

the OPEN ENCYCLOPEDIA of ANTHROPOLOGY



Mining

ALEX GOLUB, *University of Hawai'i at Mānoa*

Mining has occurred for thousands of years, and social anthropologists have studied it for almost a century. This entry explains anthropology's principle findings about mining, beginning with the lives of miners who participate in both large-scale mining (LSM) and artisanal and small-scale mining (ASM). It then discusses the politics of 'mining encounters' in which miners, local communities, and other stakeholders such as NGOs and the government engage in contests with each other to control mining and its positive and negative impacts. The entry then moves to discuss how minerals such as metals and gemstones are bought, sold, and valued, and what people do with the money they receive from mining. It closes with a brief consideration of the ethical challenges mining presents for anthropologists, and a discussion of what future topics in the anthropology of mining might be.

Introduction

People have extracted minerals from the earth for millennia and have thought, talked, and written about this activity for just as long. Since it would be impossible to survey everything in this vast and valuable literature, this entry will focus on the research findings of anthropologists or other social scientists who have conducted prolonged [ethnographic](#) fieldwork on mining and published results in English (for longer review articles, see Godoy 1985; Ballard & Banks 2003; Jacka 2018). The entry begins with the lives of mine [workers](#) and then 'zooms out' to look at wider spheres of mining, including 'mining encounters' (the politics created in a region by mining), and the lives of the traders and dealers who deal with minerals and gemstones once they have been wrested from the earth. Finally, this entry zooms out even further to address the professional [ethics](#) and politics of studying mining, and points to future directions for the anthropology of mining.

The lives of miners

Anthropologists have found it useful to divide mining into two forms: large-scale mining (LSM), which depends on substantive capital investment, and artisanal and small-scale gold mining (ASM). The lives of mine workers are shaped in fundamental ways by the techniques and technologies they use.

Large-scale mining

Anthropologists emphasise the danger and difficulty of large-scale mining, especially underground and

unmechanised mining. This laborious [work](#) is intense and exhausting, and mine workers are frequently low-paid. The images of dirty and rough work that circulate in the press and popular media are largely accurate. And yet, how miners feel about their work has more to do with how it is interpreted than the physical nature of the work itself.

During the apartheid era, black gold miners in South Africa lived in conditions similar to soldiers or prisoners, complete with barracks, and demanding shiftwork (Moody 1994), a type of ubiquitous control which Erving Goffman calls a 'total institution' (1961). These unrewarding conditions became fertile grounds for unionization and worker solidarity. On the other hand, Elizabeth Ferry's book about a collectively owned mine in Mexico shows that workers see their mine as a form of patrimony to be passed down to their [children](#), even as the silver they produce is sold into a global market (2005). While some workers [resist](#) authority, workers living in places with histories of patronage and hierarchy may embrace it (Rubbers 2010, Winchell 2017), and actively try to subordinate themselves to superiors in order to claim traditional rights over them. In these cases, mine owners who reject their role as boss and patron are the ones who may experience [labour](#) unrest. Miners in [post-socialist](#) countries were once celebrated as paragons of socialist virtue, but today often feel forgotten by a government and trade unions which once lionised them (Keskula 2016). Coal miners in the contemporary United States may see their work as a [gift](#) which provides electricity to consumers, and they may feel spurned and betrayed by middle class consumers who call for an end to coal and the rise of [sustainable](#) energy (Smith 2019).

Gender is another arena in which cultural context matters. At first glance, some might see LSM as a 'macho' male activity because it involves toughness, physical exertion, and violent force to disembed minerals from the earth. But this stereotype is misleading. Women have always worked as miners (Lahiri-Butt & Macintyre 2006), and gender roles in LSM can be quite variable. Second, male and female miners can 'undermine' gender stereotypes to create roles such as 'tough' female workers, who can endure pain and discomfort and 'softer' men who work in teams and ask for assistance as a key part of mine safety (Rolston 2014). These stereotypes are always multivalent: is the proper role of a strong man to unionise and fight for their rights, or to endure their lot with stoicism? It is in action that men and women deploy these stereotypes in practice (Finn 1998).

Folklorists have long noted that underground miners often believe mines to be inhabited by 'spirits' or other beings who must be propitiated in order for mining to be safe and successful. Anthropologists have also come to see these beliefs as more than mere superstition. In a classic early work on tin mining in Bolivia, June Nash shows that these rituals express metaphorically miners' accurate understanding of their lot: [dependent](#) upon mine ownership while also victimised by it (1979). This Marxist approach, echoed by Michael Taussig (1980), indicates the power and intelligence of miners' collective imagination.

Artisanal mining

Artisanal mining (ASM) can range from the lone hobbyist who spends weekends panning for gold to organised teams of workers using backhoes and explosives. Some research shows that ASM can supplement [farming](#) and other subsistence activities, and the small but steady income derived from it may ultimately be more sustainable and evenly distributed than the massive influx of [money](#) that accompanies large-scale mining (Hilson 2002).

Artisanal mining can often create new [moral](#) orders and social [relations](#). In Sudan, for instance, mining income frees miners from economic reliance on their parents, downplaying hierarchical sources of authority and creating new social networks among young miners (Calkins 2017). ASM can generate even more novel social orders. In some cases it can take the form of a 'rush' or 'boom' similar to the nineteenth century Pacific Rim gold rushes in California, Australia, and Alaska (Belich 2009: 306-22), and some authors have used Victorian metaphors of a mining 'frontier' to describe contemporary ASM mining camps (Bryceson & Geenen 2016). In some cases, these rushes occur in genuinely unoccupied land, such as the Mount Kare gold rush in Papua New Guinea (Henton & Flower 2007). In other cases, such as the Amazon gold rush of the 1980s (Cleary 1990), the land was occupied already, a fact that 'frontier' metaphors threaten to elide (Luning 2018).

In the nineteenth century, these rushes created a mobile population (Belich 2009: 306-20), which developed its own unique norms. Something akin to this occurs in some ASM communities today, for instance in West Africa, where miners establish their own novel social networks to mine, buy, and sell minerals (Grätz 2004, 2013). Contemporary gold camps are sometimes considered places of sexual excess and prostitution, as the nineteenth century camps were, but evidence from East Africa (Bryceson *et al.* 2014) and Indonesia (Mahy 2011) indicates that emergent forms of sexuality may free women from traditional roles and offer them avenues for [agency](#) that may be more beneficial and less exploitative than we might at first suspect.

ASM often occurs in remote areas, or areas which span national borders. As a result, ASM communities often regulate (or fail to regulate) activities typically within the remit of the government, such as pollution from mining (Beavis & McWilliam 2018) and conflict over access to minerals (Salman & de Theije 2017). Today, governments take a wide variety of approaches to ASM, ranging from making it illegal to attempts to recognise and formalise it.

Mine-affected communities and mining encounters

In addition to studying the lives of miners, anthropologists have also studied the political conflicts between stakeholders in mining such as companies, governments, local communities, and NGOs. Robert Pijpers and Thomas Hylland Eriksen have helpfully coined the term 'mining encounter' to describe these situations (2018).

Anthropologists have been very critical of what John Burton (2014) has called the '*Avatar* narrative'. This is the idea, vividly portrayed in the 2009 science fiction film *Avatar*, that local communities are always innocent and environment-loving opponents of mining, while miners are always purely evil, exploitative, and rapacious. In fact, mining encounters are much more complicated than this. They almost always feature more than two stakeholders; stakeholder groups are composed of factions with different agendas; many different kinds of stakeholders may desire mine revenue or seek to protect the environment; and often individuals are members of more than one stakeholder group at once.

Damage and knowledge of the environment

Mining by definition involves destroying the environment, and there is a large literature devoted to studying this fact. Some anthropologists, such as Stuart Kirsch, see mining as a 'harm industry' in which massive damage to the environment is inevitable, despite industry claims that mining can be 'sustainable' (2014). Mining has a long [history](#) not only of planned and sanctioned environmental destruction, but also of catastrophic accidents (Eriksen 1976). Many anthropologists have documented these incidents. The damage mining does to the environment is real and severe.

At the same time, anthropologists often study less obvious and more complicated cases of environmental damage than the many empirically obvious ones. In doing so, they draw on science studies to examine how knowledge of the environment is created and how it is used in mining encounters. For instance, it is easy to say that exposure to radiation can harm uranium miners. But what amount of radioactive background crosses the line from 'safe' to 'dangerous'? And how can we detect and record radiation when it is not available to the senses and its effects may only be felt years afterwards (Hecht 2012)?

Fabiana Li calls the process by which environmental knowledge is created and contested 'stabilization'. In it, stakeholders work to generate facts about the environment that come to seem stable and true. Engineers may consider well [water](#) identical to water from a sacred glacier, but indigenous people may see them as radically different (Li 2015). Simply asserting the truth of [science](#) over indigenous ways of knowing empowers some stakeholders and disempowers others (and vice versa). Other actors may be involved in these epistemic processes. The Catholic Church has lent its imprimatur to scientists' attempts to document lead pollution in Peru, creating an unexpected juxtaposition of science and faith which nonetheless creates facts which can become 'politically actionable' (Graeter 2017).

At the broadest level, anthropologists have sought to understand how things in the world come to be seen as 'resources' at all. What techniques do engineers and scientists use to see the underground as 'ore' (Kinchie, Phadke & Smith 2018)? This speaks to a broader literature, one which studies how people conceptualise the environment such that some things can be seen discretely as 'resources' (Richards & Weszkalnys 2014). At the broadest level, anthropologies of mining take their place alongside [political ecological](#) approaches which study wildlife, crops, and endangered species, or even 'time' or 'diversity'

amongst college students, which can be conceptualised as 'scarce' (Ferry & Limbert 2008).

Changing perceptions of space and time

Mining can radically alter the [landscape](#) where it takes place. Anthropologists have seen that mining's massive changes to the landscape affect people's understanding of themselves and the history of an entire community, as in the case of mountaintop removal in the United States (McNeil 2011). Similarly, many Mongolians are deeply embedded in a 'cosmo-economics' attached to a landscape of sacred sites and familiar pasturages (High 2017). When these are altered or destroyed, deeply held cultural beliefs are fundamentally transformed. In some cases, land must be represented as 'wasteland', 'desert', or 'deserted' in order to justify the damage mining will do it, a process Voyles calls 'wastelanding' (2015). When these conceptions override or erase local senses of place, mining tends to be part of processes of dispossession and structural injustice.

Mining can also alter perceptions of time (D'Angelo & Pijpers 2018). Some communities look forward to mining revenues with an almost religious, apocalyptic enthusiasm (Bainton 2010). Others, particularly in areas which have been through several boom-bust cycles of mining, may develop cynicism or even dread of renewed mining (Halvaksz 2008). Once mining begins, people often feel like they are living through a special time, perhaps one of abundance or exciting uncertainty (Smith 2015). Stakeholders can sometimes play down the importance of the present, such as when failures of planning and development are written off as 'lessons learned' and stakeholders focus on a better-planned future (Wiegink 2017).

Identity and migration

Mining can also disrupt existing social [relations](#) and identities. Since mines must usually get local permission to operate, they frequently look to '[tribes](#)' or 'clans' or 'local communities' to approve their construction and to receive a 'social license to operate' (Prno & Slocombe 2012). This often triggers processes of 'ethnogenesis', transforming old identities into new [ethnic](#) groups which claim to be 'traditional' owners (Jorgensen 1997). In some cases, mining encounters can lead to legal and political deadlock in which no one gets to use contested land, even when most parties want mining to begin (Oskarsson 2018). In cases where artisanal miners work gold in the vicinity of large-scale mining, autochthony can become a valuable part of social identity, enabling access to land that can be worked (Bolay 2014). At other times, traditional forms of authority, such as kingship in West Africa, may transform into a form of rentier landlordship (Smith 2018, Burton 1996).

Mining often spurs processes of mobility such as migration, radically altering life in a region where mining occurs. Some of the earliest anthropologists to study mining, members of Max Gluckman's 'Manchester school' (Werbner 1984), examined the Zambian Copper Belt in the 1930s and documented how large-scale mining's demand for [labour](#) created profound social change, including major flows of migration into mining

areas, changes in gender roles, and rapid urbanization of rural communities (Richards 1939, Epstein 1981). Emigration frequently occurs in mining areas as well. Often, mining-affected communities are relocated or resettled to clear the way for mining, as in the case of Banaba Island, where the entire population was removed so the island could be mined for phosphate (Teaiwa 2014). These processes can have drastic impacts on communities (Own & Kemp 2016). Overall, migration continues to be a major topic in anthropology today (Bainton & Banks 2018)

Governance and corporate social responsibility

Mining can be difficult to govern, especially in the case of mining 'rushes' or when large-scale mines operate in countries that lack strong government to begin with. Often, large-scale mines assume the role of the state in providing governance, [infrastructure](#), and services, creating a sort of 'shadow sovereignty' (Coyle 2015) or 'hybrid governance' (Geenen 2016).

In the broader issues of responsibility when mines damage the environment and the obligations of a mine to a community, corporations typically seek to limit their responsibility in mining encounters. When accidents take lives or ruin the environment, for instances, stakeholders in a mining encounter may engage in processes of 'responsibilisation' (Trnka & Trundle 2017). Mining companies sometimes follow the same pattern of 'spill, study, and stall' that is reported for the chemical industry (Ross & Amter 2010, Kirsch 2014). The extensive use of contractors and subcontractors often functions to diffuse responsibility (Gardner 2016).

The [bureaucratic](#) organization of corporations also contains several mechanisms to diffuse responsibility and keep individuals from being blamed for failures (Jackall 2009). For example, who counts as a representative of 'the mine' or 'the government' or 'the community' at any given time is a quite complex question. Corporations are not human beings writ large. Rather, they are both forums in which individual action occurs as well as corporate entities which people can claim to speak for on certain occasions (Welker 2014, Golub 2014, Shever 2012). As a result, it is easy for corporations to blame individual employees or subcontractors for misdeeds. The division of labour enables executives to avoid knowledge of [unethical](#) behaviour, while employees lower down can claim that they are acting on orders. [Ethnographies](#) of corporate elites reveal that in some cases they are not evil people driven by avarice and indifference to suffering. Rather, they believe themselves to be ethical even when they are part of a social process which has iniquitous outcomes (Butler 2015, Golub 2013).

Today, mining corporations are heavily invested in 'corporate social responsibility' (CSR), the idea that companies ought to orient not just to profits but also to environmental stewardship and community development as well. Anthropologists who study CSR (Dolan & Rajak 2016, Rajak 2011, Walker-Said & Kelly 2015) argue that CSR limits corporate responsibility by defining what companies are and are *not* responsible for. Anthropologists are thus critical of the way CSR can become a tool for avoiding

responsibility.

Downsides to mining: violent conflict and the resource curse

Mineral wealth is not an unqualified good. The 'resource curse', a tendency for resource-rich areas to develop more slowly and suffer corruption, often occurs in mining areas (Auty 1993, Gilberthorpe & Rajak 2017). Boom economies can crash, leaving people and regions longing for the days of increased but impermanent wealth (Ferguson 1999). While some individuals may do very well out of mining, communities and regions often struggle to turn mining activities, even if they last decades, into a robust, diverse, and sustainable economy.

Mining can lead to conflict and violence. Local communities often organise to oppose large-scale mining, and this opposition can lead to armed [resistance](#), as in Appalachian opposition to coal companies (Andrews 2010) or even civil war, in the case of the Bougainville civil war in Papua New Guinea (Laslett 2014). In other instances, such as in Sierra Leone, civil wars can be prolonged as disputants in a conflict use mineral revenue to fund their operations (Richards 1996, Le Billon 2014). Security forces at large-scale mines have also been known to engage in violence against local communities, sometimes in coordination with the police or military, violating [human rights](#) (Coumans 2017).

Buying and selling minerals

Anthropologists do not just study the lives of miners and the dynamics of mining encounters; they also analyse how these minerals enter the marketplace once they have been extracted. Artisanal miners trying to bring their product to market encounter entities and ideas like 'the world market' which buyers use to justify their prices (Smith 2015), and miners often speculate about their own role in the global system. Some miners — like many first-world consumers — may not even know the precise use to which their coltan or tantalum will be put. Judging the value of diamonds and coloured gemstones requires expertise which buyers claim a monopoly on, and which sellers often contest (Calvão 2015).

Once received, the [money](#) earned from mining is often seen to be 'hot', 'fast', or 'loose' (Walsh 2003), difficult to save and suitable for spending on luxury goods or indulgences. In mining for some minerals, such as diamonds, luck plays a large role, and mining is equated with [gambling](#), or viewed in religious terms, in that success seems to be granted by god or other supernatural forces (D'Angelo 2015). Often, mining-derived money is spent on alcohol or luxury goods in order to bolster miners' perceptions of themselves as daring and exciting, as frequently happens when they are young men (Werthmann 2008). Filip De Boeck has showed how Angolan youths from rural areas use money from diamond smuggling to live in the city, reversing typical narratives of modernization in which rural people are second rate (1998).

Diamonds and coloured gemstones are smaller and lighter than commodity metals like gold or silver, and

expertise is needed to value them. In fact, Ferry has shown that [financial](#) markets value gold because of its homogenous physical qualities, which her respondents say makes it a culture-free source of value (Ferry 2016). In fact, Anna Tsing has shown that mines can make profits without mining at all, by merely creating at the appearance of mining which appeals to first-world investors (Tsing 2000). At any rate, buyers of precious and semi-precious stones need strong personal connections and trust to sell them. Many anthropologists have studied how coloured gemstones and diamonds circulate amongst diasporic [ethnic](#) (Marsden 2016) or religious networks such as the Jewish diamond traders (Shield 2002) or Jain emerald traders (Babb 2013, Brazeal 2017): such traders move stones across international borders, grade them, and trade them relying on the trust created by their kinship and religious connections. In other cases, companies attempt to create rigorous grading standards in rationally organised shops in order to avoid the vagaries of idiosyncratic grading (Cross 2011, Bell 2017), creating [workplaces](#) employees sometimes find stifling.

In fact, there are several forces at work today which conspire to standardise and routinise the valuation and marketing of minerals. In some cases, people use certification and testing processes to establish differences between substances that can appear identical to human senses. Stones such as sapphires and diamonds (or imitation diamonds) can be relatively cheaply manufactured in a lab. Sapphires and rubies, once mined, can be cooked and altered chemically to become more beautiful. As a result, sapphire sellers use various forms of licensing and branding to ensure that 'natural' sapphires maintain their value in the face of other cheaper, but physically identical, competitors (Walsh 2010). For almost twenty years, NGOs have attempted to raise awareness of the inequities and violence of the mining industry, perhaps most successfully in the 2006 film *Blood Diamonds*. As a result, there are many attempts to distinguish and to value 'fair trade', 'conflict free', or 'ethical' minerals over those of unknown provenance (Oakley 2015, Fischer 2018).

The ethics of studying mining

As we have seen, mining is an activity that can have serious consequences, providing massive wealth but also resulting in environmental destruction and, sometimes, conflict and violence that destroy communities and ruin lives. As a result, many anthropologists have been satisfied with studying mining disinterestedly. Some anthropologists have done applied work, giving aid to mining companies and governments and providing expert advice, which they hope will prevent these stakeholders from making bad decisions (Goldman 2000, Cochrane 2017). Anthropologists have also chosen a form of 'engaged anthropology' (Kirsch 2018), forming alliances with local and indigenous people to oppose mining and taking up activist roles (Kirsch 2014, Jalbert *et al.* 2017). Still others have argued for an intermediate position, contending that an 'ombudsman' role as a middleman would suit anthropologists better (Golub 2013, Filer 1999). Anthropologists on different sides of these issues can often be very critical of each other's work (Bainton &

Owen 2018).

In a reflexive twist, scholars have even studied the anthropology of mining itself. Activist scholars have criticised the role of anthropologists in mining encounters (Coumans 2011). James Ferguson (1999) has explored the way that the Manchester school [ethnography](#) of the Zambian Copperbelt was part of social context in which mining developed, not just an objective source of knowledge that stood outside of it.

Conclusion: future directions

There are many future forms that an anthropology of mining could take. Mining itself will likely move in several new directions, many of which are being studied by anthropologists and other scholars. As stocks decline, industry will search for resources in new locations. Growing 'south-to-south' connections, such as Chinese investment in Africa, will likely be a topic of increasing interest. Asteroid mining (Pelton 2017), while still almost entirely speculative, is in fact a topic of discussion and may in the future connect the study of mining to the anthropology of [outer space](#) (Messerli 2016). Closer on the horizon is Deep Sea Mining (DSM), in which mineral-rich nodules on the [seafloor](#) are harvested through a mixture of hydraulics, robotics, and surface-level vessels. Who owns the seafloor and how do DSM companies get a 'social license to operate' (Filer & Gabriel 2018)? What role will DSM play for small island nations (Pulu 2013, Le Meur *et al.* 2016)? These classic questions are being asked in this new, aquatic context (Koshinsky 2018).

Broader economic and technological changes may also affect the study of mining. Many in the global community strive today for a 'circular economy' in which extraction of new minerals is reduced or halted altogether. This is raising interest in urban mining, such as the harvesting of recyclables from waste dumps and other locations (Cossu & Williams 2015). As a result, the anthropology of mining may connect with the anthropology of [waste](#) (Reno 2015) and discard studies more generally. Moreover, robotics is set to alter the future of [work](#) in many fields, including mining. Robots could, in theory, be cheaper and more efficient for companies to employ than humans. It is also preferable to use them in dangerous situations which could endanger the lives of people. This is just one example of how new technologies could change the mining industry in ways worthy of study (Keenan, Kemp & Owen 2019).

Lastly, it may be that 'the anthropology' of mining as a field dissolves or at least loses some of its coherence as our understanding of the social and semiotic processes surrounding mining increases. Corporate mining features social dynamics that have more in common with those found in the anthropology of the state, [bureaucracy](#), and hydrocarbons than with some of the research on artisanal mining. Artisanal mining focuses on grassroots development and [labour](#) in a way that studies of large-scale mines do not. The issues of materiality and trading that are central in the literature on gemstones separate it from studies of commodity metals such as copper. It may also be the case that in the future, anthropologists will be able to isolate and study social dynamics across several domains, regardless of whether those dynamics occur in

mining or other areas. This development would represent a maturation in the theoretical frameworks used within the discipline.

Regardless, it is incontestable that mining will remain central to important topics in contemporary politics and economy. For this reason, there is no doubt that the growing field of the anthropology of mining will be a vital and important part of scholarship in the years to come.

References

Andrews, T.G. 2010. *Killing for coal: America's deadliest labor war*. Cambridge, Mass.: Harvard University Press.

Appel, H., A. Mason & M. Watts 2015. *Subterranean estates: life worlds of oil and gas*. Ithaca: Cornell University Press.

Auty, R. 1993. *Sustaining development in mineral economics: the resource curse thesis*. London: Routledge.

Babb, L. 2013. *Emerald city: the birth and evolution of an Indian gemstone industry*. New York: Suny Press.

Bainton, N. 2010. *The Lihir destiny: cultural responses to mining in Melanesia*. Canberra: ANU Press.

——— & G. Banks 2018. Land and access: a framework for analysing mining, migration, and development in Melanesia. *Sustainable Development* **26**, 450-60.

——— & J. Owen 2018. Zones of entanglement: researching mining arenas in Melanesia and beyond. *The Extractive Industries and Society* (available on-line: <https://doi.org/10.1016/j.exis.2018.08.012>).

Ballard, C. & G. Banks 2003. Resource wars: the anthropology of mining. *Annual Review of Anthropology* **32**, 287-313.

Beavis, S. & A. McWilliam 2018. Muddy rivers and toxic flows: risks and impacts of artisanal gold-mining in the Riverine Chatchments of Bombana, Southeast Sulawesi (Indonesia). In *Between the plough and the pick: informal, artisanal, and small-scale mining in the contemporary world* (ed.) K. Lahiri-Dutt, 295-310. Canberra: ANU Press.

Belich, R. 2009. *Replenishing the earth: the settler revolution and the rise of the Anglo-world, 1783-1939*. New York: Oxford.

Bell, L. 2017. Soft skills, hard rocks: making diamonds ethical in Canada's Northwest Territories. *Focaal* **79**, 74-88.

- Bolay, M. 2014. When miners become "foreigners": competing categorizations within gold mining spaces in Guinea. *Resources Policy* **40**, 117-27.
- Brazeal, B. 2017. Austerity, luxury and uncertainty in the Indian emerald trade. *Journal of Material Culture* **22**(4), 437-52.
- Bryceson, D.F. & S. Geenen 2016. Artisanal frontier mining of gold in Africa: labour transformation in Tanzania and the Democratic Republic of Congo. *African Affairs* **115**, 296-317.
- Bryceson, D.F., J.B. Jønsson & H. Verbrugge 2014. For richer, for poorer: marriage and casualized sex in East African artisanal mining settlements. *Development and Change* **45**, 79-104.
- Burton, J. 2014. Agency and the "Avatar" narrative at the Porgera Gold Mine, Papua New Guinea. *Journal de la Société des Océanistes* **138-139**, 37-51.
- Butler, P. 2015. *Colonial extractions: race and Canadian mining in contemporary Africa*. Toronto: University Press.
- Calkins, S. 2016. How "clean gold" came to matter: metal detectors, infrastructure, and valuation. *HAU* **6**(2), 173-95.
- Calvão F. 2015. Diamonds, machines, and colours: moving materials in ritual exchange. In *The social life of materials: studies in materials and society* (eds) S. Kuechler & A. Drazin, 193-208. London: Bloomsbury.
- 2019. Crypto-miners: digital labor and the power of blockchain technology. *Economic Anthropology* **6**, 123-34.
- Carmody, P. 2016. *The new scramble for Africa*. Cambridge: Polity Press.
- Cleary, D. 1990. *Anatomy of the Amazon gold rush*. Iowa City: University of Iowa Press.
- Cochrane, G. 2017. *Anthropology in the mining industry: community relations after Bougainville's civil war*. New York: Palgrave Macmillan.
- Cossu, R. & I.D. Williams 2015. Urban mining: concepts, terminologies, challenges. *Waste Management* **45**, 1-3.
- Coumans, C. 2011. Occupying spaces created by conflict: anthropologists, development NGOs, responsible investment, and mining. *Current Anthropology* **52**, S29-S43.
- 2017. Do no harm? Mining industry responses to the responsibility to respect human rights. *Canadian Journal of Development Studies* **38**, 272-90.

- Coyle, L. 2015. Tender is the mine: law, shadow rule, and the public gaze in Ghana. In *Corporate social responsibility? Human rights in the new global economy*, (eds) C. Walker-Said & J.D. Kelly, 297-317. Chicago: University Press.
- Cremers, L., J. Kolen & M. De Theije (eds) 2013. *Small-scale gold mining in the Amazon: the cases of Bolivia, Brazil, Colombia, Peru and Suriname*. Amsterdam: Centre for Latin American Studies and Documentation.
- Cross, J. 2011. Detachment as a corporate ethic: materializing CSR in the diamond supply chain. *Focaal* **60**, 34-46.
- Cuvelier, J. (ed.) 2010. *The complexity of resource governance in a context of state fragility: the case of Eastern DRC*. Brussels: International Alert.
- D'Angelo, L. 2015. 'Diamond mining is a chain': luck, blessing, and gambling in Sierra Leone's artisanal mines. *Critical African Studies* **7**(3), 243-61.
- & R. Pijpers 2018. Mining temporalities: an overview. *The Extractive Industries and Society* **5**, 215-22.
- De Boeck, F. 1998. Domesticating diamonds and dollars: identity, expenditure and sharing in southwestern Zaire (1984-1997). *Development Studies* **29**, 777-810.
- Dolan, C. & D. Rajak 2016. *The anthropology of corporate social responsibility*. New York: Berghahn.
- Epstein, A.L. 1981. *Urbanisation and kinship: the domestic domain on the Copperbelt of Zambia, 1950-1956*. London: Academic Press.
- Eriksen, K. 1976. *Everything in its path: destruction of community in the Buffalo Creek flood*. New York: Simon and Schuster.
- Ferguson, J. 1994. *The anti-politics machine: development, depoliticization, and bureaucratic power in Lesotho*. Minneapolis: University of Minnesota Press.
- 1999. *Expectations of modernity: myths and meanings of urban life on the Zambian Copperbelt*. Berkeley: University of California Press.
- Ferry, E. 2005. *Not ours alone: patrimony, value, and collectivity in contemporary Mexico*. New York: Columbia University Press.
- 2013. *Minerals, collecting, and value across the U.S.-Mexico border*. Bloomington: Indiana University Press.

- 2016. On not being a sign: gold's semiotics claims. *Signs in Society* **4**(1), 57-79.
- & M. Limbert (eds) 2008. *Timely assets: the politics of resources and their temporalities*. Santa Fe: School for Advanced Research Press.
- Filer, C. 1999. The dialectics of negation and negotiation in the anthropology of mineral resource development in Papua New Guinea. In *The anthropology of power: empowerment and disempowerment in changing structures* (ed.) A. Cheater, 88-102. London: Routledge.
- & J. Gabriel 2018. How could Nautilus Minerals get a social licence to operate the world's first deep sea mine? *Marine Policy* **95**, 394-400.
- & P-Y. LeMeur 2018. *Large-scale mines and local-level politics: between New Caledonia and Papua New Guinea*. Canberra: ANU Press.
- Finn, J.L. 1998. *Tracing the veins: of copper, culture, and community from Butte to Chuquicamata*. Berkeley: University of California Press.
- Gardner, K. 2016. Disconnect development: imagining partnership and experiencing detachment in Chevron's borderlands. In *The anthropology of corporate social responsibility* (eds) C. Dolan & D. Rajak, 128-51. New York: Berghahn.
- Geenen, S. 2016. Hybrid governance in mining concessions in Ghana. Antwerp: Institute of Development Policy and Management.
- Gilberthorpe, E. & D. Rajak 2016. The anthropology of extraction: critical perspectives of the resource curse. *The Journal of Development Studies* **53**(2), 186-204.
- Godoy, R. 1985. Mining: anthropological perspectives. *Annual Review of Anthropology* **14**, 199-217.
- Goffman, E. 1961. *Asylum: essays on the social situation of mental patients and other inmates*. Garden City: Anchor Books.
- Goldman, L. 2000. *Social impact analysis: an applied anthropology manual*. Oxford: Berg.
- Golub, A. 2014. *Leviathans at the gold mine: creating indigenous and corporate actors in Papua New Guinea*. Durham, N.C.: Duke University Press.
- & M. Rhee 2013. Traction: the role of executives in localising global mining and petroleum industries in Papua New Guinea. *Paideuma* **59**, 215-35.
- Graeter, S. 2017. To revive an abundant life: Catholic science and neoextractivist politics in Peru's Mantra Valley. *Cultural Anthropology* **32**(1), 117-48.

- Grätz, T. 2004. Gold trading networks and the creation of trust: a case study from northern Benin. *Africa* **74**(2), 146-72.
- Halvaksz, J. 2008. Whose closure? Appearances, temporality, and mineral extraction in Papua New Guinea. *Journal of the Royal Anthropological Institute* **14**(1), 21-37.
- Hecht, G. 2012. *Being nuclear: Africans and the global uranium trade*. Cambridge, Mass.: MIT Press.
- Henton, D. & A. Flower 2007. *Mount Kare gold rush: Papua New Guinea 1988-1994*. Cotton Tree, Queensland: Mt. Kare Gold Rush.
- High, M. 2017. *Fear and fortune: spirit worlds and emerging economies in the Mongolian gold rush*. Ithaca: Cornell University Press.
- Hilson, G. 2002. Small scale mining and its socio-economic impact in developing countries. *Natural Resources Forum* **26**(1), 3-13.
- Jacka, J. 2018. The anthropology of mining: the social and environmental impacts of resource extraction in the mineral age. *Annual Review of Anthropology* **47**, 61-77.
- Jalbert, K, A. Willow, D. Casagrande & S. Paladino (eds) 2017. *ExtrACTION: impacts, engagements, and alternative futures*. London: Routledge.
- Jorgensen, D. 1997. Who and what is a landowner? Mythology and marking the ground in a Papua New Guinea mining project. *Anthropological Forum* **7**, 599-627.
- Keenen, J., D. Kemp & J. Owen 2019. Corporate responsibility and the social risk of new mining technologies. *Corporate Social Responsibility and Environmental Management* **26**, 752-60.
- Kesküla, E. 2016. Temporalities, time and the everyday: new technology as a market of change in an Estonian mine. *History and Anthropology* **5**, 521-35.
- Kinchy, A., R. Phadke & J.M. Smith 2018. Engaging the underground: an STS field in formation. *Engaging Science, Technology, and Society* **4**, 22-42.
- Kirsch, S. 2014. *Mining capitalism: the relationship between corporations and their critics*. Berkeley: University of California Press.
- 2018. *Engaged anthropology: politics beyond the text*. Berkeley: University of California Press.
- Lahiri-Dutt, K. & M. Macintyre 2006. Introduction: where life is in the pits (and elsewhere) and gendered. In *Women miners in developing countries: pit women and others* (eds) K. Lahiri-Dutt & M. Macintyre, 1-24. Aldershot: Ashgate.

- Laslett, K. 2014. *State crimes on the margins of empire: Rio Tinto, the war on Bougainville and resistance to mining*. London: Pluto Press.
- Le Billon, P. 2014. *Wars of plunder: conflicts, profits and the politics of resource*. New York: Oxford University Press.
- Le Meur, P-Y, P. Cochonat, C. David, V. Geronimi & S. Samadi 2016. *Deep-sea mineral resources in French Polynesia*. Marseille: IRD Éditions.
- Li, F. 2015. *Unearthing conflict: corporate mining, activism, and expertise in Peru*. Durham, N.C.: Duke University Press.
- Lahiri-Dutt, K. (ed.) 2013. *Gendering the field: towards sustainable livelihoods for mining communities*. Canberra: ANU Press.
- Luning, S. 2018. Mining temporalities: future perspectives. *The Extractive Industries and Society* **5**, 281-6.
- Mahy, P. 2011. Sex work and livelihoods: beyond the 'negative impacts on women' in Indonesian mining. In *Gendering the field: towards sustainable livelihoods for mining communities* (ed.) K. Lahiri-Dutt, 49-67. Canberra: ANU E Press.
- Marsden, M. 2016. *Trading worlds: Afghan merchants across modern frontiers*. New York: Oxford University Press.
- McNeil, B. 2011. *Combating mountaintop removal: new directions in the fight against big coal*. Urbana: University of Illinois Press.
- Messeri, L. 2016. *Placing outer space: an earthly ethnography of other worlds*. Durham, N.C.: Duke University Press.
- Macintyre, M & K. Lahiri-Dutt (eds) 2016. *Women miners in developing countries: pit women and others*. London: Routledge.
- Moody, T.D. 1994. *Going for gold: men, mines, and migration*. Berkeley: University of California Press.
- Munn, N. 1992. The cultural anthropology of time: a critical essay. *Annual Review of Anthropology* **21**, 93-132.
- Nash, J. 1979. *We eat the mines and the mines eat us: dependency and exploitation in Bolivian tin mines*. New York: Columbia University Press.
- Oakely, P. 2015. Introducing fair-trade and fairmined gold: an attempt to reconfigure the social identity of a substance. In *The social life of materials: studies in materials and society* (eds) S. Kuechler & A. Drazin,

155-74. London: Bloomsbury.

Oskarsson, P. 2018. *Landlock: paralysing dispute over minerals on Adivasi land in India*. Canberra: ANU Press.

Owen, J.R. & D. Kemp 2015. Mining-induced displacement and resettlement: a critical appraisal. *Journal of Cleaner Production* **87**, 478-88.

Pelton, J.N. 2017. *The new gold rush: the riches of space beckon!* New York: Springer.

Pijpers, R., & T.H. Eriksen (eds) 2018. *Mining encounters: extractive industries in an overheated world*. London: Pluto Press.

Prno, J. & D. Slocombe 2012. Exploring the origins of 'social license to operate' in the mining sector: perspectives from governance and sustainability theories. *Resources Policy* **37**, 346-57.

Pulu, T.B. 2013. Deep sea tension: the Kingdom of Tonga and deep sea minerals. *Te Kaharoa* **6**, 50-76.

Rajak, D. 2011. *In good company: an anatomy of corporate social responsibility*. Palo Alto: Stanford University Press.

Reno, J. 2015. Waste and waste management. *Annual Review of Anthropology* **44**, 557-72.

Richards, A. 1939. *Land, labour and diet in Northern Rhodesia: an economic study of the Bemba tribe*. London: Oxford University Press.

Richards, P. 1996. *Fighting for the rain forest: war, youth and resources in Sierra Leone*. London: International African Institute.

Richards, T. & G. Wesskalnys 2014. Introduction: resource materialities. *Anthropological Quarterly* **87**(1), 5-30.

Rolston, J.S. 2014. *Mining coal and undermining gender: rhythms of work and family in the American West*. Rutgers: University Press.

Ross B, & S. Amter 2010. *The polluters: the making of our chemically altered environment*. New York: Oxford University Press.

Rubbers, B. 2010. Claiming workers' rights in the Democratic Republic of Congo: the case of the collective des ex-agents de le Gécamines. *Review of African Political Economy* **37**, 329-44.

Salman, T. & M. de Theije 2017. Conflict in marginal locations: small-scale gold-mining in the Amazon. In *In between the plough and the pick: informal, artisanal, and small-scale mining in the contemporary*

- world* (ed.) K. Lahiri-Dutt, 261-74. Canberra: ANU Press.
- Shever, E. 2012. *Resources for reform: oil and neoliberalism in Argentina*. Palo Alto: Stanford University Press.
- Shield, R.R. 2002. *Diamond stories: enduring change on 47th Street*. Ithaca: Cornell University Press.
- Smith, J. 2015. 'May it never end': price wars, networks, and temporality in the '3 Ts' mining trade of the Eastern DR Congo. *HAU* **5**(1), 1-34.
- Smith, J.M. 2019. Boom to bust, ashes to (coal) dust: the contested ethics of energy exchanges in a declining US coal market. *Journal of the Royal Anthropological Institute* **25**, 91-107.
- Taussig, M. 1980. *The devil and commodity fetishism in South America*. Chapel Hill: University of North Carolina Press.
- Teaiwa, K. 2014. *Consuming ocean island: stories of people and phosphate from Banaba*. Bloomington: Indiana University Press.
- Trnka, S. & C. Trundle 2017. *Competing responsibilities: the ethics and politics of contemporary life*. Durham, N.C.: Duke University Press.
- Tsing, A. 2000. Inside the economy of appearances. *Public Culture* **12**(1), 115-44.
- Voyles, T.B. 2015. *Wastelanding: legacies of uranium mining in Navajo Country*. Minneapolis: University of Minnesota Press.
- Walker-Said, C. & J.D. Kelly (eds) 2015. *Corporate social responsibility? Human rights in the new global economy*. Chicago: University Press.
- Walsh, A. 2003. 'Hot money' and daring consumption in a northern Malagasy sapphire-mining town. *American Ethnologist* **30**, 290-305.
- 2010. The commodification of the fetishes: telling the difference between natural and synthetic sapphires. *American Ethnologist* **37**(1), 98-114.
- Welker, M. 2014. *Enacting the corporation: an American mining firm in post-authoritarian Indonesia*. Berkeley: University of California Press.
- D.J. Partridge & R. Hardin 2011. Corporate lives: new perspectives on the social life of the corporate form. *Current Anthropology* **52**(S3), S3-S16.
- Werbner, R. 1984. The Manchester school in south-central Africa. *Annual Review of*

Anthropology **13**, 157-85

Werthmann, K. 2008. 'Frivolous squabbling': consumption and redistribution in mining camps. In *Dilemmas of development* (eds) J. Abbink & A. Van Dokkum, 60-78. Leiden: African Studies Center.

Wiegink, N. The creation of a 'lessons learned' place: notes on doing research in the coal mine area of Tete, Mozambique (available online: <http://resourceworlds.org/2017/01/20/the-creation-of-a-lessons-learned-place-notes-on-doing-research-in-the-coal-mine-area-of-tete-mozambique/>).

Winchell, M. 2017. Economies of obligation: patronage as relational wealth in Bolivian gold mining. *HAU* **7**, 159-83.

Note on contributor

Alex Golub is an associate professor of anthropology at the University of Hawai'i at Mānoa. He studies the Porgera gold mine in Papua New Guinea. His book, *Leviathans at the gold mine: creating indigenous and corporate actors in Papua New Guinea* (2014, Duke University Press), won the 2015 Book Prize from the Association for Political and Legal Anthropology.

Prof. Alex Golub, Department of Social Anthropology, College of Social Sciences, University of Hawai'i at Mānoa, 2424 Maile Way, Saunders Hall 346 Honolulu, HI 96822, United States. golub@hawaii.edu