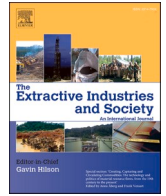




Contents lists available at ScienceDirect

The Extractive Industries and Society

journal homepage: www.elsevier.com/locate/exis

Original article

“All we have left is to defend our reserve”: Social structures and community resistance to large-scale gold mining in the Manuripi Wildlife Reserve in northern Bolivia

Janpeter Schilling^{a,*}, Claudia Pinzón Cuellar^b, Rebecca Froese^c, Diana Figueroa^d, Miguel Villavicencio^e, Luise Werland^a, Regine Schönenberg^f

^a Institute of Environmental Science & Peace Academy Rhineland-Palatinate, University of Kaiserslautern-Landau, Landau, Germany

^b Institute for Latin American Studies, Free University Berlin, Germany

^c Center of Interdisciplinary Sustainability Research, University of Münster & Research Institute for Sustainability, Helmholtz Centre Potsdam, Germany

^d Otto Suhr Institute for Political Science, Free University of Berlin, Germany

^e Area of Biological and Natural Sciences, Universidad Amazónica de Pando, Bolivia

^f Heinrich-Böll-Stiftung, Rio de Janeiro, Brazil

ARTICLE INFO

Keywords:

Gold
Mining
Resources
Resistance
Social structures
Cooperation
Political ecology
Wildlife reserve
Amazon rainforest
Bolivia

ABSTRACT

This article presents a case of community resistance against industrial large-scale gold mining (LSM) in the Manuripi National Amazonian Wildlife Reserve in northern Bolivia. Most of the reserve's population depends on collecting Brazil nuts and other non-timber forest products. Recent plans to start LSM on land pose an existential threat to the forest-based livelihoods and environment of the reserve. Hence, the communities are resisting LSM. As previous studies have stressed the importance of social relations, networks and institutions to organize resistance, the article investigates how communities living in the Manuripi Reserve draw on social structures to resist the planned LSM. To address this question, we develop a framework that combines insights from the literature on political ecology and resistance in order to analyze context conditions, the threat of LSM, and the responses to it. Based on fieldwork conducted in 2022 and 2023, our analysis shows that the communities are strengthening their existing forest-based livelihoods as a form of everyday resistance and utilizing the reserve's management committee for organized resistance against LSM.

1. Introduction

Inhabited wildlife reserves around the world have common elements: They provide protected space for animals, plants, and biodiversity, as well as a livelihood for people who depend on the reserve and its resources (Shaharum et al., 2018; Mbanze et al., 2020). However, many reserves, particularly in the Global South, are increasingly coming under threat. The wide spectrum of threats ranges from climate change to agricultural expansion and resource extraction (Godínez-Gómez et al., 2020; Chowdhury et al., 2022; Bontempi et al., 2023). The extraction of gold, for instance, has severe environmental and social consequences. These include the contamination of land, water, and air with chemicals such as mercury, deforestation, and loss of biodiversity (Pandey and Shrivastav, 2012; Mujere and Isidro, 2016; Verma et al., 2018; Basir-Cyio et al., 2020; Graham, 2022; Soe et al., 2022). On the social side, the

extraction of gold is regularly linked to the widening of inequalities and the intensification of social conflict, thus it undermines local livelihoods, poses health risks to local people, and is associated with financial flows of illicit drug markets and other criminal activities (Jenkins, 2014; Berton, 2016; Dietz and Engels, 2017; Schilling et al., 2021; Ocaklı and Niewöhner, 2022; Radwin, 2022; UNODC, 2023). Therefore, in most cases, at least some inhabitants are resisting the extraction of gold and attempting to prevent extractive companies from entering the protected area (e.g., Dietz and Engels, 2020; Radhuber and Radcliffe, 2023). According to Bebbington et al. (2008, p. 2890), “resistance is understood as a defense of livelihood, in which movements emerge to protect assets by challenging the structures, discourses, and institutions that drive and permit exploitation and dispossession” (see also Baaz et al. 2016). This definition reflects the wide body of literature on resistance to mining that highlights, among other aspects, the importance of networks,

* Corresponding author.

E-mail address: janpeter.schilling@rptu.de (J. Schilling).

<https://doi.org/10.1016/j.exis.2024.101574>

Received 7 February 2024; Received in revised form 28 October 2024; Accepted 31 October 2024

Available online 15 November 2024

2214-790X/© 2024 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

institutions, and organizations in the resistance of communities against mining (e.g., [McAdam et al., 2001](#); [Bebbington et al., 2008](#); [Conde, 2017](#); [Dietz and Engels, 2017](#); [Ögütte, 2021](#)). For instance, [Conde \(2017, p. 84\)](#) points out that “alliances at local level can [...] be decisive in the formation of resistance”. Based on cases of resistance against mining in Peru and Ecuador, [Bebbington et al. \(2008, p. 2892\)](#) note that “organizations are an important part of movement processes” (see also [Shapiro and McNeish, 2021](#)). Additionally, [Haslam and Godfried \(2023\)](#) show how mining companies in Argentina and Chile undermined social structures, local social movements, and the communities’ ability to call on the state for stricter regulation of mining activities. [Radcliffe-Brown \(1940\)](#), [Lévi-Strauss \(2014\)](#) have established social structure as a collective term for a network of social relations and the institutions and organizations that shape them.

While several studies have examined the resistance of communities in inhabited reserves against resource extraction, our understanding of the connections between social structures in protected areas and resistance to mining is still limited (e.g., [Conde, 2017](#); [Raftopoulos, 2017](#); [McNeish, 2018](#)). We address this research gap through the case study of the Manuripi National Amazonian Wildlife Reserve (in the following referred to as the Manuripi Reserve) in northern Bolivia, where small-scale artisanal gold mining (ASM) has already been taking place in the river Madre de Dios, and industrial large-scale gold mining (LSM) is planned for on land. While ASM has been carried out in recent decades and is widely accepted or at least tolerated in the reserve, the planned LSM is triggering resistance as it is perceived by most of our interviewees as an existential threat. To better understand the social processes behind this resistance, our research explores the question, “How do communities living in the Manuripi Reserve draw on social structures to resist the planned LSM?”

Our research pays particular attention to social structures as they determine how communities respond to threats like LSM and, thus, shape resistance (e.g., [Bebbington et al., 2008](#); [McAdam et al., 2001](#); [Ögütte, 2021](#)). To answer our research question, we develop a framework to analyze social structures systematically within and between communities, and with the management board of the reserve, and thus pay attention to the interconnections of networks of social relations and the institutions that shape those relations. The framework draws on the literature on political ecology and resistance, expanding existing frameworks for analyzing social structures. On the one hand, political ecology contributes insights into scale, power (imbalances), (resource) governance, access and control, territoriality, and the distribution of costs and benefits (e.g., [Peluso and Watts, 2001](#); [Ribot and Peluso, 2003](#); [Robbins, 2003](#); [Neumann, 2009](#); [Loftus, 2019](#); [Marshman, 2019](#)). On the other hand, resistance studies help us to not only better understand how community members in the Manuripi Reserve are acting in light of the threat of LSM but also how ‘having a common enemy’ fosters peaceful relationships and more cohesive community dynamics ([Hollander and Einwohner, 2004](#); see for instance [Baaz et al., 2016](#)).

With this article, we are making two main contributions: First, we are contributing to the body of literature on communal resistance against LSM in inhabited wildlife reserves. Specifically, we provide insight into communal self-organization processes and related social structures that shape resistance against the external threat through LSM. These insights will likely be relevant for other inhabited protected areas facing resource extraction. Second, the article makes a conceptual contribution as the developed framework can be applied to analyze social structures across different scales in other cases of resistance against large-scale mining or infrastructure projects in inhabited protected areas. We chose the Manuripi Reserve as a case study because it is an inhabited protected area with high biodiversity and well-organized communities facing the threat of LSM. In addition, the fact that ASM is already occurring allows us to study how communities familiar with ASM respond to planned LSM.

Our analysis is primarily based on the perceptions of people and hence we collected empirical data through interviews, focus group

discussions, and participatory observations in and around the Manuripi Reserve over four months in 2022 and 2023. In addition, we conducted an extensive review of relevant reports and scientific literature.

Below, we develop the research framework ([Section 2](#)) and present the methods, including a description of the research area and data collection ([Section 3](#)). In [Section 4](#), we present the results, followed by conclusions and a reflection on our contribution to the research on resistance against mining ([Section 5](#)). The final section provides an outlook on how the situation in the Manuripi Reserve may continue and where we see potential for further research.

2. Framework

The framework’s purpose is to guide the analysis of how communities living in inhabited wildlife reserves draw on social structures to resist projects by the extractive industry. The framework consists of two main parts. The upper (grey) part provides the theoretical perspective (2.1.) and consists of a conceptualization of the term resistance and its ties to social structures and a brief discussion of political ecology and its usefulness in understanding social structures and the resistance derived from them. The three elements of the first part feed into the analytical perspective (lower blue part of [Fig. 1](#)) described in [Section 2.2](#).

2.1. Theoretical perspective

Resistance studies focus on actions ‘from below’ by social actors against power structures, such as injustices and inequalities that negatively impact their lives ([Baaz et al., 2016](#)). We understand both action and opposition as core elements of resistance, though in some cases, recognition and intent are also included ([Hollander and Einwohner, 2004](#)). Resistance is contextual and situated, or as [Almeida and Cordero Ulate, 2017](#) argue, the political and ecological context in which resistance is built is important. As we are studying resistance in an inhabited wildlife reserve, we stress the importance of considering the social in relation to the ecological and moving beyond the human-nature dichotomy. This ‘somewhere’ of resistance is a space constructed by both the human and non-human actors who interact with that space, meaning that resistance is also relational ([Johansson and Vinthagen, 2016](#)). By organizing resistance against a target, e.g., an external actor perceived as a threat, it is collectively decided what is to be protected, what is non-negotiable, and how and with whom the inhabited territory is (or is not) to be shared. This internal dialog among the community members and their agreement about what to communicate to the public supports the communities’ identity-building process ([Salinas and Núñez, 2013](#)). Additionally, it prepares the ground for the construction or reaffirmation of peaceful and unifying relations within the communities in light of the ‘threatening’ actor ([Lowery et al., 2020](#)).

Furthermore, we differentiate between forms of resistance, particularly organized resistance and everyday resistance. Organized resistance can be defined as actions intended to politically oppose a target ([Baaz et al., 2016](#); [Lilja, 2022](#)). The organization of resistance is facilitated by social structures, in our case, by local community governance structures. Therefore, we need to understand social relations. Simply speaking, without social relations, there is no organization of collective actions and hence no (community) organized resistance. In order to describe such a “network of actually existing relations”, the social anthropologist [Radcliffe-Brown \(1940, p. 2\)](#) introduced the term social structure (see also [Lévi-Strauss, 2014](#)). Social structures enable resistance by providing the relations, networks, channels, and capabilities (knowledge, resources, and the like) that enable communities to respond to threats and, hence, enable them to resist. A better understanding of such relations is key to understanding resistance as “resistant practices [are] derived from how aspects of social structure are mobilized” ([Ewick and Silbey, 2003, p. 1331](#)). The community’s degree of mobilization helps us understand their capabilities and position of power as “power is employed and exercised in a net-like organization” ([Foucault, 1980, p. 98](#)).

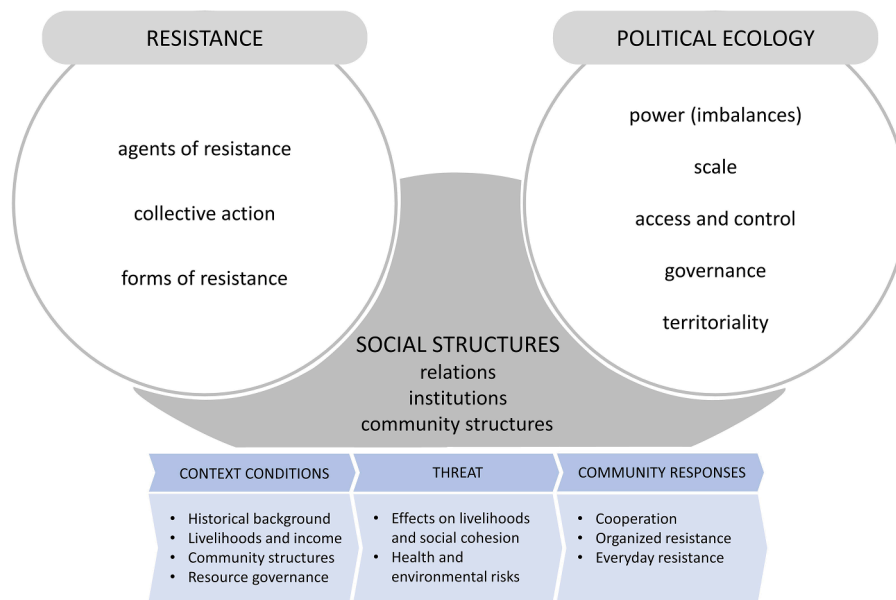


Fig. 1. Framework.

Examining social structures means focusing on social norms, roles, and systems that allow us to identify continuities and spaces for action (Fox and Alldred, 2018). As our research took place in an inhabited wildlife reserve, we argue for the relevance of situatedness (see Almeida and Cordero Ulate, 2017), meaning that the political and ecological context in which social structures are formed as networks of relations between humans and their ecological environment is relevant to understanding the processes of resistance. These relations are shaped by formal institutions and organizations, such as management boards and organizations, which address a specific issue (e.g., environmental protection), as well as informal institutions and day-to-day practices that function as identity-building processes. We, therefore, understand social structures as an umbrella term for a network of social relations within and across communities and their institutions, all of which are shaped and influenced by the communities' relationships with both state institutions and non-state actors. At the same time, resistance is always entangled with power and capable of challenging, re-negotiating, and sometimes, even undermining or supporting it (Lilja et al., 2017; Johansson and Vinthagen, 2020; Lilja, 2022).

Hence, communities have developed various forms of resistance in addition to organized resistance, one of which has been conceptualized as everyday resistance (Conde, 2017), that is, resistance that consists of individual and collective actions that are neither planned nor necessarily public. These actions draw on social-environmental relations as a source of identity but are, given their embeddedness in day-to-day activities, less visible and, thus, less researched (Conde, 2017, p. 81). Our study contributes to filling this research gap by including the day-to-day activities of the communities in an inhabited wildlife reserve in our analysis of resistance on the grounds that these activities strengthen the people's current livelihoods and make the communities less vulnerable to potential threats (Scott, 1985; Johansson and Vinthagen, 2016; Duarte-Hidalgo et al., 2020).

Social, political, and environmental dynamics at the local level are often the result of processes, in particular, power imbalances at the sub-national, national, international, and global levels (Neumann, 2009; Schilling et al., 2018). Therefore, a political ecology perspective on our research question reminds us of the importance of scale, power, (resource) governance, social structures, access and control, territoriality, and the distribution of costs and benefits (e.g., Loftus, 2019; Marshman, 2019; Robbins, 2003). We adopt Weber's (1930, p. 152) definition of power as the "probability that one actor within a social

relationship will be in a position to carry out his own will despite resistance". A general question in mining projects is whether a company has the power to influence key actors and resource governance to gain access to a specific territory and resources despite local resistance. Access, in turn, can be defined as "the ability to derive benefits from things" (Ribot and Peluso, 2003, p. 153). The distribution of those benefits and costs, e.g., in the form of livelihood losses, creates winners and losers in resource extraction (Schilling et al., 2018, 2021). Hence, the negotiations over resource extraction and the distribution of benefits and losses depend on the dynamics between local communities and the territory they inhabit, as well as their capabilities for negotiation based on their social structures and power relations. It then follows that how local communities exercise control over their territory is a process of territoriality. We understand territoriality as practices of appropriation in which a geographical space is marked by the experiences, memories, and production of meaning, as well as of power relations (Haesbaert, 2013; López Sandoval et al., 2017; Castaño-Aguirre et al., 2021). In our article, we apply an actor-oriented approach as it provides "insights [...] for examinations of efforts and successes in exercising power by corporations, state agencies, NGOs, and others." (Svarstad et al., 2018, p. 359). In addition, we recognize the relevance of the Latin American political ecology perspective for our case, as these perspectives stress the importance of pluralities in reconstructing relations between societies, cultures, and nature (Alimonda et al., 2017).

2.2. Analytical perspective

Herein, we combine the key insights from and elements of resistance and political ecology to understand social structures and apply them in our analysis. As the political ecology perspective has stressed the importance of understanding the context in which the resistance is taking place, we start with an analysis of the context conditions before describing what the local population is currently perceiving as a threat and the community's response to it (see the lower part of Fig. 1). We understand the context conditions as the historical background, the main livelihoods of the reserve inhabitants, the existing community structures, and existing resource governance. We then define community structures as a subset of social structures that relate to relations and interactions between communities and their institutions (see also Sampson et al. 2005). The economic dimension is a key aspect of the context conditions in our case, specifically, the income opportunities

that both mining and forest-based activities offer. In general, understanding the context conditions is important for determining which situations of resistance and cooperation can develop in response to threats. We define threats as activities and developments with the potential to cause significant harm to a large portion of the population or the environment of a protected reserve. Finally, we define reactions to such threats as community responses and consider collective and everyday resistance to be important elements of these responses.

3. Methods

3.1. Research area

The Manuripi Reserve is located in the department of Pando in northern Bolivia, adjacent to the Peruvian border in the west and the Brazilian border in the north, and covers an area of approximately 747,000 ha (Fig. 2). Created in 1973, originally to protect the Bolivian-Peruvian border, it gradually shifted toward the protection of the Amazon rainforest ecosystem, watersheds, flora, and fauna and promoting the integral and sustainable use of forest resources to improve the lives of the local population (MMAyA, 2012). The Manuripi Reserve is under national administration and managed by the National Service of Protected Areas (SERNAP), a decentralized institution of the National Ministry of Environment and Water (MMAyA) with management autonomy (Adrián, 2015).

There are ten communities with approximately 1,700 inhabitants in total within the reserve. We focused on the community of Chivé, which is a growing community entangled with and affected by ASM in the nearby river Madre de Dios (Fig. 2). In addition, we undertook research in the other four communities along the main road in the reserve in order to capture the effects of different degrees of exposure to ASM and potential exposure to the planned LSM. Most of the reserve's inhabitants we interviewed intend to continue forest-based smallholder lifestyles that are primarily based on non-timber forest products (NTFPs), such as Brazil nuts and açai, subsistence agricultural, livestock activities, hunting, and fishing (MMAyA, 2012; Interviews 3, 43, 45, 55 and 67). However, the framing conditions set by the management plan of the reserve are incompatible with some of the current dynamics of the area including population growth, immigration, and projections for new infrastructure developments (Cronkleton et al., 2009; MMAyA, 2012).

Since the 1990s, the communities in the Manuripi Reserve have been organized into committees and associations, which provide spaces to react to the projects of external actors and perceived foreign agendas and shape their economy, culture, and basic needs. Although the Bolivian constitution grants rights to Nature and Mother Earth, promoting their protection, government actors still allow the exploitation and commercialization of nature – even within protected areas (Plurinational State of Bolivia, 2009). In the Manuripi Reserve, ASM offers a particularly productive economic alternative that absorbs parts of the reserve's labor force and, in so doing, causes tensions within the reserve between those in favor of and those against gold mining (see also Toledo Orozco, 2022). While ASM is already occurring, plans to start LSM in the reserve were being discussed while we were undertaking our field research. ASM is carried out in the river by individual miners that are mostly organized into cooperatives, while LSM is being planned for on the land (most likely along historic river beds) on a larger scale and by an industrial mining company called Pacaguaras S.R.L.

3.2. Data collection

As we were interested in the communities in the Manuripi Reserve, their livelihoods, their social and social-environmental relations, and their perceptions, we chose a qualitative research approach based on semi-structured interviews and participatory observations. As Rabionet (2011, p. 563) states, “qualitative interviewing is a flexible and powerful tool for capturing the voices and ways in which people make sense of their experiences”. In addition, Ewick and Silbey (2003, p. 1332) note that “individual experiences and perceptions of the constraints and resources operating within a situation are a central feature of social practices, processes, and structures”. Therefore, we based our interview questions on our framework (Fig. 2) and show how we operationalized it in Table 1.

We carried out our research in and around the Manuripi Reserve in April, May, and October of 2022, and March 2023. Interviewees included Brazil nut collectors, settlers with migration backgrounds (especially from the highlands), members of the military and the police, public health workers, deputies of the regional and national government, members of academic institutions, non-governmental organizations (NGOs), environmental activists, mining-boat owners, legal representatives of one of the mining associations operating in the Madre

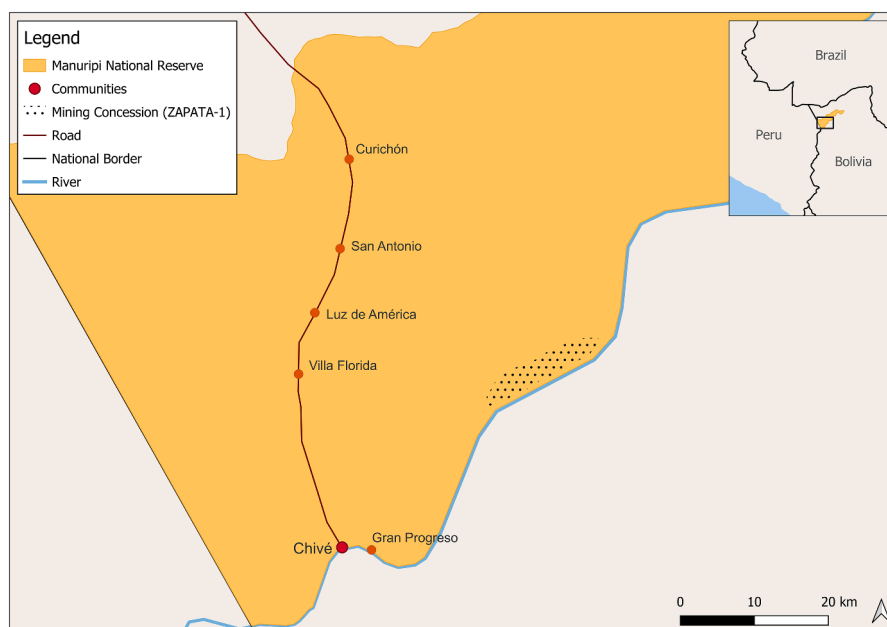


Fig. 2. Research area.

Table 1
Operationalization of the analysis of context conditions, threats, and community responses.

Context Conditions	Threat of LSM	Community Responses
<p>Historical background and livelihoods</p> <ul style="list-style-type: none"> • How do communities value the land? • What does this mean for their territoriality? • What are their main livelihoods? <p>Community structures and resource governance</p> <ul style="list-style-type: none"> • Who cooperates with whom and how? • What formal and informal structures for cooperation are there? • What inequalities, tensions, and power imbalances already exist between and within communities? • How are resources and the environment governed across scales? • How are resources distributed? • Who has access to the resources? • Who benefits from and who bears the costs of the status quo? 	<p>Organization of LSM</p> <ul style="list-style-type: none"> • How is LSM organized and governed? • Who are the powerful actors? • Where do they derive their power from? • How does the specific assertion of power play out? • Who benefits from and who bears the costs of LSM? <p>Livelihoods and social cohesion</p> <ul style="list-style-type: none"> • How does LSM affect current livelihoods and social cohesion? <p>Health and environmental risks</p> <ul style="list-style-type: none"> • What risks does the LSM pose to the community's health and the reserve's environment? 	<p>General response and cooperation</p> <ul style="list-style-type: none"> • How do communities respond to the planned LSM? • How does LSM (potentially) impact the current social structures and level of cooperation between and within communities? <p>Organized and everyday resistance</p> <ul style="list-style-type: none"> • What form of organized resistance can be observed? • What form of everyday resistance can be observed?

de Dios River, and workers responsible for the gold extraction. In total, we conducted 87 semi-structured interviews with community members and representatives of governmental institutions and NGOs. To protect the interviewees from potential negative effects, we refer to individual interviews with consecutive numbering and refrain from indicating group or stakeholder identities. The analysis of the interview transcripts was supported by the software MAXQDA. The data collection through interviews was supplemented by participatory observations, an extensive review of relevant reports by governmental institutions and NGOs, and relevant scientific literature found via the Web of Science, Scopus, and Google Scholar.

Our study is limited in some regards, mainly because of the limited availability of some actors for interviews. Specifically, we were unable to conduct interviews with representatives of Pacaguaras S.R.L. Furthermore, some actors in the mining sector who were organized in cooperatives were less open to being interviewed. Nevertheless, we did conduct some interviews with mining actors in and outside the Manuripi Reserve. To reduce the risk of potential biases, all interviews were conducted by at least two members of the research team. In most cases, three members were present, and the different sets of notes were compared and collated into one transcript. We considered a quantitative approach based on standardized questionnaires. However, we realized that this would not have enabled us to gain the in-depth insights that the interviews and focus group discussions provided. In the first phase of the research, the COVID-19 pandemic posed a potential health risk for interviewees and the research team. We mitigated the risk by undertaking regular COVID-19 tests, conducting almost all interviews outside, and wearing protective masks when needed.

4. Results

The results section is structured along the three elements of the analytical perspective of the framework: context conditions, threats, and community responses (see lower blue part of Fig. 1). It draws on the field research and is supplemented by a literature review.

4.1. Context conditions

4.1.1. Historical background and livelihoods

The Manuripi National Amazonian Wildlife Reserve was created in the 1970s to protect the Bolivian and Peruvian borders, as well as the natural resources and wildlife in the area (MMAyA, 2012). Given these priorities, the reserve lacked a management plan for the sustainable use of these resources during the first decades of its existence (MMAyA, 2012). Although the reserve has been inhabited since its creation, it was not until the 1990s that former rubber tappers and their families organized themselves and established the communities in the reserve (see

also Cronkleton et al., 2009). Historically, these former rubber tappers worked for the large landowners (*barraqueros*) who held the land rights before the reserve was created. Most people living in the communities in the Manuripi Reserve share cultural, social, and economic practices, as well as a territory they highly value due to its importance in securing the communities' livelihoods. Nevertheless, income opportunities are limited. The most common economic activity in the area is based on the collection of NTFPs, such as Brazil nuts and açai. Collecting these forest products requires them to relocate their daily life deep into the rainforest for several months, building infrastructure to sustain their day-to-day activities there, and transporting forest products through the forest or along the rivers. The locally called and self-identified *extrac-tivistas* explained that Brazil nuts trees need the Amazonian ecosystem to produce Brazil nuts. This means that the communities are aware of the importance of avoiding deforestation and the benefits of the rainforest. This was confirmed by Castaño-Aguire et al. (2021), who found that the reserve's territory where Brazil nuts are collected is constantly undergoing a process of territorialization in which cultural and political identities are entangled with geographical space.

ASM on the Madre de Dios River has existed for several decades, as one interviewee told us in April 2023: "I came from Beni to Manuripi to work as a gold miner in 2008" (Interview 1). This economic activity in the Madre de Dios River has created tension between the communities that benefit most from gold mining and those concerned about the consequences of these activities on the environment and their socio-economic relations (Interviews 5, 57). A community member of Villa Florida gave us a vivid example: "Before the processing plant for açai pulp was built, almost everyone went to the river to make [extract] gold" (Interview 7). Although gold mining negatively impacts the riverbed and the miners' health, it is an attractive economic activity because it generates a regular income. "You may not always find the same amount of gold, but it is always certain that you will find some", said a miner in Chivé (Interview 60). Another interviewee mentioned that "One teacher earns 5000 BOL in one month, while a gold miner can earn 1000 BOL in one day and half a night" (Interview 1).

Chivé, given its location close to the river, is the community most active in and also most affected by gold mining and, according to our interviews and observations, several of Chivé's inhabitants are involved in ASM as owners of mining boats, so-called *balsas*, miners, or intermediaries (Interview 3). As described above, gold mining is very lucrative, for companies in particular, but also for individual miners, and has, therefore, enabled the community of Chivé to grow substantially, both economically and demographically. To date, the five communities have perceived ASM as a latent but not yet a major threat. However, they acknowledge that this situation could change. Therefore, some community leaders expressed their hope that the communities would develop açai and other NTFP businesses to engage their members,

particularly their youth, in the collection of NTFPs rather than gold mining.

Regarding political support and control over mining activities, the leading party, MAS, incorporates mining into its “left” identity, trying to regulate and formalize mining activities nominally in favor of the Bolivian people (Toledo Orozco, 2022, p. 46). Gold was Bolivia’s main export in 2021, with exported gold worth 2.5 billion USD – an increase of 105 % compared to 2020. Indeed in 2021, Bolivia was the world’s 27th largest exporter of gold (Workman, 2023). The mining sector in Bolivia is mainly organized in cooperatives that benefit from their enormous mobilization potential and the “weight” of their support for the government. They play on their image and prestige as generators of employment in times when employment is a critical feature of the country’s economic predicament and use their presence in government and institutional circles to advocate for their interests (Carrillo et al., 2013).

4.1.2. Community structures and resource governance

The communities in the Manuripi Reserve are registered as *Organizaciones Territoriales de Base* (OTB), which can be roughly translated as territorial grassroots organizations. To be registered as an OTB, the Bolivian Law requires that each community organizes a community board with eight to twelve positions to be filled by each community according to the availability of people and their needs. Our interviews confirm that the community board acts as a local institution that responds to the needs of the inhabitants, works on conflict resolution, and organizes community events, as well as economic activities to foster community building. The community boards are key elements of the community structures, offering platforms to organize community cooperation, including resistance, while at the same time, allowing the population to have discussions and reflect on their condition and identities as extractivists. Once a month, the community board organizes an assembly where community activities, needs, and conflicts are discussed. However, access to the assembly is restricted to *comunarios*. These are inhabitants who, according to local regulations, are considered affiliated members of the community, can officially reside in the reserve, and have the right to use 500 ha of allocated land to collect NTFPs. One interviewee explained that people sometimes come from outside of the reserve, ask the community board for permission to present themselves at the monthly assembly, and justify their wish to reside within the protected area (Interview 5). After the board has given permission, the community decides whether or not to accept the request of the applicant and their family as non-affiliated members, locally known as *viviente*. According to our empirical data, this norm is regularly respected in three of the five communities. Although participatory and democratic, these structures generate inequalities between the *comunarios*, who are included in the reserve’s community decision-making structures, and the *vivientes*, who are excluded from these structures although they live in the reserve. Several interviewees confirm the perceptions of exclusion and underrepresentation caused by the exclusively reserved rights of the *comunarios*.

Within the community structures, the Management Committee (formed by *comunarios* and *barraqueros*), plays a crucial role (Interview 45). Since 2008, the Management Committee has been operating as the representative body of the local population and participating in the planning, supervision, and management of the area (MMaYA, 2012). According to an interview conducted in October 2022, four people – three community representatives (all *comunarios*) and one *barraquero* – are active in the Management Committee (Interview 65). Furthermore, according to the reserve’s management plan, the Management Committee supports the reserve’s director, who is also part of SERNAP, the responsible environmental agency (MMaYA, 2012). Our framework allows us to consider the national and international power dynamics present in the case of the Manuripi Reserve. For example, several interviewees mentioned that continuous cooperation between the Management Committee and SERNAP is difficult because of the frequent turnover of

SERNAP directors (Interviews 65 and 67). A representative from SERNAP reported that the institution is chronically underfinanced and gave some background on their endowment with financial and human resources. For example, the agency provides four governmentally financed park rangers for the entire 747,000 ha of the Manuripi Reserve, but any further activities, such as the monitoring or elaboration of the management plan, SERNAP is reliant on international cooperation, e.g., with the European Union (Interview 65 and 86). Consequently, conflict resolution, developing projects that could benefit local communities, and law enforcement in the reserve have been neglected. *Comunarios*, *vivientes*, and *barraqueros*, as well as the park rangers, feel ignored by the national government and rely on their capacity to organize themselves to improve the conditions in the Manuripi Reserve and defend their territory from developments they see as negative. Therefore, community organizations, together with local NGOs are promoting ecological tourism, constructing açai processing plants, and strengthening social ties through community activities, with the aim to integrate *comunarios* and *vivientes*, and thus, contribute to both the local economy and social cohesion. The annual football tournament, organized by the communities during the summer (dry season, outside of the season for Brazil nut collection), serves as space for different generations within the reserve, regardless of community status to connect, and thus, promotes dialog and exchange. These organizational structures already show us the categories that are used in our framework, such as territoriality, distribution of costs and benefits, and levels, as well as the spaces that make it possible to initiate dialogs, strengthen identity, or even organize resistance.

4.2. The threat of large-scale mining

4.2.1. State and organization of large-scale mining

In 2021, the company Pacaguaras S.R.L. was granted a 3000 ha mining concession called Zapata I, located in the Manuscript Reserve (see Fig. 2) by the mining authority (Autoridad Jurisdiccional Administrativa Minera), the regulatory authority in charge of the mining sector. The proposed mining project differs significantly from existing ASM activities, as it involves large-scale industrial gold mining on land run by a large company (for a comparison of ASM and LSM, see Díaz-Cuellar and Francescone, 2016; Yankson and Gough, 2019; Gudynas and Rojas, 2020). In the perception of the inhabitants and *barraqueros* of the Manuripi Reserve, the Pacaguaras S.R.L. is significantly larger and more powerful than the gold miners involved in ASM, even though the ASM minors are organized into cooperatives (Interviews 85, 86 and 87). Pacaguaras S.R.L. derives its power from its financial resources and size. Indeed, several interviewees suggested that the company has close ties to the central government of Bolivia, which is interested in the taxes that would be generated through the mining (e.g., Interviews 26 and 86, see also Solon, 2016, Díaz-Cuellar, 2017). Several communities complained about the lack of transparency in the process of granting the concession, as they were only informed about the plans in 2022 when the mining authority contacted the SERNAP office in Cobija (which manages the Manuripi Reserve) requesting a certificate to allow LSM in Zapata I (Interview 87). Although the office denied the certificate, the mining authority had already allocated a potential location for LSM without informing the administration of the Manuripi Reserve and its population (Interview 67). Although, at the time our research was being conducted, the LSM had not yet begun in the Manuripi Reserve, people’s reactions to this project were the topic of several conversations, and we were able to identify several issues of concern. For example, in addition to undermining existing livelihoods, the local population feared that LSM would weaken the social cohesion of the communities in the Manuripi Reserve, and pose significant health and environmental risks. The potential extent of these risks becomes apparent through comparison with those of the existing ASM. Therefore, we draw on the effects of the existing ASM to assess the threats of the planned LSM.

4.2.2. Effects on livelihoods and social cohesion

Several community members perceived LSM as a threat to their livelihood because Zapata I is located close to the communities of Chivé and Gran Progreso (see Fig. 2), where organic certified Brazil nuts and açai are collected, and cacao is cultivated by the community members in the rainforest (e.g., Interview 55 and 67). Several certified collectors also expressed fear that LSM would violate their land rights and that mining the land would lead to an increase in deforestation, the construction of new roads, motorized traffic, pollution, and the loss of organic certifications (Interview 67). As a result, many would lose access to the value chain of organically certified Brazil nuts and açai, and hence suffer a severe loss of income (Interview 67, see also Duchelle et al., 2014).

Few interviewees commented on the potential effects of LSM on social cohesion. Nevertheless, by analyzing the social effects of the existing ASM, one gets a sense of how they could evolve, especially in the small town of Chivé, where ASM plays a significant role. “On the weekends, the miners come here [to Chivé] to relieve stress” after having worked on the *balsa* and getting paid (Interview 62). The weekly income of a miner depends on the amount of extracted gold. Miners and other interviewees reported that their weekly earnings range between 1000 and 1500 BOL (150 USD – 217 USD) (Interview 20). When returning from the *balsas*, the miners carry large amounts of cash to spend during their weekends in Chivé. Therefore, as we observed, the town’s infrastructure and demography are rapidly changing and increasing to cater to the miners’ needs. Bars and accommodation businesses have opened, and some interviewees reported on a plan for a nightclub. One interviewee stated, “A woman asked me to open a brothel with me in Chive” (Interview 65). Several community members noted that the mining and related changes in the community are weakening the social fabric in Chivé. One interviewee noted that “there is no cohesion in this community [...], each family only thinks of its own family, not the community” (Interview 62). Another one noted, “There is little ‘community’ in Chivé” (Interview 65). Indeed, between our first visit to the Manuripi Reserve in April 2022 and our last research phase in March 2023, we observed increased immigration to the Manuripi Reserve, as well as a rising number of houses, bars, restaurants, and accommodation facilities. These increases were only evident in Chivé and are likely linked to the expansion of ASM. Should LSM start in Zapata I, these developments and their effects on social cohesion will likely accelerate further.

Studies from other countries suggest that both ASM and LSM can have “boomtown” effects (Lawrie et al., 2011, p. 139), generate employment, and create a local economy (Langston et al., 2015; Yankson and Gough, 2019). However, these effects frequently undermine existing forest-based livelihoods and social cohesion. For instance, a study on surface gold mining in Ghana concluded that “local people are clearly not profiting from this [gold] boom, instead experiencing eroded livelihood foundations, lost income opportunities, health problems, and social and cultural alienation” (Schueler et al., 2011, p. 537). Other studies on the social impacts of LSM on local communities stress prostitution and alcoholism, as well as increased levels of illegality, dispossession, violence, and insecurity (Schueler et al., 2011; Betancur-Corredor et al., 2018; Toledo Orozco and Veiga, 2018; Yankson and Gough, 2019; Bainton et al., 2020). Previous studies have identified ambivalent results regarding the interaction between LSM and ASM. In some cases, “co-construct[ed] ASM-LSM interfaces” (Bainton et al., 2020) can arise, including shared labor and capital. However, should LSM lead to expanding the existing ASM from the river to land, there may also be conflicts between industrial and small-scale mining on land (see for instance Yankson and Gough, 2019).

4.2.3. Health and environmental risks

While ASM was not perceived as a major threat by most of the community members we interviewed in the Manuripi Reserve, some of our interviews and scientific studies from other locations show that ASM

already poses significant health and environmental risks. These can be seen as harbingers of what the planned LSM may cause. For example, staff members of the local health station in Chivé reported that the station increasingly receives people with stomach ache, diarrhea, and vomiting (Interview 62). The interviewee explained these symptoms were caused by the deteriorating quality of the drinking water, which is often obtained from the river and other untreated sources. It remains unclear to what extent these health problems are related to increased disposal of sewage and residual waste, mercury pollution, or other sources. Regardless, the reported symptoms have been well documented and described in other locations as being typical in people exposed to mercury (e.g., Fraser, 2009). In addition to digestive symptoms, the central nervous system and brain function are impacted by mercury (Gibb and O’Leary, 2014). Some interviewees, particularly from the communities far from the river who were not involved in mining activities and, instead, relied on the collection of NTFPs, complained that “the chemical being used” is harmful to the ecosystem. They were concerned for the youth who favored gold mining over collecting NTFPs (Interviews 19 and 14). As environmental laws are rarely enforced in ASM operations, this will likely be similar in LSM operations. Asked about the expected impact of LSM, one interviewee noted, “In the river, the mining already causes a lot of destruction, but on land, it is even worse” (Interview 65).

At the time of our research, it was unknown what type of LSM Pacaguaras S.R.L. would use in the Manuripi Reserve. Since the gold can be expected to be located close to the surface along the old river beds, it is likely that an open pit approach will be used. Hence, significant damage to the terrestrial ecosystem can be expected, as seen elsewhere. In Ghana, for instance, LSM caused “extensive land cover changes” (Schueler et al., 2011, p. 536) including deforestation and loss of farmland. Other studies also identified habitat fragmentation and ecological deterioration, including pollution of soil, water, air, and land (Bridge, 2004; Usman Kaku et al., 2021; Mestanza-Ramón et al., 2022; Obodai et al., 2024). While the use of mercury, the original method for processing gold, is still used in ASM, cyanide leaching is the most commonly used method in LSM. Cyanides are acutely toxic (Fashola et al., 2016; Terán Mita, 2021; Hammer et al., 2023). However, mercury still plays a role as gold frequently occurs in rocks containing concentrations of sulfides of various elements, including lead, copper, and mercury (Kastury et al., 2024). Extracting the gold generates oxidizing conditions and releases sulfuric acid (Thiombane et al., 2023). Then, to remove these toxic by-products, they are washed away, which produces mine waste in the form of “semi-solid slurry” (Thiombane et al., 2023, p. 5068) called tailings. Left uncontained, these tailings pollute soil and groundwater and also pose a health risk to animals and humans through bioaccumulation in the food chain (LeBlanc et al., 2020).

4.3. Community responses

4.3.1. General response, cooperation, and organized resistance

The Management Committee and several community members from the five communities that were the focus of our research are the main agents of organized resistance. They increased their cooperation in response to Pacaguaras S.R.L.’s targeting of the Manuripi Reserve for LSM on the land. In particular, the Management Committee played an important role in strengthening existing alliances with actors within and beyond the protected area and organizing resistance against the threat of LSM. According to several interviews, Pacaguaras S.R.L. reached out to all members of the Management Committee and the presidents of the community boards, offering them financial compensation in exchange for the approval of the mining concession (Interviews 65, 67, 70, 71, and 72). The members of the Management Committee reacted by informing everyone on the Management Committee about the company’s offer of 10,000 USD for each community (Interview 65). Together, they calculated the share for each family, concluding that the compensation would be much less than the expected income and livelihood losses and social

and environmental impacts likely caused by LSM. Several interviewees reported that Pacaguaras S.R.L. convened the Management Committee and the community boards in Chivé to present their project and indicate the locations where they were planning to extract gold (Interviews 64 and 65). One interviewee who took part in that meeting reported that the information from the company was rather unspecific. Their intention to deceive the Management Committee and the presidents of the community boards became quite obvious (Interview 72). The Management Committee expected to receive the necessary information from the company to carry out a self-organized, prior, and informed consultation with their communities. However, when they perceived a lack of transparency from the company, they left the meeting and rejected the project (Interview 72). Pacaguaras S.R.L. continued contacting the community leaders in attempts to convince and even bribe them. However, the community leaders ignored these contact attempts. Pacaguaras S.R.L. then decided to approach the Sub-Central, a representative body comprised of all the communities of a municipality, in an attempt to convince other decision makers not officially linked to the Management Committee and the local community boards (Interview 70 and 64).

Moreover, Bolivia adheres to the ILO Convention 169 (ILO, 1989). It is, as such, committed to implementing proceedings of free, prior, and informed consent in areas inhabited by Indigenous and traditional people before implementing any project. As reported by the representatives of the community boards, this instrument has been misused by the company, which has expressed its intention to call for arbitrarily composed meetings in the reserve's communities while deliberately excluding the legitimate representatives and pressing the participants for signatures. Hence, the company intended to invert the logic of the global governance instrument, the ILO Convention 169, to legitimize its activities in the area. After the communities were informed about this practice, they decided to get active by writing an official document that would reject and denounce Pacaguaras S.R.L.'s attempts to enter the Manuripi Reserve for LSM, and thereby, disregard the law declaring the Manuripi Reserve a protected area (Interview 70 and 71). In addition, according to two interviewees, the Management Committee publicly denounced Pacaguaras S.R.L.'s plans to start LSM in the Manuripi Reserve. As part of the Management Committee's strategy to communicate their disagreement towards the company and the mining authority, the Management Committee officially handed the *Pronunciamiento Público Reserva Manuripi*, a resolution written and signed by several community boards and some NGOs, over to the authorities. This collective action of resistance was streamed by more than three news media outlets. It was an important step to show that the communities, including *comunarios*, *vivientes*, and *barraqueros* are cooperating and rejecting gold mining on land (Interview 70 and 71). Additionally, Management Committee members mentioned plans to mobilize the communities and people working with the *barraqueros* to organize a blockade with at least 500 people if the company attempts to enter. One interviewee expressed the community's worries about the possibility that the company would enter the reserve through the Madre de Dios River, close to the community of Chivé. Yet another interviewee from Chivé affirmed that the community board in Chivé would support the blockade (Interview 64). In addition, cultural aspects related to the identity of the people living in the reserve were also raised as a reason to oppose LSM on the grounds that starting such activities would disturb their traditional way of life and threaten future generations: "All we have left is to defend our reserve and to defend our next generations because we are from there" (Interview 67).

Based on our interviews, we can conclude that the community leaders and the communities they represent, are resisting the entry of LSM. The strength of this resistance depends on how these community representatives use their networks and leadership to preserve their traditional ways of life. However, we cannot expect future representatives with different perspectives and interests to necessarily share the same considerations. Therefore, in our analysis of organized resistance,

community leaders' perceptions play an important role, and we can emphasize that current representatives are actively mobilizing actors in and outside the reserve who share their opposition to LSM rather than focusing on a quantitative approach or many people opposing LSM.

4.3.2. Everyday resistance

We identified practices of everyday resistance in the communities of the Manuripi Reserve in the local population continuation and strengthening of existing forest-based livelihoods, such as collecting Brazil nuts in the forests, in particular, and in their development of additional forest-based income streams, such as collecting açai and cacao production. By using the forests to sustain their livelihoods, the communities demonstrate, each harvest season, that the land has more value to them in its current state than it would if the rainforest is destroyed by LSM or other activities with an almost irreversible impact on the land through water pollution and logging. Some interviewees involved in the community organizations also highlighted the economic and cultural value of harvesting Brazil nuts and other NTFPs, and how they are determined to protect their reserve and home from the mining industry (Interviews 85, 86, and 87). Everyday resistance, according to our analysis, refers to activities that reinforce existing livelihoods, which, in the case of the Manuripi Reserve, depend primarily on the rainforest. These activities can be seen as potentially hindering projects, in this case, LSM, with the potential to weaken existing social structures that set the norms of the ways of life within the reserve. At the same time, we observe an interweaving of nature and culture that manifests itself in the inhabitants' self-designation as an extractivist population. Therefore, we identify those activities as everyday resistance that, on the one hand, benefit the community's income without damaging the rainforest and, on the other hand, simultaneously further consolidate their cultural identity as people connected to the rainforest. For example, one interviewee in Curichón mentioned cacao as an alternative to diversify the local economy and highlighted the importance of cultivating non-harmful species (Interview 57).

Although no one described cacao harvesting specifically as a strategy to combat LSM or ASM, we observed how communities and one NGO are establishing a new value chain based on cacao growing in the rainforest in order to diversify the income possibilities for the families and foster the sustainable use of the standing rainforest. For example, "In Luz de America there is one site, where the cacao is selected, dried, and fermented" (Interview 35 and 36). This cacao grows mostly on the banks of the Madre de Dios and Manuripi rivers. Increasing the profits of the extractivist families by adding value to Brazil nut sales also influences decisions to invest in the reserve, which in turn reflects an incentive to maintain this economic activity. One of our interviewees recently founded a Brazil nut processing place by purchasing and installing six hand-operated peeling machines within the reserve. This initiative reduces the transportation costs associated with peeling Brazil nuts in the nearest town of Cobija, Riberalta, or Villa Bush while having no environmental impact in the Manuripi Reserve (Interview 55). The continuity of the reserve's existence, as well as that of the extractivist culture, depends not only on political will but also on the inhabitants. Therefore, we interpret establishing projects that involve new generations in forest-based activities, such as açai harvesting, as one strategy being used by community leaders to ensure the continuity of a specific territoriality in which livelihoods and the forest are intrinsically connected. In the words of one interviewee, "Maintaining the reserve is our objective. For me, it is a paradise." (Interview 5). The same person told us that most young people work in a new açai plant that has been active for four years and, therefore, "people no longer migrate".

Another characteristic that we identified as everyday resistance is the ability of youth to self-organize and negotiate the right to use the rainforest to collect NTFPs, instead of going to work in the river as gold miners. As an example, we took the case of one community in which the youth have organized to ask for special permission to collect NTFPs on state-owned land within the Manuripi Reserve (Interview 8). As

Table 2
Summary of key results responding to the questions raised in Table 1.

Context Conditions	Threat of LSM	Community Responses
<p>Historical background and livelihoods</p> <ul style="list-style-type: none"> The communities strongly value their land beyond its function as the basis for their livelihood and as entities with collective rights over the land and see their identity as closely linked to their territory <p>Land is largely understood as territory; the main livelihoods are the collection of Brazil nuts, açai, and other NTFPs; ASM is taking place on the river; community structures and resource governance</p> <ul style="list-style-type: none"> Communities in the Manuripi Reserve cooperate with each other through the Management Committee The Manuripi Reserve is managed by the National Service of Protected Areas and within the Manuripi Reserve, community structures take care of the local governance of the land and the environment The community in Chivé has access to the river and benefits from ASM The social costs of ASM are most visible in Chivé The status quo gives <i>comunarios</i> better access to land and NTFPs than <i>vivientes</i> 	<p>State and organization of LSM</p> <ul style="list-style-type: none"> LSM is organized top-down Pacaguaras S.R.L. is the key powerful actor with access to financial resources and potential ties to the government In the Manuripi Reserve the Management Committee is the key actor in mitigating the threat of LSM Pacaguaras S.R.L. (via taxes) and the government would benefit from LSM at the national level while the communities would bear the costs at the local level <p>Livelihoods and social cohesion</p> <ul style="list-style-type: none"> LSM poses a significant threat to livelihoods and social cohesion in the Manuripi Reserve LSM poses a significant threat to the renewal of organic certification for NTFPs <p>Health and environmental risks</p> <ul style="list-style-type: none"> Mercury pollution, destruction of ecosystems, and deforestation are key threats 	<p>General response and cooperation</p> <ul style="list-style-type: none"> Increased cooperation between actors within and beyond the Manuripi Reserve Increased attention being paid to ASM (and its negative environmental effects) <p>Organized and everyday resistance</p> <ul style="list-style-type: none"> Organized resistance consists of informing community members about LSM, writing a resolution, and creating media attention Everyday resistance can mostly be seen in the continuation and strengthening of existing livelihoods based on a healthy ecosystem (e.g., NTFP)

mentioned above, each family is entitled to 500 ha. However, this land distribution does not meet the current needs of a growing population. Despite having the option to engage in gold mining, young adults are wanting to follow in their parent’s footsteps and engage in forestry activities. One interviewee mentioned how some young people returned home after trying to work in ASM: “It is very hard for the young people. They have to work day and night, so they often decide to go back.” ASM is usually attractive for younger generations or people in debt, as the income resulting from that activity is usually higher and can be earned quickly. Therefore, communities have engaged in the creation of associations that diversify their livelihood activities, including tourism and fishing, among others. That way, the communities ‘hold the ground’, give meaning to their land, and exert power over their territory. Therefore, collecting Brazil nuts and açai and cultivating cacao become acts of territorialization and a form of everyday resistance against the existing ASM and the planned LSM.

5. Conclusions

LSM poses a significant threat to the forest-based livelihoods, social cohesion, health, and environment in the Manuripi Reserve. The communities practice organized and everyday resistance to prevent LSM from entering the reserve. Particularly, the reserve’s Management Committee, consisting of representatives of each community and land-owners, plays a key role in the organized resistance. At the same time, we have observed that the members of the community boards and the Management Committee constantly activate the community structures and offer the local population a space for dialog. This encourages self-reflection and dialog, which have been the basis for expressing needs and ideas, the resolution of conflicts, and organized and everyday resistance. We have found that the diversity of dialogical spaces, both administrative and recreational, are linked to community structures and promote a diversity of discussions that strengthen local social cohesion.

The Management Committee wrote a resolution to position itself against LSM (Table 2) which generated media attention and has likely helped to prevent LSM from entering the reserve. The communities practice everyday resistance by strengthening their forest-based livelihoods and community structures. For instance, the collection of Brazil nuts and other NTFPs from the rainforest strengthens a sense of belonging and, thus, increases social cohesion and cooperation. This peaceful resistance does not directly confront the mining company, but this demonstration in the form of valuing the land can be interpreted as an act of everyday resistance.

While community members across the Manuripi Reserve perceived

LSM as a threat and were a lot less critical of ASM, the discussion around LSM also increased the communities’ attention to ASM, particularly its environmental effects. For instance, the Management Committee, as the representative body of the inhabitants, demanded more supervision and regulation of ASM on the river Madre de Dios.

6. Outlook

Several interviews suggested that Pacaguaras S.R.L. could face stronger organized resistance should the mining company enter the Manuripi Reserve. Roadblocks have been mentioned by the Management Committee and the communities. For how much longer LSM or extractive projects in general (e.g., oil) can be prevented from entering the reserve depends on how successfully the communities join forces and reject bribes offered by the company. Furthermore, the degree to which the Management Committee can promote alliances with governmental institutions, as well as national and international NGOs and civil society actors, will be crucial to the ability to exert pressure on the different levels of government regarding prioritizing nature conservation and forest-based livelihoods over profits gained through the exploitation of resources. While resistance to LSM is to be expected, it is also likely that the negative aspects of AMS in terms of ecological and social impacts will receive more attention from the local communities and governments.

Further research on the economic, ecological, social, and cultural impacts of the different forest-based value chains of inhabited wildlife reserves can contribute to understanding community-based decision-making at the crossroads of forest-based or mining activities and determining how such decision-making processes contribute to cooperative community relations and resistance. This knowledge could lead to management plans that, if co-created by government institutions and local communities, could prevent the violation of communities’ rights and, thus, protect both the integrity of the wildlife reserve and people’s livelihoods. In addition, knowledge about communal structures could also be used by actors supporting mining to undermine resistance against it. Hence, researchers need to carefully consider this and protect the interviewees’ anonymity.

CRedit authorship contribution statement

Janpeter Schilling: Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Investigation, Formal analysis, Conceptualization. **Claudia Pinzón Cuellar:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization,

Investigation. **Rebecca Froese**: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization, Investigation. **Diana Figueroa**: Writing – review & editing, Investigation. **Miguel Villavicencio**: Writing – review & editing, Resources, Investigation. **Luise Werland**: Writing – review & editing, Project administration. **Regine Schönenberg**: Writing – review & editing, Supervision, Investigation, Funding acquisition.

Acknowledgments

We thank all interviewees for their hospitality and for sharing their time and perspectives. We thank the external reviewers and guest editors for their helpful comments and suggestions. We thank Camilo Goetz Restrepo for assisting us with the transcription of the interviews. The Federal Ministry of Education and Research (Germany) (BMBF) supports and funds the overall work under Grant No's. 01LC1824A to 01LC1824F, project PRODIGY.

Data availability

The collected interview data includes personal and sensitive information and cannot be made publicly available.

References

- Adrián, A.H.A., 2015. ¿Qué tanto conocemos de nuestras áreas protegidas nacionales en Bolivia? Acta N 7, 93–105. http://www.scielo.org.bo/pdf/ran/v7n1/v7n1_a06.pdf (accessed 15 September 2024).
- Alimonda, H., Toro Pérez, C., Martín, F., 2017. Ecología política Latino Americana: pensamiento crítico, diferencia Latino Americana y rearticulación epistémica. Vol. first, 1st ed. Ciudad Autónoma de Buenos Aires: CLACSO; México: Universidad Autónoma Metropolitana; Ciudad Autónoma de Buenos Aires: Ciccus. https://biblioteca.clacso.edu.ar/clacso/gt/20171030111951/GT_Ecologia_politica_Tomo_1.pdf (accessed 15 September 2024).
- Almeida, P., Cordero Ulate, A. (Eds.), 2017. Movimientos sociales en América latina: perspectivas, tendencias y casos. CLACSO Consejo Latinoamericano de Ciencias Sociales, Buenos Aires. https://biblioteca.clacso.edu.ar/clacso/se/20170721051921/Movimientos_sociales.pdf (accessed 15 September 2024).
- Baaz, M., Lilja, M., Schulz, M., Vinthagen, S., 2016. Defining and analyzing “resistance”: possible entrances to the study of subversive practices. *Alternatives* 41, 137–153. <https://doi.org/10.1177/0304375417700170>.
- Bainton, N., Owen, J.R., Kenema, S., Burton, J., 2020. Land, labour and capital: small and large-scale miners in Papua New Guinea. *Resour. Policy* 68, 101805. <https://doi.org/10.1016/j.resourpol.2020.101805>.
- Basir-Cyio, M., Irsun-Baso, M., Nakazawa, K., Mahfudz-Muchtar, T., Napitupulu, M., Anshary, A., Abd Rauf, R., Laude, S., 2020. The effect of traditional gold mining to land degradation, mercury contamination and decreasing of agricultural productivity. *Bulg. J. Agric. Sci.* 26, 612–621.
- Bebbington, A., Humphreys Bebbington, D., Bury, J., Langan, J., Muñoz, J.P., Scurrah, M., 2008. Mining and social movements: struggles over livelihood and rural territorial development in the Andes. *World Dev.* 36, 2888–2905. <https://doi.org/10.1016/j.worlddev.2007.11.016>.
- Berton, E.F., 2016. Gold rush in Bolivia sparks conflict between miners and the community. *Mongabay*. <https://news.mongabay.com/2016/10/gold-rush-in-bolivia-a-sparks-conflict-between-miners-and-the-community/> (accessed 15 September 2024).
- Betancur-Corredor, B., Loaiza-Usuga, J.C., Denich, M., Borgemeister, C., 2018. Gold mining as a potential driver of development in Colombia: challenges and opportunities. *J. Clean. Prod.* 199, 538–553. <https://doi.org/10.1016/j.jclepro.2018.07.142>.
- Bontempi, A., Venturi, P., Del Bene, D., Scheidel, A., Zaldo-Aubanell, Q., Zaragoza, R.M., 2023. Conflict and conservation: on the role of protected areas for environmental justice. *Glob. Environ. Change* 82, 1–14. <https://doi.org/10.1016/j.gloenvcha.2023.102740>.
- Bridge, G., 2004. Contested terrain: mining and the environment. *Annu. Rev. Environ. Resour.* 29, 205–259. <https://doi.org/10.1146/annurev.energy.28.011503.163434>.
- Carrillo, F., Salman, T., Soruco, C., 2013. Cooperativas de minería de pequeña escala en Bolivia: de salvavidas de los pobres a maquinaria de manipulación política. *Letras Verdes. Rev. Latinoam. Estud. Socioambient.* 14, 233–254.
- Castaña-Aguirre, C.A., Baracaldo-Silva, P., Bravo-Arcos, A.M., Arbeláez-Caro, J.S., Ocampo-Fernández, J., Pineda-López, O.L., 2021. Territorio y territorialización: una mirada al vínculo emocional con el lugar habitado a través de las cartografías sociales. *Rev. Guillermo Ockham* 19, 201–217. <https://doi.org/10.21500/22563202.5296>.
- Chowdhury, S., Alam, S., Labi, M.M., Khan, N., Rokonzaman, M., Biswas, D., Taheha, T., Mukul, S.A., Fuller, R.A., 2022. Protected areas in South Asia: status and prospects. *Sci. Total Environ.* 811, 1–8. <https://doi.org/10.1016/j.scitotenv.2021.152316>.
- Conde, M., 2017. Resistance to mining. A review. *Ecol. Econ.* 132, 80–90. <https://doi.org/10.1016/j.ecolecon.2016.08.025>.
- Cronkleton, P., Pacheco, P., Ibarguen, R., Albornoz, M.A., 2009. Reformas en la tenencia forestal en Bolivia: la gestión comunal en las tierras baja. CIFOR, CEDLA, RRI, La Paz, Bolivia. https://www.cifor-icraf.org/publications/pdf_files/Books/BCronkleton0901.pdf (accessed 15 September 2024).
- Díaz-Cuellar, V., 2017. The political economy of mining in Bolivia during the government of the Movement Towards Socialism (2006–2015). *Extr. Ind. Soc.* 4, 120–130. <https://doi.org/10.1016/j.exis.2016.12.011>.
- Díaz-Cuellar, V., Francescone, K., 2016. Canadian mining interests in Bolivia, 1985–2015: trajectories of failures, successes, and violence. *Lat. Am. Policy* 7, 215–240. <https://doi.org/10.1111/lamp.12108>.
- Dietz, K., Engels, B., 2017. Contested extractivism: actors and strategies in conflicts over mining. *DIE ERDE* 148, 111–120. <https://doi.org/10.12854/erde-148-42>.
- Dietz, K., Engels, B., 2020. Analysing land conflicts in times of global crises. *Geoforum* 111, 208–217. <https://doi.org/10.1016/j.geoforum.2020.02.019>.
- Duarte-Hidalgo, C., López-Rojas, C., Ochoa-García, P., Salazar-Enriquez, P., 2020. Acción colectiva, antagonismos y resistencia comunitaria en el conflicto socio-territorial de Freirina. *Rev. Eleuthera* 22, 170–188. [10.17151/eleu.2020.22.2.11](https://doi.org/10.17151/eleu.2020.22.2.11).
- Duchelle, A.E., Kainer, K.A., Wadt, L.H.O., 2014. Is certification associated with better forest management and socioeconomic benefits? A comparative analysis of three certification schemes applied to Brazil nuts in Western Amazonia. *Soc. Nat. Resour.* 27, 121–139. <https://doi.org/10.1080/08941920.2013.840022>.
- Ewick, P., Silbey, S., 2003. Narrating social structure: stories of resistance to legal authority. *Am. J. Sociol.* 108, 1328–1372. <https://doi.org/10.1086/378035>.
- Fashola, M.O., Ngole-Jeme, V.M., Babalola, O.O., 2016. Heavy metal pollution from gold mines: environmental effects and bacterial strategies for resistance. *Int. J. Environ. Res. Public Health* 13. <https://doi.org/10.3390/ijerph13111047>.
- Foucault, M., 1980. *The History of Sexuality. Vol. 1, An Introduction*. Random House. Vintage Books, New York.
- Fox, N.J., Alldred, P., 2018. Social structures, power and resistance in monist sociology: (new) materialist insights. *J. Sociol.* 54, 315–330. <https://doi.org/10.1177/1440783317730615>.
- Fraser, B., 2009. Peruvian gold rush threatens health and the environment. *Environ. Sci. Technol.* 43, 7162–7164. <https://doi.org/10.1021/es902347z>.
- Gibb, H., O'Leary, K.G., 2014. Mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining community: a comprehensive review. *Environ. Health Perspect.* 122, 667–672. <https://doi.org/10.1289/ehp.1307864>.
- Godínez-Gómez, O., Schank, C., Mas, J.F., Mendoza, E., 2020. An integrative analysis of threats affecting protected areas in a biodiversity stronghold in Southeast Mexico. *Glob. Ecol. Conserv.* 24, e01297. <https://doi.org/10.1016/j.gecco.2020.e01297>.
- Graham, T., 2022. In Bolivia, mercury pollution spreads amid a surge in gold mining. *YaleEnvironment360*. Published at the Yale School of the Environment. <https://e360.yale.edu/features/bolivia-mercury-gold-mining> (accessed 15 September 2024).
- Gudynas, E., Rojas, A., 2020. Informal, illegal, artisanal, tradicional, ancestral: desentrañando el entramado de los extractivismos por el oro en los ríos sudamericanos. *Yeiyá* 1, 21–45. [10.33182/y.v1i1.1302](https://doi.org/10.33182/y.v1i1.1302).
- Haesbaert, R., 2013. A global sense of place and multi-territoriality: Notes for dialogue from a ‘peripheral’ point of view. In: Featherstone, D., Painter, J. (Eds.), *Spatial Politics. Essays for Doreen Massey*, 1st. ed. Wiley-Blackwell, Malden, Mass, pp. 146–157.
- Hammer, V., Vanneste, J., Vuono, D.C., Alejo-Zapata, F.D., Polanco-Cornero, H.G., Zea, J., Bolaños-Sosa, H.G., Zevallos Rojas, C.A., Figueroa, L.A., Bellona, C., 2023. Membrane contactors as a cost-effective cyanide recovery technology for sustainable gold mining. *ACS EST Water* 3, 1935–1944. <https://doi.org/10.1021/acsestwater.3c00026>.
- Haslam, P.A., Godfrid, J., 2023. Lost in corporate translation: how firms mediate between social mobilization and regulatory intervention in the extractive sector. *Lat. Am. Polit. Soc.* 65, 20–46. <https://doi.org/10.1017/lap.2022.63>.
- Hollander, J.A., Einwohner, R.L., 2004. Conceptualizing resistance. *Sociol. Forum* 19, 533–554. <https://doi.org/10.1007/s11206-004-0694-5>.
- ILO, 1989. C169 - Indigenous and Tribal Peoples Convention (No. 169). https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0:NO:P12100_ILO_CODE:C169 (accessed 15 September 2023).
- Jenkins, K., 2014. Women, mining and development: an emerging research agenda. *Extr. Ind. Soc.* 1, 329–339. <https://doi.org/10.1016/j.exis.2014.08.004>.
- Johansson, A., Vinthagen, S., 2016. Dimensions of everyday resistance: an analytical framework. *Crit. Sociol.* 42, 417–435. <https://doi.org/10.1177/089620514524604>.
- Johansson, A., Vinthagen, S., 2020. *Conceptualizing ‘Everyday Resistance’: A Transdisciplinary Approach*. Routledge, New York, NY.
- Kastury, F., Besedin, J., Betts, A.R., Asamoah, R., Herde, C., Netherway, P., Tully, J., Scheckel, K.G., Juhasz, A.L., 2024. Arsenic, cadmium, lead, antimony bioaccessibility and relative bioavailability in legacy gold mining waste. *J. Hazard. Mater.* 469, 133948. <https://doi.org/10.1016/j.jhazmat.2024.133948>.
- Langston, J.D., Lubis, M.I., Sayer, J.A., Margules, C., Boedhihartono, A.K., Dirks, P.H., 2015. Comparative development benefits from small and large scale mines in North Sulawesi, Indonesia. *Extr. Ind. Soc.* 2, 434–444. <https://doi.org/10.1016/j.exis.2015.02.007>.
- Lawrie, M., Tonts, M., Plummer, P., 2011. Boomtowns, resource dependence and socio-economic well-being. *Aust. Geogr.* 42, 139–164. <https://doi.org/10.1080/00049182.2011.569985>.
- LeBlanc, M.E., Parsons, M.B., Chapman, E.E.V., Campbell, L.M., 2020. Review of ecological mercury and arsenic bioaccumulation within historical gold mining districts of Nova Scotia. *Environ. Rev.* 28, 187–198. <https://doi.org/10.1139/er-2019-0042> (Environmental Reviews).

- Lévi-Strauss, C., 2014. Social structure. In: Moore, H., Sanders, T. (Eds.), *Anthropology in Theory. Issues in Epistemology*, 2nd ed. Wiley Blackwell, Chichester, pp. 78–87.
- Lilja, M., 2022. The definition of resistance. *J. Polit. Power* 15, 202–220. <https://doi.org/10.1080/2158379X.2022.2061127>.
- Lilja, M., Baaz, M., Schulz, M., Vinthagen, S., 2017. How resistance encourages resistance: theorizing the nexus between power, 'organised resistance' and 'everyday resistance'. *J. Polit. Power* 10, 40–54. <https://doi.org/10.1080/2158379X.2017.1286084>.
- Loftus, A., 2019. Political ecology I: where is political ecology? *Prog. Hum. Geogr.* 43, 172–182. <https://doi.org/10.1177/0309132517734338>.
- López Sandoval, M., Robertsdotter, A., Paredes, M., 2017. Space, power and locality: the contemporary use of territorio in Latin American geography. *J. Lat. Am. Geogr.* 16, 43–67.
- Lowery, B., Dagevos, J., Chuenpagdee, R., Vodden, K., 2020. Storytelling for sustainable development in rural communities: an alternative approach. *Sustain. Dev.* 28, 1813–1826.
- Marshman, J., 2019. Communing with bees: a whole-of-community approach to address crisis in the anthropocene. *J. Agric. Food Syst. Community Dev.* 9, 1–24. <https://doi.org/10.5304/jafscd.2019.091.029>.
- Mbanze, A.A., Da Viera Silva, C., Ribeiro, N.S., Silva, J.F., Santos, J.L., 2020. A livelihood and farming system approach for effective conservation policies in protected areas of developing countries: the case study of the Niassa National Reserve in Mozambique. *Land Use Policy* 99, 1–16. <https://doi.org/10.1016/j.landusepol.2020.105056>.
- McAdam, D., Tarrow, S., Tilly, C., 2001. *Dynamics of Contention*, Reprint. Cambridge University Press, Cambridge, p. 387.
- McNeish, J.A., 2018. Resource extraction and conflict in Latin America. *Colomb. Int.* 3–16. <https://doi.org/10.7440/colombiaint93.2018.01>.
- Mestanza-Ramón, C., Mora-Silva, D., D'Orío, G., Tapia-Segarra, E., Gaibor, I.D., Esparza Parra, J.F., Chávez Velásquez, C.R., Straface, S., 2022. Artisanal and small-scale gold mining (ASGM): management and socioenvironmental impacts in the northern Amazon of Ecuador. *Sustain.* 14, 6854. <https://doi.org/10.3390/su14116854>.
- Mujere, N., Isidro, M., 2016. Impacts of artisanal and small-scale gold mining on water quality in Mozambique and Zimbabwe. In: McKeown, E., Bugyi, G. (Eds.), *Impact of Water Pollution on Human Health and Environmental Sustainability*. IGI Global, Hershey PA, pp. 101–119.
- MMAyA, SERNAP, RNVSA, 2012. Plan de manejo de la reserva nacional de vida silvestre Manuripi 2012-2022, Cobija, Bolivia. https://www.bivica.org/files/manuripi_plan-manejo.pdf (accessed 20 March 2024).
- Neumann, R.P., 2009. Political ecology: theorizing scale. *Prog. Hum. Geogr.* 33, 398–406. <https://doi.org/10.1177/0309132508096353>.
- Obodai, J., Bhagwat, S., Mohan, G., 2024. Gold mining's environmental footprints, drivers, and future predictions in Ghana. *Remote Sens. Appl. Soc. Environ.* 33, 101103. <https://doi.org/10.1016/j.rsase.2023.101103>.
- Ocaklı, B., Niewöhner, J., 2022. Making and unmaking gold as a resource. Resistant signatories in Maidan, Kyrgyzstan. *Geoforum* 131, 151–162. <https://doi.org/10.1016/j.geoforum.2022.03.015>.
- Ögütle, V.S., 2021. Institution as mediation between social structure and agency: toward a realist social ontology of institutions. *J. Theory Soc. Behav.* 51, 489–507. <https://doi.org/10.1111/jtsb.12293>.
- Pandey, G., Shrivastav, A.B., 2012. Contamination of mercury in fish and its toxicity to both fish and humans: an overview. *Int. Res. J. Pharm.* 3, 44–47.
- Peluso, N.L., Watts, M., 2001. *Violent Environments*. Cornell University Press, Ithaca, London.
- Plurinational State of Bolivia, 2009. Constitución política del estado (CPE). 07 February 2009. https://www.oas.org/dil/esp/constitucion_bolivia.pdf (accessed 15 September 2024).
- Rabionet, S., 2011. How I learned to design and conduct semi-structured interviews: an ongoing and continuous journey. *Qual. Rep.* 16, 563–566. <https://doi.org/10.46743/2160-3715/2011.1070>.
- Radcliffe-Brown, A.R., 1940. On social structure. *J. R. Anthropol. Inst.* 70, 1–12. <https://doi.org/10.2307/2844197>. GB Irel.
- Radhuber, I.M., Radcliffe, S.A., 2023. Contested sovereignties: indigenous disputes over plurinational resource governance. *Environ. Plan.* 6, 556–577. <https://doi.org/10.1177/25148486211068476>.
- Radwin, M., 2022. Shady contracts, backdoor deals spur illegal gold mining in Bolivian Amazon. Mongabay. <https://news.mongabay.com/2022/11/shady-contracts-backdoor-deals-spur-illegal-gold-mining-in-bolivian-amazon/> (accessed 15 September 2024).
- Raftopoulos, M., 2017. Contemporary debates on social-environmental conflicts, extractivism and human rights in Latin America. *Int. J. Hum. Rights* 21, 387–404. <https://doi.org/10.1080/13642987.2017.1301035>.
- Ribot, J.C., Peluso, N.L., 2003. A theory of access*. *Rural Sociol.* 68, 153–181. <https://doi.org/10.1111/j.1549-0831.2003.tb00133.x>.
- Robbins, P.F., 2003. Political ecology in political geography. *Polit. Geogr.* 22, 641–645. [https://doi.org/10.1016/S0962-6298\(03\)00071-4](https://doi.org/10.1016/S0962-6298(03)00071-4).
- Salinas, S.C., Núñez, J.M.J., 2013. *Las interculturalidad-es, identidad-es y el diálogo de saberes*. *Reencuentro* 66, 10–23.
- Sampson, R.J., McAdam, D., MacIndoe, H., Weffer-Elizondo, S., 2005. Civil society reconsidered: the durable nature and community structure of collective civic action. *Am. J. Sociol.* 111, 673–714. <https://doi.org/10.1086/497351>.
- Schilling, J., Saulich, C., Engwicht, N., 2018. A local to global perspective on resource governance and conflict. *Confl. Secur. Dev.* 18, 433–461. <https://doi.org/10.1080/14678802.2018.1532641>.
- Schilling, J., Schilling-Vacaflor, A., Flemmer, R., Froese, R., 2021. A political ecology perspective on resource extraction and human security in Kenya, Bolivia and Peru. *Extr. Ind. Soc.* 8, 1–12. <https://doi.org/10.1016/j.exis.2020.10.009>.
- Schueler, V., Kuemmerle, T., Schröder, H., 2011. Impacts of surface gold mining on land use systems in Western Ghana. *Ambio* 40, 528–539. <https://doi.org/10.1007/s13280-011-0141-9>.
- Scott, J.C., 1985. *Weapons of the Weak: Everyday Forms of Peasant Resistance*. Yale University Press, New Haven, p. 423.
- Shaharum, N.S.N., Shafri, H.Z.M., Gambo, J., Abidin, F.A.Z., 2018. Mapping of Krau wildlife reserve (KWR) protected area using landsat 8 and supervised classification algorithms. *Remote Sens. Appl.* 10, 24–35. <https://doi.org/10.1016/j.rsase.2018.01.002>.
- Shapiro, J., McNeish, J.A., 2021. *Our Extractive Age: Expressions of Violence and Resistance*. Routledge, London.
- Soe, P.S., Kyaw, W.T., Arizono, K., Ishibashi, Y., Agusa, T., 2022. Mercury pollution from artisanal and small-scale gold mining in Myanmar and other southeast asian countries. *Int. J. Environ. Res. Public Health* 19, 1–21. <https://doi.org/10.3390/ijerph19106290>.
- Solon, P., 2016. Es posible el vivir bien?: Reflexiones a quema ropa sobre alternativas sistémicas. 1st ed., Fundación Solón, La Paz, Bolivia. https://www.alainet.org/sites/default/files/es_posible_el_vivir_bien-.pdf (accessed 15 September 2024).
- Svarstad, H., Overå, R., Benjaminsen, T., 2018. Power theories in political ecology. *J. Polit. Ecol.* 25, 350–363. <https://doi.org/10.2458/v25i1.23044>.
- Terán Miña, T.Á., 2021. Evaluación de los efectos ambientales de la minería aurífera a pequeña escala en el ANMIN-Apolobamba (Bolivia). Programa de Doctorado en Tecnología y Modelización en Ingeniería Civil, Minería y Ambiental. Universidad Politécnica de Cartagena. <https://repositorio.upct.es/server/api/core/bitstreams/3a0781a6-7d88-4c5e-9cfa-f82acdca7dd9/content> (accessed 15 September 2024).
- Thiombane, M., de Vivo, B., Niane, B., Watts, M.J., Marriott, A.L., Di Bonito, M., 2023. A new hazard assessment workflow to assess soil contamination from large and artisanal scale gold mining. *Environ. Geochem. Health* 45, 5067–5091. <https://doi.org/10.1007/s10653-023-01552-5>.
- Toledo Orozco, Z., 2022. Informal gold miners, state fragmentation, and resource governance in Bolivia and Peru. *Lat. Am. Polit. Soc.* 64, 45–66. <https://doi.org/10.1017/lap.2022.5>.
- Toledo Orozco, Z., Veiga, M., 2018. Locals' attitudes toward artisanal and large-scale mining - a case study of Tambogrande, Peru. *Extr. Ind. Soc.* 5, 327–334. <https://doi.org/10.1016/j.exis.2018.01.002>.
- UNODC, 2023. World drug report 2023: The nexus between drugs and crimes that affect the environment and convergent crime in the Amazon basin. United Nations, New York. https://www.unodc.org/res/WDR-2023/WDR23_B3_CH4_Amazon.pdf (accessed 15 September 2024).
- Usman Kaku, D., Cao, Y., Al-Masray, Y.A., Nizeyimana, J.C., 2021. An integrated approach to assess the environmental impacts of large-scale gold mining: the Nzema-Gold Mines in the Ellembele District of Ghana as a case Study. *Int. J. Environ. Res. Public Health* 18. <https://doi.org/10.3390/ijerph18137044>.
- Verma, R.K., Singh Sankhla, M., Kumar, R., 2018. Mercury contamination in water & its impact on public health. *Int. J. Forensic Sci.* 1, 72–78.
- Weber, M., 1930. *The Protestant Ethic and the Spirit of Capitalism*. Routledge Classics, London. New York translated by T. Parsons.
- Workman, D., 2023. Gold exports by country plus average prices. *World's Top Exports*. <https://www.worldstopexports.com/gold-exports-country/> (accessed 28 February 2024).
- Yankson, P.W., Gough, K.V., 2019. Gold in Ghana: the effects of changes in large-scale mining on artisanal and small-scale mining (ASM). *Extr. Ind. Soc.* 6, 120–128. <https://doi.org/10.1016/j.exis.2018.09.009>.