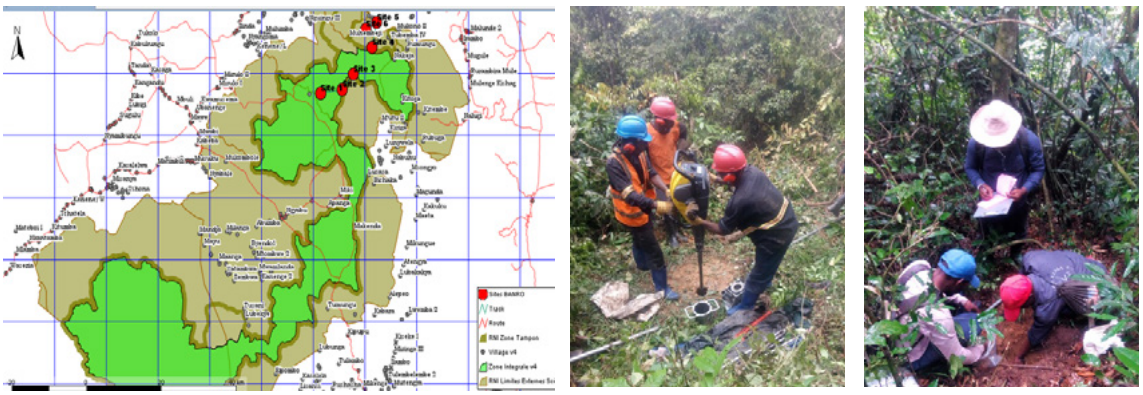

Figure 5: Map of 2016 boundaries of Itombwe Nature Reserve overlaid with sites where Banro conducted mineral prospection inside the reserve (left), and images of Banro's operatives carrying out prospection activities inside the reserve (right).

These activities provoked considerable opposition from environmental civil society in the provincial capital of Bukavu and from several international NGOs including World Wildlife Fund (Simpson and Fikiri 2020). To gain the support of an international audience, conservationists used several methods: they distributed their message through online media, they alerted the Canadian, US and French embassies in Kinshasa about their struggle, and they started an online petition to denounce Banro's activities in Itombwe.[9] On 12 February 2019, the Provincial Director for ICCN in South Kivu also filed a letter addressed to the commander of the 33rd Military Region. It accused Banro of conducting illegal activities inside the reserve and collaborating with members of *Les Forces démocratiques de libération du Rwanda* (FDLR) Hutu rebel group (notorious for its connections to the previous Rwandan government responsible for 1994 genocide) to secure its prospection sites.[10] In reality, these allegations were probably a strategy to rally international support to stop Banro exploiting in the reserve than based on verifiable facts. What seems more likely is that Banro paid local defence (or 'Mai Mai') forces as a way to secure its operatives in Kigogo, which ICCN then strategically accused of being FDLR as a way to shut down the industrial mining frontier that overlapped with the reserve.

Yet Banro was able to temporarily win the support of some of the local population in Kigogo by promising to provide opportunities for development and employment in the future. According to one villager, 'Our community is for development, so its reaction should only be positive. All the people of Kigogo in general and Kihazi, Mashako and Muhembeje in particular were happy to hear that Banro wants to come here.'[11] There are even rumours the company paid-off chiefs in Kigogo and Luindi to help rally the support

[9] The petition against Banro can be found at this link: https://www.rainforest-rescue.org/petitions/1150/keep-gold-miners-out-of-gorilla-country
[10] This was widely reported by the local media in South Kivu. See for example: https://www.radiomaendeleo.info/2019/03/19/economie/sud-kivu-banro-accusee-dutiliser-les-fdlr-dans-la-rni-la-chefferie-de-lwindi-sinterpose/
[11] Interview with villager, Muhuzi locality, Kigogo groupement, Luindi chiefdom, 25/06/2021.

of their communities.[12] As a result of these and other promises, the chiefs of Kigogo along with a significant portion of the population were persuaded to the point that it discontinued its participation in the reserve altogether in order to open up the way for Banro to begin full-scale extraction on their land. A village stated that,

> *'Resistance to the reserve began when we heard about Banro's arrival at a time when INR [the reserve] project was not living up to its promises. We needed a partner who could develop our villages, open up roads and build health, education and other facilities, which INR had not done.'*[13]

Despite the initial hype surrounding the possibility of industrial mining coming to Kigogo, Banro has since discontinued its attempts to territorialise land for mining inside the reserve and in other sites in eastern DRC. As a reason for this, its CEO cited the government's failure to provide a stable environment for its business operations, attacks against its employees by armed groups and the occupation of mining sites by artisanal miners.[14] Consequently, the industrial mining frontier that directly coincides with reserve has – at least temporarily – shut down. Though the permits that overlap with the Reserve still exist, meaning industrial mining could come back at some point in the future.

Figure 6: images of Chinese-led semi-industrial gold mining operations at the edge of Itombwe Nature Reserve in the village of Kitumba, Wamuzimu chiefdom. The site on the left is an open-pit mine excavated by mechanical diggers, and a mechanised dredging operation in the Ulindi River is shown on the right.

While industrial mining appears to once again be in a state of contraction on the Itombwe Massif, the mining frontier that coincides with the reserve continued to expand through territorialisation at the semi-industrial scale. Two wildcat Chinese companies established semi-industrial operations at the south eastern edge of the reserve in 2019 (Figure 6). Regal SK started a semi-industrial gold mining operation in Kiziba (Wakabango 1 sector) and Congo Blueant Minerals has established a gold mine in Kitumba (Wamuzimu chiefdom). Exactly who owns the companies is unclear, as well as precisely how they came to begin mining operations in South Kivu. Neither is their relation to the Chinese state, which – at least in public – denies any association with these companies. The Chinese companies have established mining operations in the Elila River using boat dredges as well as open-pit mines on the river's banks excavated by mechanical diggers. The Chinese companies use various chemicals in the gold production process, including mercury, which is polluting local water sources, such as rivers and fish farms.

Unlike Banro, the Chinese companies operate without the correct legal documents, through shady deals with local power-brokers. It is reported that they obtained exploration permits but then proceeded to begin full extraction as soon as they located sufficient deposits of gold. In the Kitumba mining site, Congo Blueant appears to have initially deceived the local population

[12] Various interviews conducted in Kasica, Luindi chiefdom, November 2019.
[13] Interview with villager, Muhuzi locality, Kigogo groupement, Luindi chiefdom, 22/06/20021.
[14] See: https://www.agenceecofin.com/or/1002-73666-rdc-banro-cherche-un-acheteur-pour-la-mine-d-or-namoya

so as not to arouse suspicion of its true motives. The company reportedly arrived in a village close to the Kitumba mine in February 2019, claiming to be there to rehabilitate the road. They asked members of the local population where their ASM gold mine was located so that they could use the excess stones for the road. However, after having been shown the location of this mine, the company started to establish its own semi-industrial gold mining operations. It is rumoured that these companies paid off local officials and members of the provisional and national parliaments in order to set up the mines. They also paid several villagers, members of the Congolese police force and the government army to provide security at the mining sites. However, the mining activities are performed almost exclusively by Chinese workers. The fact that Chinese semi-industrial mining companies operate on the edge or at the margin or legality likely enabled them to establish functional mines at the edge of a protected area, causing considerable environmental damage, without properly compensating the local population(s) whose mines they appropriated. Such shadowy operations would unlikely be possible if pursued by an industrial scale company that works through more licit channels.

The establishment of semi-industrial mining operations has effectively 'squeezed' the community between the Chinese mines on the one side and the nature reserve on the other. For example, the Kitumba mining site is just a few hundred meters from where ICCN had established a patrol post from which eco-guards were conducting patrols inside the reserve. A villager from Kitumba told the second author,

> *We are being held hostage because of our wealth! The future in this village is uncertain. On the one hand, the Chinese have evicted us from our fields and mining sites. On the other hand, the reserve is going to forbid us from entering the forest. In the face of this suffering, our authorities are keeping quiet![15]*

This has led to widespread anger among the local population. According to a local farmer, 'The local population began to do strikes and demonstrations when they saw Chinese were operating where they were. They called Kimbilikiti [a forest spirit] to prevent the Chinese from accessing the site.'[16] Local civil society also organised a protest in the regional centre of Kitutu to demand the Chinese companies leave the area and give the gold mining sites back to the local populations. The situation reached a climax on the morning of 21 November 2019 when a local armed group raided the Chinese mining camp and kidnapped three of Chinese workers while injuring a fourth.[17] Two government soldiers who had been paid to guard the site was also killed during the attack. In the days afterward, the Chinese left the area and ICCN's abandoned its patrol post in the village of Kitumba out of fear its eco-guards could suffer a similar attack.[18] Thus in some instances, resistance to expansion of the mining frontier could also pose limitations on territorialisation for conservation in double frontier regions. On 02 December 2020, another Chinese worker was killed between Kitumba and Kitutu while travelling to Bukavu. The assailants escaped with the gold he was carrying.[19]

While ICCN decided to close its patrol post in Kitumba in the months after the attack, the Chinese eventually returned to the mining site under the protection of the Congolese military, who moved its headquarters in Wamuzimu chiefdom from Kitutu to Kitumba. This suggests that mining operations may be more able to win the support and protection of local elites and politico-military entrepreneurs due to the comparatively larger rents they can secure in the short term (also see Simpson and Pellegrini 2022). According to a peasant farmer from Kitumba, 'With the attacks on Chinese mining facilities, the army is now in the village to protect the Chinese and not the population.'[20] Exactly what the relationship between these companies and the government military remains unclear, other than the fact the former is paying the latter for protection. However, given

[15] Interview with farmer, Bingili Bazala, 01 November 2019.
[16] Interview with farmer, Bingili Bazala, 02 November 2019.
[17] Focus group conducted with villagers in Kitumba village, Wamuzimu chiefdom, May 2021.
[18] Interviews conducted with villagers in Kitumba village, Wamuzimu chiefdom, May 2021.
[19] Interviews conducted with villagers in Kitumba village, Wamuzimu chiefdom, May 2021.
[20] Interview conducted with peasant farmer, Kitumba village, Wamuzimu chiefdom, 21 May 2021.

the military's role in illegal resource extraction elsewhere in eastern DRC, it is reasonable to assume certain individuals within its ranks benefitted from the presence of the Chinese. There are now numerous complaints against the government soldiers positioned in Kiziba and Kitumba, who the local populations accuse of imposing forced labour ('Salongo') on them once a week, collecting illegal taxes at roadblocks either side of the village, and cutting trees to make charcoal inside the reserve.[21] These complaints reached fever pitch in August 2021, sparking protests against the presence of the Chinese companies across Mwenga territory. On 20 August 2021, the governor of South Kivu suspended the operations of all Chinese companies in the territory of Mwenga, although in the weeks that followed local media reported the continuation of semi-industrial mining operations despite the ban.[22] Whether the semi-industrial mining frontier remains open in the region remains to be seen.

Figure 7: Image of the large cassiterite mine 'Zombe' inside Itombwe Nature Reserve shown on the left, and a map showing the location of Zombe in relation to the reserve's multiple use (light green), buffer (clear) and core (dark green) zones on the right.

While the semi-industrial and industrial forms of territorialisation for mining are highly contested on the Itombwe Massif, ASM continues to play a significant role in the livelihoods of many communities living in and around the reserve. The most commonly mined minerals are gold, cassiterite and coltan. Up to this day, many of the sites previously operated by MGL are now used by artisanal miners. For example, the large cassiterite mine of Zombe can draw up to a thousand miners at a busy time of the year, and is commonly referred to as the economic 'lung' of Basile chiefdom (Figure 7).[23] There is considerable deforestation in the area surrounding Zombe and other mines. Hunters also regularly sell bush meat to miners inside the reserve. Numerous miners and traders still use the road MGL constructed from Mwenga Centre to Zombe. Past territorialiations at the industrial scale thus influence later territorialisations at the artisanal scale. The artisanal miners often buy food and other supplies in villages along the route. As such, the economic knock-on effects of artisanal mining go way beyond the miners. One inhabitant of the village of Kalundu told the second author, 'Without Zombe, there is no life in our village!'[24] Considering its importance for local economies, the reserve managers decided to allow ASM to continue in the reserve's multiple use zone. Eventually the plan is to validate the main sites within the zone as officially artisanal mining zones (ZEAs). At the moment, artisanal miners cam still walk past ICCN's patrol post in the village of Kalundu on the way to the Zombe site unhindered.

In Basile chiefdom, which overlaps with the west of the reserve, a memorandum of understanding has now been signed between the customary chief, the reserve managers and artisanal miners grouped under the COOMIDEM-SCOPS mining cooperative. This declaration states mining will be allowed to continue as it does not cross over into the core or buffer zones. Under this territorial agreement, some form of overlap would be permitted between both mining and conservation frontiers. This presents a challenge given the large Zombe mine is located at the edge of the

[21] Interviews conducted with villagers in Kitumba village, Wamuzimu chiefdom, May 2021.
[22] As reported in local media: https://actualite.cd/2021/08/21/rdc-voici-les-9-entreprises-en-majorite-chinoises-dont-les-activites-dexploitation
[23] Focus group, Kalundu village, Basile chiefdom, 27 May 2021.
[24] Interview with small businessmen, Kalundu village, Basile chiefdom, 15 November 2019.

buffer zone and is continuing to expand as new deposits of cassiterite are unearthed. To prevent miners from pushing further toward the buffer zone, there is a plan to demarcate the limits of the site.[25] However, this has still not yet been completed due to financial and logistical difficulties. The informal, itinerant nature of artisanal mining means that additional mining sites could easily emerge across all three of the reserve's zones in the future, posing a further conundrum for conservationists. Territorialisation for mining at the artisanal – and to a degree semi-industrial – scale(s) can thus be considered adaptations to enable mineral extraction to take place on top of or adjacent to conservation frontiers, whether legal or not.

Another issue concerning the governance of ASM sites inside the reserve is the presence of armed groups, and the absence of state control inside the reserve itself. Many of these armed groups established control of the remote mining sites inside the reserve during Congo's two wars. Although armed group involvement in ASM is not as significant as it once was, there are still some sites that are positioned in areas under direct control of armed groups (for example, the sites of Miki and Kitopo sites in Itombwe Sector) or which have indirect linkages to armed groups through informal taxes (for example the Zombe site in Basile Chiefdom). The presence of these armed groups makes it difficult for the reserve's small group of 30 or eco-guards to regulate or restrict mining activities. Sites under the influence of armed groups cannot be validated through the ITSCI due diligence program currently being rolled out in eastern DRC. Despite the fact there are no mines that have been officially validated inside the reserve, there is evidence that minerals from the illegal sites are inserted into 'conflict free' supply chains, including from the large Zombe mine, by taking them to sites that have already been validated.[26] These uncertified minerals are then transported from the sites to the centre of Basile Chiefdom and on to Bukavu, where they are sold on to international markets certified as conflict free.

4.2. Madagascar's Loky Manambato New Protected Area

In the northern Madagascar's east coast (Figure 8), in a landscape characterised by seasonal rainforests, grasslands and mangroves, the rivers Loky and Manambato limit the habitat of one of the world's most endangered primates, the Golden-Crowned Sifaka. A study by Vargas et al (2002) deemed habitat destruction through slash-and-burn agriculture, grass fires, wood and gold extraction, and poaching as the main threats to Golden-Crowned Sifaka and recommended the conservation of the area stretching over 250 000 ha. The area has exceptional biodiversity overall – 84 percent of its species are endemic, including ten species of lemurs and the fossa, Madagascar's largest carnivore (World Bank Group 2019).

The Malagasy NGO Fanamby started the project to conserve the area between Loky and Manambato rivers from 2001–2003 funded by the Critical Ecosystem Partnership Fund[27]. The initial plan was to create a national park combined with reserves of lower protection status (Fanamby 2003). However, the national parks authority (ANGAP at the time) withdrew from the partnership and Fanamby signed agreement with the Ministry of Environment and Waters and Forests to ensure the protection of the area under a new protected area framework. President Ravalomanana's promise to triple Madagascar's protected area over five years came in 2003, with Fanamby as part of the president's delegation, and led to the creation of the 'New Protected Area' model. Loky Manambato New Protected Area was one of the three first pilot sites where the framework was tested (Fanamby 2003).

The protected area is large in size and hosts four rural communes with villages and small towns. It was territorialised through a zoned approach (Figure 9). Outside of the marine and coastal areas, there is firstly the 'core conservation' zone (*noyau dur*), which is the most valu-

[25] Interview with representative of ICCN in Itombwe Nature Reserve, 10 January 2020.
[26] Interview with representatives of Ministry of Mines, Mwenga Centre, Basile chiefdom, 20 November 2020.
[27] The Critical Ecosystem Partnership Fund is a US-based biodiversity conservation initiative of l'Agence Française de Développement, Conservation International, European Union, Global Environment Facility, Government of Japan and the World Bank.

able in terms of biodiversity. It is reserved strictly for conservation, research and ecotourism, and functions as fortress-style exclusionary conservation territory. The core zone is split into several geographically separate but equally strict conservation areas within the protected landscape. Secondly, core zones are surrounded by forest where logging is only permitted by the local state forest authority and monitored by local conservation committees established by Fanamby, and therefore in practise serve as a buffer around the core zone. Third, zones of 'controlled use' overlap partly with forests and allow local communities to continue their livelihood activities within their limits. Fourth, specific 'mining zones' have also been delimited in areas already assigned to miners and communities holding small exploitation permits prior to the establishment of the protected area (World Bank Group 2019). Fifth, there is the zone of forest restoration. The territorialisation for conservation thus follows a mosaic pattern where the inner, inflexible fortress-style conservation areas are surrounded by layers of flexible conservation areas. The division of land into zones was finalised in 2005 when the Loky Manambato New Protected Area gained official status.

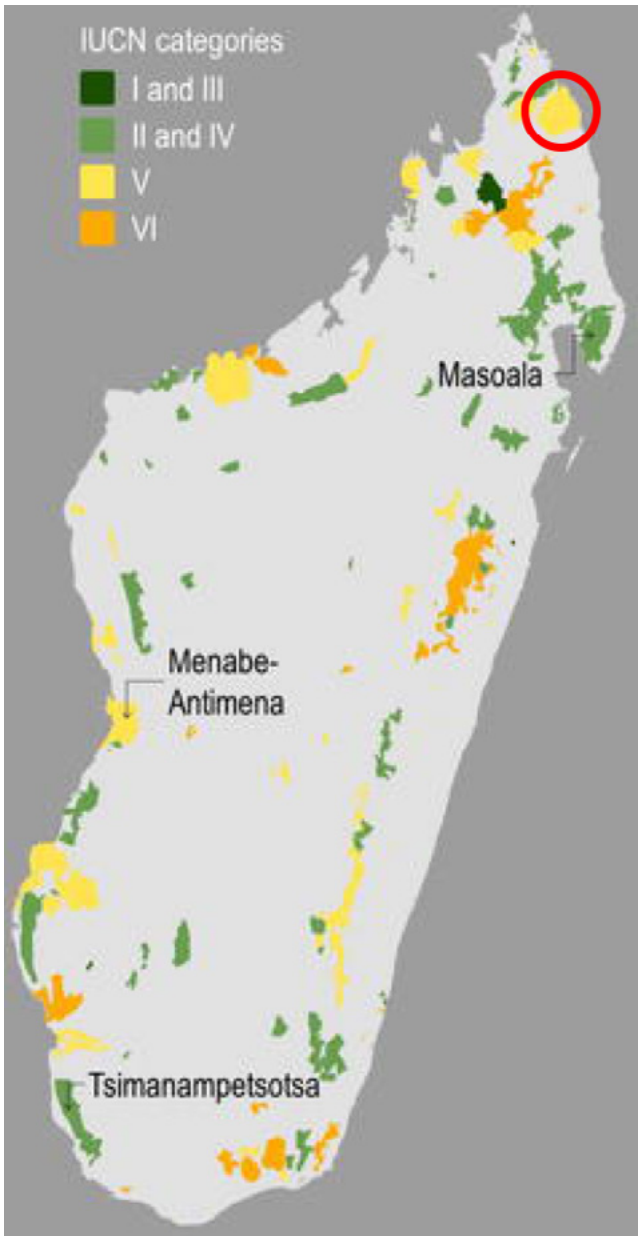

Figure 8: Location of Loky Manambato, an IUCN category V protected area in Northern Madagascar (map: Waeber et al. 2019).

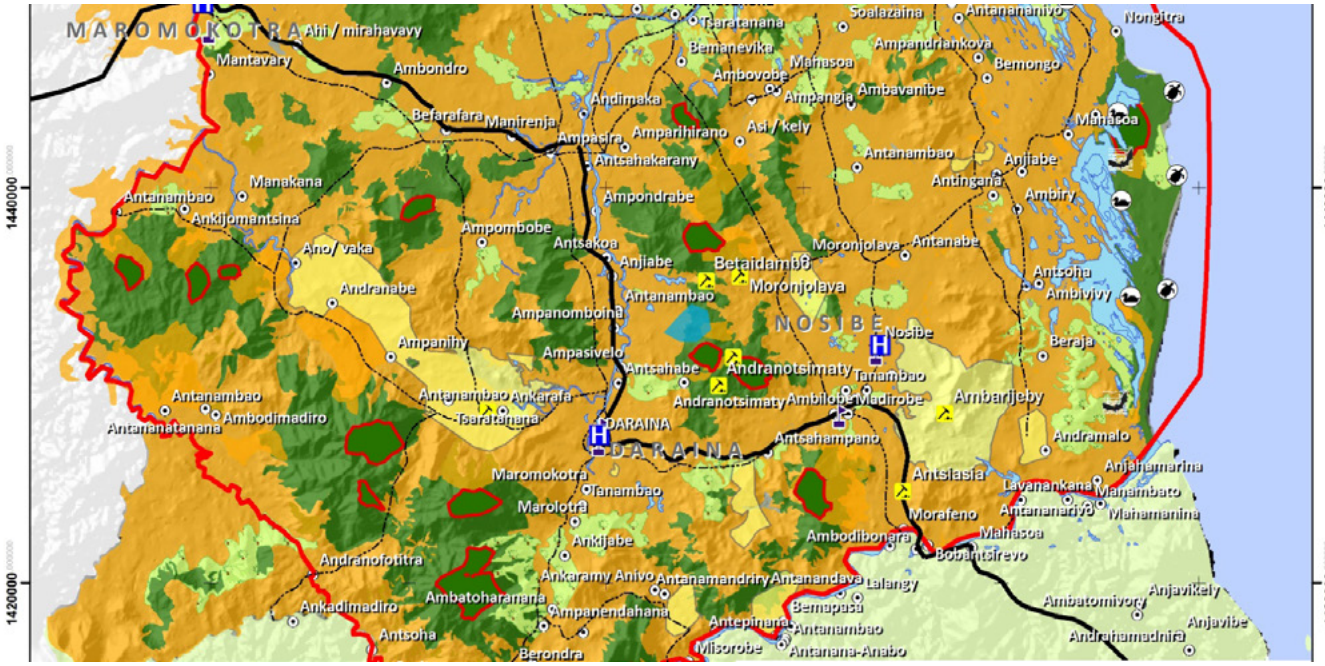

Figure 9: Map showing a part of the Loky Manambato Protected Area and its division into zones. Location of the mining site and community of Andranotsimaty is marked with yellow circle (Map by NGO Fanamby).

A member of a local community commented: 'Fanamby started conservation by telling us the areas that we can and can't use. We think the division is unfair because this is not a reserve and we are Malagasy so we have the right to use the land.'[28] The territorial right of Fanamby to establish rules over land use was also questioned by some of the local politicians based on the same argument: 'Is it Fanamby or the Republic of Madagascar who owns this land?'[29] This perception is not shared by all inhabitants within the vast protected area. Many who live right outside the strict core zone (Figure 10) agree with the conservation goal even if it entails restrictions. 'I understand that the forest can disappear because we mine here.' 'We have the rule that we cannot cut trees on this side. But if we really have to, we must get a permit from Fanamby. It is not so difficult because it is for the best.'[30]

[28] Interview in Andranotsimaty, rural commune of Daraina.
[29] Interview in the rural commune of Daraina.
[30] Interviews with miners living in Andranotsimaty, rural commune of Daraina.

Figure 10: A sign marking the boundary of a strict core conservation zone within Loky Manambato. The sign says: 'Protected Area Loky Manambato "Forbidden forest". Prohibited to: Cut forest, Burn, Hunt.'

This conservation frontier links to global capitalist value chains in multiple ways. The conservation of the protected area has been funded by a variety of international conservation and development organisations such as UNDP and GEF, governments, and foundations such as Mac Arthur. However, Fanamby management does not consider the unreliable and typically a 1–4-year funding cycle of the conventional donors suitable for the long-term commitment that is required when working with local communities. Instead, Fanamby has more recently become interested in seeking funding from private sources such as corporate social responsibility programs of multinational companies. Fanamby has supported the development of local enterprises, such as local community vanilla production in cooperation with L'Oréal. A share of profit from these enterprises can be used to fund conservation and organisational costs of Fanamby when needed.

The different forms of territorialisation taking place on the conservation frontier intersect with a mining frontier being territorialised at three scales – ASM, semi-industrial and industrial. Since the colonial era, the area around Daraina has been known for its gold deposits, with evidence of mining dating back to 1910 (Cook and Healy 2012). During this time, the ASM frontier has expanded and constituted a form of territorialisation emerging in the predominantly informal and mobile practices of gold mining and trading. The mining practices range from digging the bare soil with shovels, panning in dried river beds with family members, to more professionalised rock mining through tunnels, often using simple machinery, such as water pumps. While gold is the most important mineral, quartz, chrystal and sphene are also produced artisanally in the area (World Bank Group 2019). The mining frontier expansion has had a profound effect on the local social-ecological structure. The ecological impacts of more than a century of artisanal of mining are notable and include erosion, hydrological changes, and destruction of vegetation (World Bank Group 2019). Yet ASM plays a key role in the local economy, with an estimated 80-90 % of the population getting income directly or indirectly from mineral exploitation. While most villagers identify primarily as rice cultivators, the majority of them also practise ASM – which has become the most important source of cash for households. Today, the town of Daraina is a local centre of gold trade where roughly one hundred gold traders buy gold to resell in the cities of Vohémar, Sambava, Ambilobe, and Antananarivo (World Bank Group 2019). In 2019, only three of these traders had official permits.

The ASM territory within Loky Manambato, which since the 1980s have been characterised by the fluctuation of mobile miners, has taken on more permanent forms over time. One such example is the village of Andranotsimaty, which emerged during the gold rushes in the early 1990's and is now located just outside the core conservation zone. Although the population continues to fluctuate depending on where the latest gold rush takes place, Andranotsimaty has be-

come a permanent mining site with its most long-term inhabitants living there since 1992. In addition to this informal mining territory, the villagers also hope for it to be formally recognised to enhance their territorial control; they are trying to find a way to get a status of an officially recognised village. Yet despite their relative wealth arising from the production of gold, the villagers hold back from constructing comfortable houses or anything too permanent out of the fear of being chased away by gendarme and military forces (Figure 11).

Figure 11: An abandoned artisanal mining site and the village of Andranotsimaty.

Such evictions took place in 2011, when a gold rush pulled in numerous miners to Andranotsimaty starting a clash between mining and conservation territorialisations. As the number of miners right at the border of the core conservation zone grew unsustainable, Fanamby saw no other option but to call the gendarmes and military to evict everyone from the village. People were forced to flee after their settlements ravaged. 'We ran! And in the meanwhile everything in our houses was broken by the military.'[31] Yet, after a few days, a group of longer-term residents returned. They raised the Malagasy flag to indicate their desire to have Andranotsimaty recognised as an official village. The eviction was blocked also by the help of the mayor of Daraina who supported the continuation of mining in Andranotsimaty. An accord was eventually signed between the parties which redefined the rules for the mining and conservation zones. Long-term inhabitants of Andranotsimaty told the first author,

> *In the end the state could not force us to stop mining here. Now we have found a way to be together, miners and conservation.*[32]

Since then, we have the freedom to work and Fanamby doesn't threaten us like before. This is as long as we stay within the limited area. But it is very difficult to follow the rules of Fanamby because as miners we change places all the time.[33]

Despite the move toward formal acceptance of ASM in Loky Manambato, the sector remains primarily under the influence of shadow state actors. As the events in Andranotsimaty suggest, local politicians enable informal gold mining to continue in the buffer zone. The miners of Andranotsimaty explain that those in local positions of power also try to take advantage of gold production – for example by demanding a share of gold as an informal tax.

Other than the 2011 incident in Andranotsimaty, Fanamby has for the most part been able to maintain peaceful relations with the local peasant and mining communities. By allowing mining to continue in Andranotsimaty as a part of the unofficial agreement with the communities (despite it not being completely legal), Fanamby has reduced the impacts of mining on the forest (World Bank Group 2019). Other illegal activities such as bush burning and logging without a permit in the buffer zone take place regularly, challenging the de facto territorial power of Fanamby. In general, however, local communities continue their livelihood activities unencumbered by conservation regulations thanks to the large flexible zone[34]. They are also persuaded by, though re-

[31] Interview in Andranotsimaty, rural commune of Daraina.
[32] Interview in Andranotsimaty, rural commune of Daraina.
[33] Interview in Andranotsimaty, rural commune of Daraina.
[34] Interviews in local communities of Andranotsimaty and Ankijabe, rural commune of Daraina.

main sceptical of, Fanamby agents' promises to provide development opportunities in the future – thus the tentative acceptance of the conservation territorialisation. In the Malagasy conservation scene, Fanamby is known for its expertise in creating economic incentives to encourage local communities to support conservation. In this regard, it is working towards developing a Fairtrade gold business in the area and supporting local miners to establish mining associations and to acquire mining permits.[35] New ways to commodify the local socio-nature can also be observed in the establishment of a 'gold-miner nature walk' for eco-tourists that uses Andranotsimaty as a key exhibit.

While ASM is partly accepted and incorporated into the conservation zones forming a territorial dynamic where both can somehow co-exist, semi-industrial mining has not been able to do the same, or to challenge conservation territorialisation. In 2017, a Chinese company started exploiting an open-pit mine near Andranotsimaty (Figure 12). They negotiated with a local miner who got hired by them and learnt to use their machines. 'It was good to work with the machines so it was a good cooperation.'[36] However, it did not last long. 'People here did not agree for the Chinese to be here. They feared that the Chinese would take their land and they were also jealous of the gold they found.'[37] The community, who were afraid of losing access to the area and its gold deposits, knew the Chinese did not have a permit to mine at the border of the core conservation zone. They informed Fanamby about the operation. Fanamby promptly called gendarmes to put an end to the illegal mine and evict the Chinese. 'Gendarmes came and took the machines. They were called here by the people.'[38] The majority of miners in Andranotsimaty were in favour of the eviction, except for a person hired by the Chinese – even though he eventually re-occupied the mine alongside a team of local miners. Hence, Andranotsimaty's artisanal miners effectively took advantage of conservation and its access to state law enforcement to secure control of their mining territory against the Chinese company. Thus, the double frontier has offered a perhaps unexpected avenue for the informal miners of Andranotsimaty to use state territorial authority in order to push forward and defend their own territorialisation.

Figure 12. Gold mine dug by a Chinese semi-industrial mining company close to Andranotsimaty

The extraction of gold at the mine abandoned by the Chinese company continued

[35] Interview with the director of Fanamby, December 2019
[36] Interview in Andranotsimaty, rural commune of Daraina.
[37] Interview in Andranotsimaty, rural commune of Daraina.
[38] Interview in Andranotsimaty, rural commune of Daraina.

at the artisanal scale because the gendarmes had taken the machinery away. 'Deep in the tunnel the rock is hot and there is a smell of dead rat. It is a sign of gold. We have a system to bring fresh air for the team members who are inside – otherwise they will pass out. But we are really hopeful that there is going to be lots of gold.'[39] It has become an aspiration of the team mining this tunnel to acquire the kinds of machines the Chinese used, preferably with the help of external capital. They are already negotiation a deal with a local gendarme to provide them with a motor and fuel in exchange for three shares of profit.[40] Such aspirations suggest a future for semi-industrial mining in Loky Manambato. The Chinese company failed to establish relations of support with the local state authorities or key military personnel (which has occurred elsewhere in Madagascar to the detriment of local artisanal miners) unlike ASM miners who, during their eviction threat, had the mayor's support. If local miners will scale up their extraction or if another Chinese company comes up with a deal with key local authorities, under the presence of shadow state, semi-industrial mining frontier might take on a more permanent form in Andranotsimaty despite the legislation protecting the Loky Manambato Protected Area currently.

Large-scale industrial mining has not taken place in Loky Manambato to date. Yet there are already competing territorialisations at play between conservation and industrial mining frontiers. When both mining and conservation frontiers in Madagascar suddenly expanded since 2003, the overlap between these activities increased dramatically (Cardiff and Andriamanalina 2011). The degree of overlap between authorised mining grid squares and conservation territories is particularly high in

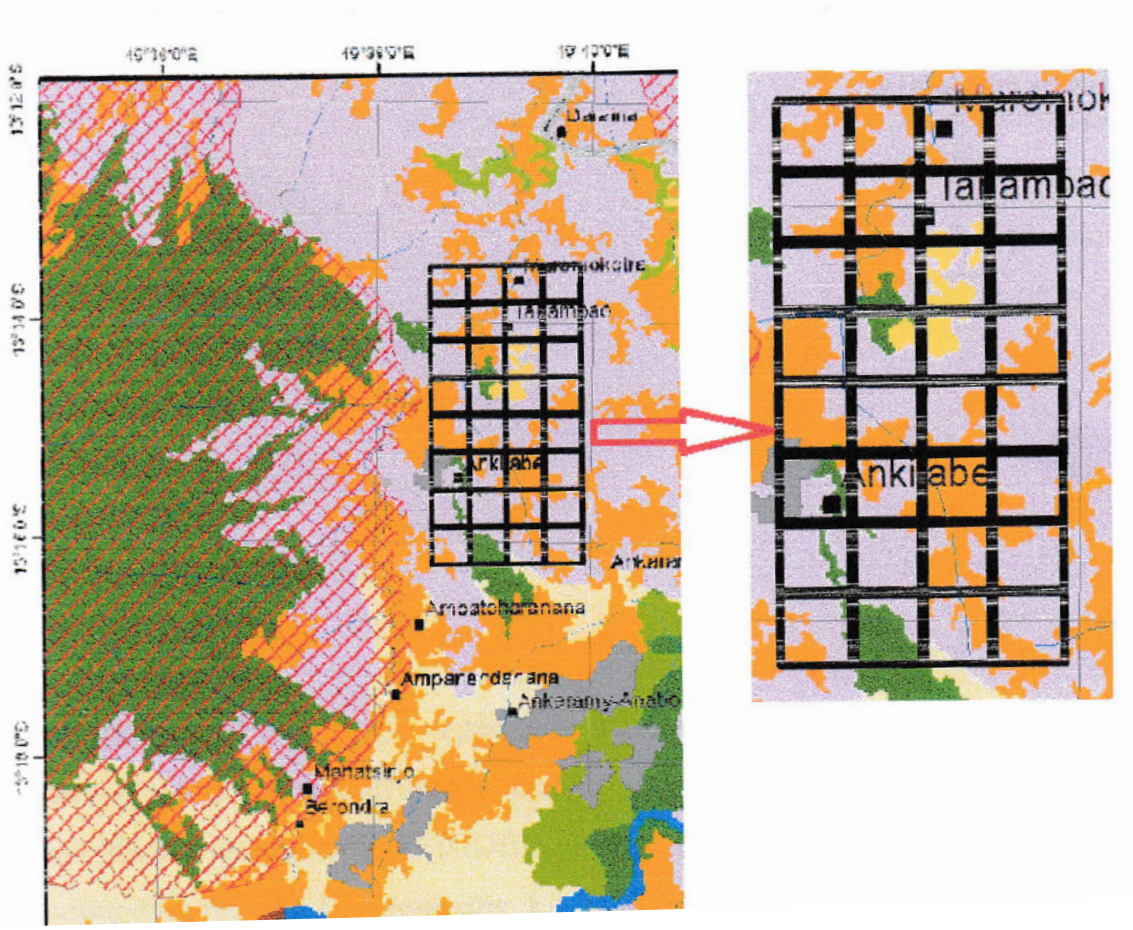

Figure 13. Map locating one of the exploitation permits that overlaps with Loky Manambato Protected Area including three villages and a river. The permit allows the extraction of gold, jasper, quartz, rose quartz, chrystal, sphene, copper and rare earths.

[39] Interview with a member of the mining team in Andranotsimaty, rural commune of Daraina.
[40] Also the first author was offered a similar deal.

the rural commune of Daraina (Cardiff and Andriamanalina 2011). At least two mineral exploitation permits to concessions the size of four and eight km^2 have been granted within the protected area and currently held by the company Ever Prosperes International S.A.R.L. This permitted mining territory overlaps with several villages, forests and restoration zones – all just a few kilometres away from the core conservation zone (Figure 13). Fanamby personnel perceive these concessions as one of the biggest threats to conservation. Yet the Malagasy Office of Mining Registration (*Bureau du Cadastre Minier*) does not consider itself obligated to provide information on mining concessions to the protected area manager. While NGO Fanamby has found out that the two mining permits within the protected landscape exist, it has not found a legal way to cancel the permits and prevent possible exploitation from starting.

5. Discussion

This article examines 'double frontier' dynamics, whereby mining activities and conservation efforts intersect. Our argument is based on the assumption that both mining and conservation link up to global value chains and sources of finance that originate far from where those activities are implemented. However, the way in which double frontier dynamics play out is greatly influenced by national- and local-level histories, processes and structures. A review of the literature demonstrates the similarities of how mining and conservation projects are implemented, and how their impacts upon local communities are not as different as one might expect (Geenen and Verweijen 2017; Cavanagh and Benjaminsen 2015; Verweijen 2017; Dowie 2011; Büscher and Davidov 2013a). We nuance our analysis by disaggregating different commodity frontiers, and by suggesting that this multiplicity of mining and conservation frontiers interacts in numerous ways. Using two flexible, community-based conservation areas in DRC and Madagascar as illustrative examples, we have identified three categories of territorialisation on conservation frontiers (core, buffer and flexible conservation zones) and three scales of overlapping mining activities (ASM, semi-industrial and industrial).

In terms of territorialisation for conservation, protected area managers hold the strongest territorial control within strict fortress conservation areas, and in the case of more flexible protected areas, in core conservation zones. Designated exclusively for conservation and scientific research – as well as ecotourism in the case of Loky Manambato – core zones forbid any local livelihood activities, including all forms of mining, and at least on paper can be enforced through state violence. It is therefore possible communities experience core zones and the forms of territorial control that surround them in the same way as exclusionary 'fortress' conservation areas, which could make them most prone to local resistance. The difference is that core zones are nested within flexible zones and buffer zones. Both of the latter designations allow natural resource use to different extents and constitute a form of conservation frontier in which wealth accumulation – for example, through ecotourism and the attraction of donor funding – does not necessitate dispossession and displacement in the way fortress models do. In this light, flexible, community-based approaches to conservation could be viewed as an adaptation to the conservation commodity frontier in the same way artisanal mining is to industrial mining (Verbrugge and Geenen 2019): i.e. a way to expand the frontier into regions where it would otherwise be likely to provoke resistance at local and international levels.

Different types of mining and conservation interact in various ways. In our case studies, the least conflictual type of interaction is when artisanal mining and flexible conservation zones overlap. This is because the population(s), for whom ASM was an essential livelihood strategy, managed to secure agreements that allowed them to continue exploiting minerals within certain regions of the protected areas. Thus the ASM and conservation frontiers converged, yet in the interests of small scale miners. In this regard, it is also important to note that ASM is unique in that enables local communities to participate in the expansion of the mining frontier. Indeed, dependency on mining, for example due to the lack of other livelihood options, has been identified as a factor increasing local acceptance of ASM (Conde and Le Billon 2017). While large-scale mining

and conservation frequently lead to local resistance, ASM typically functions as part of customary land use structures and is therefore more often accepted and adopted by communities themselves (Verbrugge and Geenen 2019). ASM is therefore somewhat exceptional in that it can occasionally and temporarily act as a form of accumulation *without* dispossession. It is therefore likely to be the most difficult scale of mining to entirely remove from protected areas. In turn, given ASM is usually informal and itinerant by nature (Peluso 2018), sites located in multiple-use zones of protected areas can expand and new deposits can be unearthed inside core conservation zones where mining is forbidden. As our case studies highlight, this can also lead to conflict with reserve managers.

Large-scale mining and conservation frontiers converge when governments, intentionally or unintentionally, give mining companies permits to mine inside protected areas. While industrial mining activities have not taken place inside the protected areas themselves, both Itombwe Nature Reserve and Loky Manambato New Protected Area overlap with several industrial mining permits. This is primarily because of fragmented governance systems which result in inconsistencies between different legislations. In the former case, this has led to some industrial-scale mineral exploration, though not full-blown extraction. In turn, because large-scale mining is likely to cause the most severe environmental impacts, conservation actors are likely to oppose its advancement inside protected areas. The fact that the behaviour of transnational companies is not necessarily aggressive, but often follows legal procedure and adapts to political conditions, can in some instances provide conservationists with an effective means to prevent its occurrence inside protected areas. Also interesting is the fact that large-scale mining has managed to establish itself when it is has offered conservationist packages, such as in the form of integrated mining and biodiversity offsetting projects (Cavanagh and Benjaminsen 2014; Brock 2020; Enns, Bersaglio, and Sneyd 2019), in an act of adaptation and reconfiguration of its practices.

This challenges the assumption that industrial mining and conservation frontiers would automatically be conflictual.[41] Semi-industrial mining, on the other hand, appears to operate at the edge or margin of legality. In both our cases, semi-industrial mining activities were driven by Chinese companies, which are likely under less scrutiny from civil society organisations and domestic populations, and less concerned about obtaining required mining permits. This is explained by the state's weak central authority in remote areas such as Itombwe or Loky Manambato combined with shadow state dynamics where, by winning a support from key power-brokers at the local level, these mining companies are allowed to operate even against the will of local populations or the law of the state. This potentially enables them to access regions Western companies, exposed to more intensive democratic inquiry, might not be able to. In this regard, semi-industrial mining could also be considered a form of territorial adaptation to expand the reach of larger scale mining frontiers into regions, such as protected areas, where for practical and political reasons, full-scale industrial mining is difficult to implement.

This analysis has largely focussed on the interactions between mining and consrvation. However, double frontier dynamics are also influenced by national and local politics and social relations that are only indirectly related to each activity. In this regard, there is no deterministic law dictating whether local populations will contest, collaborate with or remain ambivalent to conservation or mining (Halvaksz 2013; Simpson and Fikiri Zirhumana 2020; Simpson and Pellegrini 2022). Local reactions depend on the degree to which both individuals and communities can access project benefits, the extent of negative consequences, as well as the effectiveness of social mobilisation 'from above' (Hall et al. 2015; Geenen and Verweijen 2017; Verweijen and Dunlap 2021). Resistance to mining projects has been observed to depend on a complex set of factors related to the mining project and the company, the community in question as well as state policies (Conde and Le Billon 2017). Trust in institutions is a factor decreasing local communities' resistance, while political marginalisation often prevents resistance by preventing people from participating in so-

[41] In biodiversity offsets, the nature destroyed by a mine is offset by various activities including protected area establishment in order to have a 'net-zero' or even a 'net-positive' impact (Seagle 2011). Thereby mining and conservation actors are able to justify the territorialization by the other, gain approval from states as well as the national and international publics and secure the expansion of the double frontier.

cial movements, along with inadequate information about the impacts of mining project (Conde and Le Billon 2017). The perception of benefits can also have a decisive role even in areas new to mining where local communities are not yet dependent on it (Conde and Le Billon 2017). In some cases, local community leaders have directly negotiated with mining companies, rejecting environmental authorities, in an attempt to secure benefits, which is what happened in Itombwe Nature Reserve.

Our findings suggest double frontier dynamics are most likely to occur in places where the state is weak or absent, no single actor holds a monopoly over the means of violence, and a degree of legal or regulatory ambiguity exists (also see Javelle and Veit 2012). In DRC and Madagascar, the governments promoting mining and the expansion of protected areas emerged under conditions of acute crisis, where the role of the state was weakened: two bloody wars in Congo and a serious political and economic crisis generated by a socialist government in Madagascar. In these contexts, the restauration of market economy involved the liberalisation of mining laws, later followed by contradicting conservation legislation now lobbied by the international conservation actors. This created spaces of dual legality, which led to the emergence of double frontiers. Such ambiguities mean that despite it being illegal for mining activities to take place inside conservation areas, there is widespread overlap between protected areas and both small, medium and large-scale mining permits and activities. The fact political and business elites realise the potential to capture rents from future extractive activities could diminish their incentive to deal with this conundrum. In turn, a lack of enforcement of conservation regulations means the mining frontier – at least at artisanal and semi-industrial scales – can expand into regions where it is technically forbidden, often without incurring the disciplinary force of the state. In frontier contexts, this is further exacerbated by the presence of shadow state operators who often enable and profit from illicit activities, such as by demanding informal taxes from the miners of Andranotsimaty and Zombe, making it all the more difficult to shut illegal mines down (Duffy 2005; Peluso 2018). The presence of non-state armed actors can also serve to enable the expansion of mining frontiers into protected areas. In Itombwe Nature Reserve, for example, it is possible that the reason protected area management have not orchestrated the forced eviction of artisanal miners – which took place in Loky Manambato's Andranotsimaty – is because of the possibility of triggering a conflict with the non-state armed groups involved in ASM.

With regard to state territorial control, our results differ from previous research by Käkönen and Thuon (2018) who analysed overlapping frontiers in Cambodia. Their analysis found that overlapping hydropower, logging and conservation zones converged in ways which facilitated state territorialisation (even if the frontiers were driven by international actors) and the exclusion of local communities. Our analysis, conversely, shows how it is the weakness of the nation states in both Madagascar and DRC that has likely contributed to the extensive degree of overlap between mining and conservation we see today. As shown above, informal ASM makes it possible for the mining frontier to expand without state authorization or the backing of powerful corporate capital. In turn, flexible conservation approaches in both Loky Manambato and Itombwe Nature Reserve have, at times, been even more accommodating of ASM than national legislation should technically permit. Local negotiations rather than strict, armed enforcement of conservation rules have enabled relatively peaceful relations to arise between informal miners and protected area managers. This results in highly dynamic, overlapping territorialisations that form not so much zones of exclusion, but rather an evolving patchwork of inclusions and exclusions that shift over time and space. Indeed, our study contributes to the previous literature by bringing forth a broader spectrum of ways in which frontiers can converge.

6. Conclusion

This discussion paper makes an empirical contribution to debates on the dynamics between intersecting conservation and mining frontiers – conceptualised as 'double frontiers' – in two countries where the nation state is weak or absent. Perhaps the most valuable aspect of this work is to demonstrate that mining and conservation frontiers, and the various forms of territorialisation that take place upon them, are not mutually exclusive; but rather often converge within the same landscapes. Where previous literature has tended separate mining and conservation frontiers and the various forms of territorialisation that surround them, we believe there are analytical benefits of considering the two simultaneously. This is especially pertinent in view of the considerable overlap between mining activities and conservation efforts across the world, but also because of the restrictions and opportunities the mining/conservation nexus poses for increasing numbers of people. The expansion of commodity frontiers – whether of mining or neoliberal conservation – reconfigures social, economic and environmental systems in line with modern capitalistic logics. Our analysis also shows that the way in which these frontiers touch ground is significantly influenced by the nature of nation-states and localised political economic conditions. These intertwined configurations provide a promising avenue for future research in political ecology at the interface of mineral extraction and conservation in the Global South.

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