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Citation for published version:
Le Billon, P & Spiegel, S 2021, 'Cleaning mineral supply chains? Political economies of exploitation and hidden costs of technical fixes', *Review of International Political Economy*.
https://doi.org/10.1080/09692290.2021.1899959

Digital Object Identifier (DOI):
10.1080/09692290.2021.1899959

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Peer reviewed version

Published In:
Review of International Political Economy

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Download date: 24. Sep. 2022

Cleaning Mineral Supply Chains? Political Economies of Exploitation and Hidden Costs of Technical Fixes

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Funding details:
This work was supported by the Social Sciences and Humanities Research Council under Grant Number 895-2018-1002.

Disclosure statement:
No financial interest or benefit has arisen from the direct application of this research.

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Word count: 12,000.

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Abstract

This article examines hidden costs of three prominent mineral supply chain 'solutions' that respectively aim to create 'conflict-free' minerals, curtail corruption, and reduce mercury pollution. Our analysis underscores the heterogeneous ways in which global capitalism shapes regulatory injustices spanning multiple scales, illustrating how 'clean' mineral supply chain schemes can hide inequitable territorial and economic regimes of accumulation and labour exploitation resulting in social harms for artisanal and small-scale mining communities, negative environmental impacts, and the reproduction of extractive political economies dominated by large corporations. We argue for increased critical attention to how mineral supply chain schemes narrowly circumscribe spaces for pursuing counter-hegemonic 'transformation'.

Keywords: Supply chains; global production networks; extractive industries; transparency; traceability; formalization; conflict minerals; Kimberley Process Certification Scheme; Extractive Industries Transparency Initiative; Minamata Convention on Mercury.

1. Introduction

Framed by mineral sector liberalization and growing calls for greater corporate responsibility, the past two decades have seen a rise in transnational initiatives seeking to 'clean' mineral supply chains from human rights abuses, corruption and pollution (Auld et al., 2018; Bebbington et al., 2018). The 'hybrid governance' structures widely adopted to promote supply chain 'solutions' combine voluntary and mandatory instruments tied with various types of reward for compliant parties (Fredericksen, 2019; Haufler, 2013), often as a result of a complex interplay between civil society organizations, corporations and governments (Eberlein, 2019).[1] Promising more effective and collaborative governance, these initiatives have generally been supported by industry associations and intergovernmental organizations, often after coming under pressure from human rights and environmental advocates (Acosta, 2013; Bebbington et al., 2018; Feitchtner et al., 2019; Rustad et al., 2017). Yet, as Szablowski and Campbell (2019) conclude from studies of extractive governance initiatives taken over the past 20 years, "[p]ressures from transnational activist networks, Indigenous peoples' movements, local communities, and concerned publics … often translate into governance reforms that deliver little in terms of substantive change" (pp. 635-636).

Other critiques have pointed at the unintended consequences of such reforms (Autesserre, 2012; Diemel & Hilhorst, 2019), and more generally, many questions have arisen regarding institutionalized efforts of global value chain governance, their influence on types and redistribution of power within value chains, or their effects on environmental sustainability (Diprose et al., 2020; Ponte, 2019). Among these questions, our study explores the costs of global governance 'solutions' to 'clean' mineral supply chains, interrogating *how* these costs and their relatively hidden character reflect international political economies of exploitation.[2] Engaging with LeBaron and Lister (this volume)'s definition of hidden costs as 'unintended consequences, perverse effects, and unacknowledged impacts on societal protection and well-being', we focus here not so much on the 'invisibility' of these costs – the fact they may not be easily visible (at least to some actors) – but rather on their 'invisibilization' and what we seek to understand as the political economies of exploitation that are perpetuated by their 'hiddenness'.[3]

To do so, we examine three prominent technical fixes in global supply chains: conflict minerals certification schemes (CMCS) against the funding of civil wars that victimized millions of people, the Extractive Industries Transparency Initiative (EITI) against corruption in natural resource sectors worth billions of dollars in countries with often high levels of poverty, and the

Minamata Convention on Mercury (MCM) targeting mercury pollution from artisanal and small-scale gold mining poisoning many communities and ecosystems. These three cases, selected within a universe of 48 mineral supply-side 'solutions' (see list and brief descriptions in Supplementary Information; for the broader universe of cases across other industries, see e.g. Auld et al. 2008; Gardner et al., 2019). Our three cases were chosen for: a) their relevance for this special issue as transnational supply chain solutions involving hybrid governance; b) their commonality but also combined diversity in hidden costs identified (see below), and c) long-established research engagement with these schemes by the two authors which allowed a deeper understanding of their evolution and multiple dimensions than would be possible through a simple review of the literature or fieldwork of limited duration. Our analysis thus draws on ongoing research conducted since 1998 of what became the Extractive Industries Transparency Initiative (EITI) and Kimberley Process Certification Scheme (KPCS), and since 2004 for Artisanal and Small-scale Gold Mining (ASGM) mercury pollution and the Minamata Convention on Mercury (MCM). This notably included long-term studies using ethnographic techniques, participation in policy forums, expert interviews, and field visits in 16 countries.[4]

These three schemes have in common their focus on minerals and extractive sectors, and their transnational character and hybrid governance approach, as well as their profound impacts on artisanal and small-scale miners and effects on economic exploitation. They also reached international prominence (e.g. United Nations and G20 statements) and had framing effects on other supply solutions and corporate due-diligence processes. Yet, these three schemes also differ in their initial core purposes (i.e., primarily addressing armed conflicts, corruption, or pollution) and their main modes of intervention (i.e., certification, disclosure, or formalization and restriction), allowing us to cover differences in purposes and approaches among mineral supply chain 'solutions'. With each of these schemes – all shaped by diverse forms of corporate influence and political capture – we argue for critical attention to be paid to the political economies that facilitate exploitation and related hidden costs, pointing to the role of narratives, actors, tools, and practices associated with supply chain reforms.

In line with this special issue, we interrogate how "the rise and proliferation of supply chain solutions is playing an important, yet under-discussed, role in stabilizing, legitimating, and reproducing contemporary capitalism" (LeBaron and Lister, this special issue). Costs can be unapparent, for example due to lack of sufficient research into a product's toxicity or indirect economic effects. Some costs may not be obvious to audiences such as policy makers, but highly

apparent to those bearing these, such as local producers losing market share as a result of more stringent environmental norms. However, extending beyond critiques of simply understanding externalities as 'market failures' (Herrmann-Pillath, 2017), our analysis of mineral supply schemes points to the at least partial intentionality in the *invisibilization* of these costs. Rather than seeing these costs as being hard to identify due to their *intrinsic* characteristics, we argue that hidden costs in these schemes are often concealed as their disclosure would expose the narrow and often biased rationality of these solutions, undermine their legitimacy, and consolidate claims for compensation or alternative solutions by cost-bearers. These negative consequences or side effects of supply chain solutions are not formally accounted for and generally imposed on third parties without their consent. We suggest that they are actively hidden by discursive constructs (e.g. by bounding a problem and associated solution); hidden by promoters of the solutions (e.g. campaigners) and implementers (e.g. consulting companies); hidden from the victims of these costs (e.g. local communities), the duty-bearers for these victims (e.g. health and regulatory authorities), and some of the supporters of these solutions (e.g. donors). The hidden character of these costs can not only prevent or delay their mitigation, adaptation or compensation, but also shift blame for these costs as some of their more visible symptoms become more easily mis-represented. In this sense, hidden costs can become part of schemes 'rendering society technical' (Li, 2011) through circumscribed norms and procedures that generally benefit economic elites in several ways, including by containing forces that press for more substantive reforms.

Using a political economy analysis, we focus on how solutions to 'clean' mineral supply chains can contribute to various forms of structural violence[5], exacerbating exploitation while subordinating certain interests below others. Harm inflicted through each of the three cases calls for a critical engagement with the politics of both governing and producing knowledge more broadly about systems for controlling spaces of decision-making and distributing rights and 'regimes of access' (Ribot & Peluso, 2003) that maintain business as usual. In each of our three cases, civil society organizations mobilized a disruptive narrative to demand change within an extractive sector and *initially* succeeded (to some extent) in destabilizing (some aspects of) its political economy status quo, thereby threatening (at least some of) its beneficiaries. While supply chain solutions acknowledge the initial power of civil society narratives in demanding specific changes (e.g. an end to human rights abuses, corruption or mercury pollution), we argue that the so-called solutions – in all three cases – reflect the preferences of traditionally dominant

actors – *corporations and the states that pursue their interests*. Demands for change, as we illustrate in our three cases below, frequently turn into institution-building exercises socializing, disciplining, or even capturing progressive actors around limited and seemingly reachable goals in part defined and largely operationalized through technical fixes.

Our theoretical framework builds on the concept of technical fixes as discursive practices representing "a domain to be governed as an intelligible field with specifiable limits and particular characteristics" that can then be acted upon in a technical way through concrete practices (Rose, 1999, p. 33). A key aspect here is the selective "defining [of] boundaries, rendering that within them visible, assembling information about that which is included and devising techniques to mobilize the forces and entities thus revealed" (ibid). Technical fixes are thus selective processes seeking to make calculations and actions possible. In doing so, however, technical fixes tend to obfuscate or sideline some realities, selectively representing a complex context for the sake of devising and justifying a policy intervention. As bluntly put by Van den Hoven et al. (2012), technical fixes do not address "the real problem but the problem in as far as it is amenable to technical solutions" (p. 152). More than expressing a reductionist form of interventionism, however, technical fixes also promote particular interests over others. Here, we follow on Markusson et al. (2017)'s theorization of technical fixes as "imagined defensive spatio-temporal fixes of specific political economic regimes" (p. 1) – with a political economy focus examining the consequences of technical fixes on the exacerbation of economic exploitation.

Our theoretical framework thus understands the hidden costs of technical fixes as imbued with power relations (re)shaping the political economies of mineral supply chains. Conceptually, we therefore argue that while 'solutions' may respond to genuine concerns, their design, scope and implementation as technical fixes bear costs that are frequently intentionally hidden. We further argue that the exacerbation of economic exploitation, inequalities, physical and psychological toll, and racialization of social hierarchies – often inextricably interrelated with consequences for workers as well as broader social and environmental impacts – are *intentionally* hidden not only for the sake of legitimacy of the schemes, but also to maintain hegemonic power in the mineral supply chains themselves.

Empirically, each of the three mineral supply chain schemes promotes a different set of technical fixes (see Table 1), and each brings a different set of hidden costs (see Table 2) emerging from their entanglement in political economies of exploitation within the extractive

sector. Juxtaposing these three diverse initiatives provides a deeper understanding of the diversity of ways in which the evolving frontiers of extractive industry governance advanced through new instruments and institutional logics (Van Alstine & Barkemeyer, 2014) remain driven by the pursuit of extractivism (Acosta, 2013) and deploy intricate 'tactics of dispossession' (Frederiksen & Himley, 2019). Building on the literature and sustained long-term academic engagement with the selected cases, our analysis pays attention to the ways in which different moments of critical disappointment among initial scheme proponents – and in particular civil society organizations that first called for action - have emerged in relation to highly public failures of the governance instruments in question, as well as less public (and far more hidden) consequences. In each case, we argue that legitimizing the main industrial players who may otherwise be challenged by more radical measures led to 'solutions' adopted to largely exonerate powerful elite actors, while often further marginalizing the poorer populations in production areas through diverse repertoires of exploitation and subordination.

The next section sets the stage, reviewing theoretical rationales for promoting supply chain solutions in mineral industries and why there is a need to critically nuance understandings of structural violence and hegemonic power at play. The third section briefly presents the rationale and some of the hidden costs of each of these technical fixes; the fourth section deepens the analysis in these sets of fixes in terms of the political economy of exploitation in which these are embedded. The paper concludes with a discussion of broader implications for directions in theorising and conceptualising mineral supply chain governance and alternatives to the status quo, particularly in an age of growing counter-extractivist movements (Conde & Le Billon, 2017) that beckon radically reshaped thinking on political economies of exploitation and resulting social transformations within mineral sectors.

2. 'Cleaning' mineral supply chains - or bolstering global political economies of extraction?

Numerous studies in the supply chain governance literature positively assess the effectiveness of mineral supply solutions, including from a sustainability perspective (Sauer & Seuring, 2017; Troester & Hiete, 2018). As critics point out, implementation of governance reform often seems to have become a goal to serve the commercial interests of large companies and the 'good conscience' of consumers, rather than improving the situation of populations in mineral-rich regions (Diemel & Hilhorst, 2019; Gillies, 2010; Hilson et al., 2016). While mineral sectors – including metals and fossil fuels – generated around 3.5 trillion dollars in annual gross revenue

for the global economy in the past decade (about 5% of global GDP),[6] and represented 14% of world merchandise exports in 2017 (WTO, 2019), numerous studies examining the 'developmental' impact of this wealth support the concept of 'resource curse' – though with many effects being income-level and institutional quality dependent (Badeeb et al., 2017). Much of the academic literature on poverty reduction and the developmental effects of mining have drawn bleak pictures, with a frequent rise in income inequalities, social conflicts, and long-term negative effects on mining regions (Gamu et al., 2015). The socio-environmental impacts of the fossil fuel sectors have also received much attention, including for their role in global climate change or their more localized impacts, as seen in the Niger Delta (Watts, 2005). Overall, mineral sectors have been among the most criticized economic activities within global trade, in part due to the many negative impacts of mineral production processes on the environment and host societies, including local communities and Indigenous peoples (Conde & Le Billon, 2017).

Trade flows rely on market demand and, at least in theory, the willingness of consumers to accept products from certain firms and production areas (Klein et al., 2004). The links between consumers and resource extraction areas, as well as the whereabouts of revenues generated by these commodities, have offered a valuable opportunity for campaigners to demand an end to poor practices and call for reforms in global value chains (GVCs) (Palpacuer, 2019). In response, national governments have worked with companies, international agencies and civil society organizations to re-regulate some mineral sectors, using supply chain approaches to bring up production standards or increase (at least the perception of) transparency and accountability. 'Ethical' supply chain instruments have been deployed by a range of actors across many mineral sectors, from boutique schemes to trade in 'fair gold' from specific mining cooperatives (e.g. Fairmined) to global initiatives to rid the industry of corruption or 'conflict minerals' financing armed groups (Auld et al., 2018).

Experimentation through supply chain solutions from the late 1990s onwards also reflected a deadlock with the mainstream international security and human rights protection system over the most effective ways to respond to impacts of globalization, including controversies over transnational companies' conduct, as reflected in initiatives such as the United Nations 'Global Compact' and the Guiding Principles on Business and Human Rights (Fitzgerald, 2019). If industry self-regulation through voluntary codes raised concerns about a softening of regulatory regimes (Haufler, 2013), the shift from vertically integrated firms to disaggregated supply chain global production networks also created new challenges for tracking

and regulating commodity production and flows (Kim & Davis, 2016). Regulatory attempts to monitor and control supply chains have rested on a range of corporate and governmental (self)regulation, tracking technologies, auditors, as well as whistleblowing and advocacy (Schütte et al., 2015; Short et al., 2016). Companies, producing countries, or even entire commodity sectors have sought to protect themselves from reputational damage and commercial losses through 'due diligence' processes and 'industry standards', while also seeking to avoid costly monitoring and compliance processes, or more expensive commodity sourcing (Vlaskamp, 2018).

The proposed solutions have therefore often consisted of compromises, whereby relatively low standards and partial monitoring could reflect positively on the Corporate Social Responsibilities (CSR) of companies exposed to reputational risks and protect exporting countries from more drastic measures such as full bans (Arikan et al., 2017). Many large companies under growing pressure from campaigners, retailers, or consumers (e.g. DeBeers for diamonds or BP for oil) actively shaped the supply chain solutions adopted. In doing so, these 'key' corporate players could insulate themselves from criticism about the wider sector, and differentiate themselves from other players, including competitors (Van Bockstael, 2018). Such differentiation, in turn, offered some benefits, including price premiums, support from credit agencies and development banks, or praise from campaigners (Le Billon, 2006), and more generally allowed lead firms to 'link economic and social upgrading in more integrated forms of CSR' (Gereffi & Lee, 2016, p. 25). The resulting 'synergistic governance' often observed as a result of the "confluence of "private governance" (corporate codes of conduct and monitoring), "social governance" (civil society pressure on business from labor organizations and non-governmental organizations), and "public governance" (government policies to support gains by labor groups and environmental activists)" (Gereffi & Lee, 2016, p. 25), has, in turn, designed and mobilized technical fixes to reshape sectors and – as we suggest below – contributed to exploitative political economies.

Many technical fix instruments have followed multi-stakeholder governance models linking governments, corporations and civil society in efforts to address areas of concern while protecting fiscal and core commercial interests from more radical policies (Aaronson, 2011; Cutler et al., 1999). If mineral supply chain solutions reflected the resulting *compromises* of growing civil society and corporate interventions into mineral governance, these solutions have also led to a *narrowing* of narratives around the causes of armed conflicts, pollution, and failed

development outcomes (Autesserre, 2012; Hilson et al., 2016). Technical fixes around supply chains have achieved certain outcomes (e.g. raising awareness about some linkages or curtailing some of the worst plunder), and – for example in the case of some technical provisions within the MCM – demonstrated the value of "inclusive stakeholder engagement and boundary coordination between different governance schemes …for transnational partnerships to promote cooperation in intergovernmental fora" (Sun, 2017, p. 21).

Yet, as discussed below, such engagement was not inclusive of vulnerable populations affected by these initiatives and the resulting solutions were not without hidden costs, including the overall obfuscation of the underlying exploitative political economies at play. While launching new regimes of auditing and analysis cultures that replicate certain hegemonic ideas and norms as fixtures for multi-actor network building, they have also contributed to new dilemmas about how certain economic inequities and relationships might be understood in mineral sector areas. As discussed below, we suggest that hiding the costs of these technical fixes – for example to donors and consumers – contributes to the legitimacy of these schemes, and that when these costs are exposed or disclosed, technical fixes need to either adapt (e.g. EITI broadening its scope of disclosure to encompass company beneficiary owners or environmental impacts) or exclude (e.g. KPCS government members in effect refusing to extend the applicability adapt the scheme to human rights abuses by states, thus leading key NGOs to leave the scheme and so self-exclude). Technical fixes are therefore not just depoliticising, but they are also re-orchestrating institutional logics of partnership within the governance of supply chains, notably for the purpose of maintaining costs hidden or coping with their exposure.

More broadly, counter-hegemonic lenses are needed to appreciate how such fixes are also *integrated* in repertoires of power that crowd out, reject, or hide certain knowledge, rights, and costs from discussion, lead to certain forms of development agenda-setting that risk compounding racialized, gendered and class-based inequalities, and create economic blueprints for 'solutions' that often position existing powerful actors in markets as 'champions'. They thus create limitations and dilemmas for how we might understand, narrate and study global and regional histories of political economies in which diverse peoples, institutions, and forms of mineral extraction are implicated.

3. Case studies - mineral supply chain 'fixes' and hidden costs in economies of exploitation

As discussed below, some of the outcomes of the three schemes reviewed here reflect difficult trade-offs and implementation challenges. Yet, many of their promised 'solutions' have fallen short of their goals, whether they are to curtail links between minerals and human rights abuses, to root out corruption, or to reduce pollution. They also have major hidden costs, ranging from racialized discrimination to bolstering violent military crackdowns to deepening monopolistic control of resources (at various scales), undermining livelihoods, and exacerbating exploitation that amplifies environmental and health inequities as well as economic deprivation (see Table 2). While the value of supply chain solutions should not be discounted and the efforts of their promoters dismissed, we stress that the design and implementation of supply chain solutions are inflected by political economies of exploitation, operating at material and discursive levels connecting local, sub-national, regional and global processes.

[Insert Tables 1 and 2 here]

The hidden costs of 'conflict minerals' certification schemes

Public awareness about 'conflict minerals' gained prominence in the late 1990s as media reports, UN Security Council resolutions, and NGO campaigns highlighted the role of diamonds and other minerals in funding rebel groups (Nest, 2011; Smillie, 2014). The main response was a series of supply chain 'conflict minerals' certification schemes (CMCS) seeking to ensure that only 'clean' (i.e., conflict-free) minerals would reach retail markets (see supplementary material). Under pressure from NGOs such as Global Witness and Partnership Africa Canada (now IMPACT), as well as diamond companies and governments seeking to protect the sector, the Kimberley Process Certification Scheme (KPCS) constituted a public-private governance mechanism facilitating consensus building, socialization, and implementation measures among participating stakeholders (Kantz, 2007). The scheme was widely seen as innovative within global governance and conflict prevention, in part because it combined a "voluntary industry-led certification system with an inter-state import/export control regime" (Haufler, 2009, p. 403), and saw rapidly concluded negotiations between states, companies, and campaigners (but not communities). Initially piloted in Sierra Leone and Belgium, launched in 2002, and rapidly adopted by most diamond producing and trading countries, the KPCS combined exclusive access to certified 'clean' diamonds among participants, legally binding requirements for participation,

and tri-partite peer reviews that could lead to expulsion and ban (Grant, 2012).

By the late 2000s, however, the KPCS's credibility had seriously declined as some of its previously hidden costs became more apparent as a result of their more blatant character and more critical appraisals of the scheme. Among these initially hidden costs were the frequent racialization of diamonds and diamond mining present in some media, advocacy, and corporate narratives, a racist character that became more blatant and obviously intentional when several diamond companies explicitly contrasted 'pure/white' (certified) Canadian diamonds to 'tainted/black' African ones in order to increase their market share or generate a price premium (Le Billon, 2006). A second hidden cost was the biased standard defining 'conflict diamonds', which allowed governments to commit human rights abuses with impunity; something that became increasingly apparent as some civil society organizations initially outside the KPCS – such as Doctors Without Borders – documented abuses against artisanal miners and local communities by state security forces and corporations in Angola following the end of the war with UNITA in 2001 (Smillie, 2014).

These initial criticisms were shared and amplified by NGOs that had pushed for the creation of the KPCS following a military crackdown ordered by the late President Robert Mugabe against artisanal miners in 2008 in Marange district, eastern Zimbabwe – rationalized in the name of complying with the KPCS (Spiegel, 2015). In the midst of the deep economic and political crisis affecting the country, the newly discovered alluvial diamond deposits had become a vital source of income for thousands of artisanal miners – and their families – who had migrated to Marange from across the country (Maguwu, 2013). The brutal crackdown – including reports of mass shootings from helicopter gunships – enabled criminalized networks involving army, business and political elites to violently control diamond production and exports (Saunders & Nyamunda, 2016). Because the use of force came from government security forces rather than rebel groups, the diamonds from Marange did not qualify as 'conflict diamonds' under the KPCS, highlighting the narrow definition and double standards of a supply chain solution that allowed regimes to act with impunity against artisanal miners.

By 2009, Ian Smillie from Partnership Africa Canada and founding member of the KPCS had resigned from his position, declaring that he could "no longer in good faith contribute to a pretense that failure is success, or to the kind of debates we have been reduced to" (IRIN, 2009). Two years later, Global Witness, which had spearheaded the conflict diamonds campaign and pushed for the KPCS, withdrew from an initiative decried for its limited scope and its protection

of elite interests at the expense of the mining poor. Meanwhile, Zimbabwean state officials continued for several years to use the KPCS to justify military action, leading to sexualized violence, forceful exclusion of populations who had long ties to the land, and intensified food insecurity (Saunders & Nyamunda, 2016; Spiegel, 2015).

Beyond 'blood diamonds', most conflict minerals campaigns and solutions focused on the Democratic Republic of the Congo (DRC), where rebellions in the east partly depended on the revenues from minerals, including 'coltan', a metallic ore used in electronics (Nest, 2011). Articulating the need to curtail the use of 'conflict minerals' to end rampaging by rebels while still enabling mining, many supply chain solutions were developed to trace mineral flows from mines to refiners and manufacturers (Laudati & Mertens, 2019). Most CMCS relied on monitoring mining sites and tracking mineral shipments, with due diligence assessments seeking to confirm that minerals were not coming from rebel-controlled areas. Faced with critiques of continued 'leakages' between rebel-controlled sites and 'clean' supply chains, DRC President Joseph Kabila decreed a ban on artisanal and small-scale mining in 2009 throughout the three eastern provinces of North Kivu, South Kivu, and Maniema, and deployed Congolese army forces (FARDC) to enforce it. The costs of these measures – often hidden from public narratives by schemes seeking to promote 'conflict-free' minerals from the DRC – included collapsing local prices for (uncertified) minerals, massive loss of livelihoods, human rights abuses by security forces, higher bribe payments to Congolese authorities, more frequent petty crimes, new types of conflicts, and increased recruitment by militias. Costs were also intentionally hidden to serve Kabila's objectives of placing more loyal FARDC commanders in the mining areas, helping large-scale foreign mining companies drive artisanal miners out of their 'concessions', and diverting attention from some poorly negotiated (and potentially corrupt) deals with industrial mining companies (Diemel & Hilhorst, 2019; Wakenge, 2018).

The counterproductive effects of the ban led to its cancellation in March 2010, but the pursuit of campaigns for 'clean' minerals supply chains led the US Congress to pass an anti-conflict minerals legislation specifically targeting eastern DRC (Dodd-Frank 1502) that same year, which drove many international buyers to alternative supply sources, effectively supporting an embargo on the region. Due-diligence requirements for 'conflict-free' status for minerals from eastern DRC led to a flurry of activities to assess conflict exposure, trace mineral flows, and establish certified trading channels as well as disclosure regulations, yet saw low levels of corporate compliance (Sarfaty, 2015; on the EU Conflict Minerals Regulation, see also Partzsch,

2018). Like many other formalization initiatives, supply chain reforms in eastern DRC proved not only difficult to implement, but often left artisanal and small-scale miners to face the extortive practices of government authorities, depressed local prices, and continued human rights abuses (Vogel et al., 2018). Studies assessing the costs of these supply chain solutions have found an association between these interventions and an increase, at the time, in violence against civilians, and looting, especially in areas with gold mines (Stoop et al., 2018; 2019).

To sum-up, recent 'technical fixes' to 'clean' mineral supply chains of conflicts were initially driven by often-racialized blood diamonds narratives and facilitated by dominant players such as major buyers (e.g. De Beers), or refiners (e.g. for coltan) within mineral sectors. While campaigns initially targeted companies 'laundering' conflict minerals, the 'solutions' themselves often remained influenced or even politically captured by mineral producing states and some of the commercial interests that were most implicated and that, in turn, had an interest in hiding from consumers the costs of these 'solutions'. Promoting such 'technical fixes' not only helped avoid measures such as public boycotts threatening their core business, but also portrayed these companies as 'responsible' actors rather than as guilty parties that could be held accountable for actively promoting the pillage and laundering of millions of dollars of minerals fuelling deadly conflicts. As candidly put by a diamond company representative, the KPCS represented a 'wonderful *insurance*' for his employer against market losses and potential liabilities (cited in Le Billon, 2006, p. 796). More broadly, a major hidden cost of 'conflict minerals' supply chain solutions was the narrowing of explanations about the complex causes of these conflicts and the false impression that, once flows of conflict minerals dried up, the 'war' – and rapes – would stop. This, in effect, promoted narrow and technical supply chain interventions "hinder[ing] the search for a more comprehensive solution" while increasing harassment of local populations by state officials (Autesserre, 2012, p. 202). Concluding their extensive study of supply chain reform impacts, Vogel and Rayemakers (2016) argue that: "[r]ather than peace, in the sense of an absence of structural violence, this reform deepens the terror of displacement and dispossession and endangers livelihoods and economic survival" (p. 1116). While the hegemonic nature of conflict-free mineral schemes is increasingly under fire, their hidden costs continue to demand the need for more nuanced socio-economic understandings.

Extractive industries and the hidden cost of pseudo-transparency

Spurred by a Global Witness (1999) campaign against corruption in war-torn oil-rich Angola, the Extractive Industries Transparency Initiative (EITI) was officially launched in June 2003 under the impulse of British Prime Minister Tony Blair. Designed as a voluntary process of extractive sector revenue disclosure and reconciliation between companies and governments, the EITI evolved into a broad instrument seeking to improve transparency and accountability along the whole natural resource management value chain, including corporate beneficiary ownership (EITI, 2019a). While national-level participation is voluntary, disclosure is mandatory for all extractive companies, including state-owned national companies, once the government is participating in the initiative. Compliant status requires the implementation of strict standards of public disclosure, audit verification, and participation of civil society, with the international EITI board deciding on members' suspension or exclusion. Implementation is mostly promoted through financial and reputational incentives, especially from development banks and international donors (Gillies, 2010). By 2019, the EITI counted 52 implementing countries, including many resource-dependent low- to middle-income countries, and had helped disclose about 2.5 trillion US dollars of government revenues (EITI, 2019a).

The objectives and strategies of the EITI, and the disclosure campaign that led to the creation of the EITI, evolved over time (Van Oranje & Parham, 2009; Rich & Moberg, 2017). The pre-EITI period from 1998 to 2002 was essentially geared at using revenue disclosure to 'name and shame' government officials and extractive companies suspected of corrupt practices, and thereby dissuade such behavior. Exposure of corruption could lead to reputational damage and direct sanctions (e.g. under the US Foreign Corrupt Practices Act); transparency of payments by companies could infringe contractual confidentiality rules; and leaked information about revenues possibly embezzled by government could fuel public frustrations and civil unrest. The EITI became a way to institutionalize disclosure, to tame civil society organizations by enrolling them into a 'constructive' (if slow) process, and to protect and even enhance the reputation of (mostly Western) extractive companies by demonstrating their good will and compliance to new anti-corruption standards. In the first decade after its launch in 2003, the EITI was mostly about enrolling governments to institutionalize revenue disclosure (Haufler, 2009). Inclusivity was a key principle for 'globalizing' the initiative, to the point where some highly controversial governments accused of authoritarianism and corruption – such as that of Equatorial Guinea, under pressure from EXXON – were accepted into the scheme, before being rejected after failing

to comply (Appel, 2019). The EITI progressively took on a 'value chain approach', mobilizing governments, members of parliament, civil society and the media to increase the scope and impacts of disclosures (e.g. by including corporate beneficiary ownership) and to build capacity and oversee the entire value-chain process from *decision to extract* to the *allocation of revenues* (Mejía Acosta, 2013; EITI, 2019b). As such, the EITI evolved from an anti-corruption tool to a resource-governance framework.

The EITI has drawn praise from many international donors and NGOs for bringing much needed transparency into natural revenue flows and setting new standards of disclosure in a notoriously corrupt sector. While the EITI's institutional and operational successes have been generally recognized, its effectiveness has remained in doubt, in part because of its voluntary approach and lack of effective accountability mechanism (Le Billon et al., forthcoming; Lujala & Epremian, 2017; Rustad et al., 2017). The hidden costs of the EITI have also become more apparent, with a failure to curtail corruption in resource-rich countries or to improve developmental outcomes from extractive sectors; key resource-rich countries still not part of the initiative; and double-standards reflecting donor-dependence and the thirst for foreign direct investment rather than the need for or the efficacy of reforms. In light of the high number of corrupt (and often low- to middle-income) countries joining the EITI, David-Barrett and Okamura (2016) suggest that the initiative intentionally serves as "reputational intermediary, whereby reformers can signal good intentions and international actors can reward achievement" (p. 227).

The effects of the EITI on oil theft and corruption have also been questioned, with some pointing out that few, if any, bribes and embezzled funds have been recovered or jail sentences served (Ejiogu et al., 2019). Within the parameters of the technocratic transparency worlds of EITI, the setting up of a system to monitor and report has, for some critics and practitioners, been mostly a ritual of display of 'good governance' in the absence of effective accountability processes (see Le Billon, 2012). Some NGOs have found 'room for maneuver' to foster institutional change and layer what they consider "marginal innovations that become cumulatively significant" (Around et al., 2019, p. 665; Appel, 2019). Nonetheless, Öge (2017)'s statistical analysis showed that "EITI membership is not correlated with better civil and associational rights in authoritarian countries" (p. 816), arguing that NGOs remain the weakest link in the majority of EITI-implementing states – thereby creating 'transparent autocracies' – raising concerns that transparency language functions more as a bureaucratic ritual and a form of

‘spectacle’ that conceals more than reveals (Hansen et al., 2015), notably because of its focus on the financial benefits of extraction rather than on its many costs (Jacka, 2018), though noting that the EITI 2019 Standard finally ‘encourages’ – but does not yet require – the disclosure of limited information on environmental *expenditures* by companies (EITI, 2019b). The opposition of extractive companies to environmental disclosure was perhaps most evident during the 42nd EITI Board meeting, which reported that “the industry constituency did not support” two proposals, ‘Encouraging disclosures of contextual information related to environmental monitoring’ and ‘Encouraging links to existing disclosures on climate risks’, despite a “letter signed by over 100 civil society organizations in Latin America and the Caribbean asking for environmental transparency” (EITI, 2019c, pp. 11-12).

To sum up, the EITI was focused on a sector dominated by large state-owned and private oil and mining companies; the target was resource-rich governments labelled as corrupt and poorly managed. The choice of a voluntary instrument was not initially favored by Global Witness, which – along with Oxfam and other early members of the Publish What You Pay (PWYP) coalition – advocated for mandatory disclosure. But in the face of resistance from home governments and stock exchange regulators, as well as the challenge of bringing about transparency for national extractive companies that were not publicly listed, the EITI appeared as a pragmatic and even promising option. The intentional hiding of some of the costs of the EITI enabled companies, development banks and trading jurisdictions to more easily legitimate their profit-seeking and supply-focused investments by burnishing the ‘reformist’ reputation of authoritarian and corrupt regimes, and legitimizing extractive corporations and mineral sectors through selective forms of transparency while delaying and diverting efforts from potentially more effective anti-corruption schemes (Ejiogu et al., 2019; Gillies, 2010). As these hidden costs became apparent dissensions grew, including within civil society, and especially between organizations supporting the initiative (including government-organized ones; see Appel, 2019) and those denouncing their complicity in the reproduction of political economies of exploitation privileging mostly transnational extractive corporations at the expense of the artisanal sector and local communities affected by industrial extraction. By contributing to structures of power supporting large-scale extraction by (often foreign) corporations and domestic elite interests, the EITI thus obscures the “costs of the accumulation that extractive capitalism demands, in lost biodiversity, lost resources and lives, in environmental pillage and in the opportunity costs to be

found in not doing something else, all while pretend[ing] that the West[ern-led initiative] is "helping"." (Bracking, 2009, p. 20).

Mercury pollution and the hidden costs of mining formalization

Seeking to end the use of mercury in artisanal and small-scale gold mining (ASGM) through shutting down supply sources, the Minamata Convention on mercury (MCM) is a more recent global technical fix, one requiring National Action Plans for ASGM specifically, as well as tackling other sectors. This international agreement, named after the infamous mercury poisoning disaster in Minamata, Japan, and signed in 2013 by governments from 92 countries, aimed to curtail the trade, use and emission of mercury in a wide range of industries. Emerging after decades of scientific warnings about the environmental and human health impacts of mercury pollution and following years of inter-governmental negotiations, at the core of the convention was an attempt to address the multiple facets of the supply chains of mercury and mercury-based products and processes (Fritz et al., 2016). However, how the Convention will impact the world's poorest populations, who are disproportionately exposed to mercury's negative effects, is still uncertain. Largely driven by poverty and limited livelihood options, artisanal miners often operate without formal mining licenses. *Intentions* in the governance of this sector range from well-meaning efforts at curbing toxic threats, to deliberately keeping it informalized to benefit from corruption, to efforts at eliminating the sector entirely.

Most artisanal and small-scale miners depend on mercury use for gold extraction, since amalgamation is the cheapest and simplest extraction method, with safer technology alternatives often difficult to access (Hilson et al., 2018). A growing sector in more than 70 countries, ASGM – gold production using rudimentary technologies – is the world's largest anthropogenic source of mercury releases to air and water, responsible for more than 1,400 tons of mercury released into the environment annually, posing health risks for miners and downstream communities (Murao et al., 2019). Nonetheless, 80–100 million people around the world rely directly or indirectly on ASGM for their livelihoods - and an expanding body of scholarship has been documenting the growth of ASGM in Africa and elsewhere as a 'poverty alleviation' activity, highlighting that low-tech artisanal mining is an essential livelihood for rural communities that have found agriculture employment prospects to be critically limited (Mkodzongi & Spiegel, 2019; Maconachie & Hilson, 2011). In this context, the hidden costs of the Minamata Convention implementation strategies have already been numerous – as many of the most

economically impoverished people working in the ASGM sector have been further marginalized through national 'implementation' planning. In Africa, Asia and South America, while governments have used foreign donor funding to hire consultants to diagnose mercury threats and promote medium-scale 'business' models for entrepreneurial actors to phase out mercury in gold mining (sometimes using dangerous cyanide methods as a replacement), the uneven balancing of social and environmental goals in recent years has entailed a lack of careful contextual attention to marginalized and criminalized artisanal and small-scale miners and communities (Spiegel, 2016; Spiegel et al., 2018).

From Zimbabwe and Ghana to Cambodia and Indonesia and beyond, global emphasis on creating and implementing national mercury phase-out policies is often easy to instrumentalize in economies where government and business elites have longstanding histories of subordinating local populations' land claims and resource access claims. In Cambodia, for example, both foreign mining companies and government officials have used a contentious combination of mercury pollution discourses and 'productive land use' rhetoric to prioritize the territorial claims of companies that, in some cases, operate in tandem with the military in land contested by other populations (Spiegel, 2016). In Ghana, where women account for at least 50 percent of the region's ASGM workforce and carry out the largely 'invisible' manual work at the lower tiers of the sector's labour hierarchies, critical challenges exist for reducing mercury use (Hilson et al., 2020). Concerns have also been raised related to bans on mercury use and trade driving gold mining activities among the most marginalized miners underground, rendering regulation impossible (Clifford, 2010). Moreover, the trade of mercury is not completely restricted because ASGM is identified in the Convention as a 'use allowed' sector, meaning that national governments have the power to choose when to restrict use and how. While it is increasingly stressed that "equity and fairness need to be at the heart of strong and durable international regimes" (Biermann et al., 2012, p. 56), the implementation of the Minamata Convention allows for flexible options that government leaders can selectively apply.

Arguably, this flexibility existed as an intentional loophole from the beginning of negotiations for the Convention, to allow powerful political actors to apply objectives as they saw fit. This flexibility has often been used against economically marginalized people in mining regions, sometimes discussed alongside both military and police interests. In Zimbabwe, mercury curtailment discourse has been used in the continuity of brutal police and military crackdowns on ASGM-dependent populations since the mid-2000s (Spiegel, 2014; Spiegel, 2017), while in

Tanzania it compounded mining reforms widely criticized by small-scale miners' associations for empowering multinational companies at the expense of artisanal miners, with state officials using highly selective notions of 'sovereignty' in the minerals sector (Emel et al., 2011). MCM implementation has seen a severe lack of engagement of local artisanal mining communities in decision-making on mercury abatement, policies favouring large-scale over artisanal and small-scale producers, and repressive approaches to ASGM over economic empowerment initiatives that could reduce poverty-driven incentives to use mercury, and without engaging local knowledge in technology planning (Hilson et al., 2018). Widespread ratification of the Convention on Mercury by national governments has been treated by global agencies as a sign of success, yet new reasons for criminalization have served to aggravate relations of exploitation and elite ownership over mineral resource claims have left miners with often a mere fraction of the value of their gold output (Mkodzongi & Spiegel, 2019).

While neither the successes nor the hidden costs of the Convention have yet been robustly documented given the relative novelty (and diversity) of implementation practices, current evidence suggests that some developments – particularly in Indonesia – have indeed translated into *more mining for mercury* while deepening trafficking and undeclared uses (Spiegel et al., 2018). In these settings, anticipation of the Minamata Convention drove up mercury mining – and the rights of marginalized groups in such circumstances have been nested within regimes of informalized control that involve military, police, businessmen and a range of other social actors. Additionally, rhetoric on the need to create private sector partnerships and 'formalization' often promotes licensing opportunities for more established miners (Hilson et al., 2018). Moreover, a phenomenon being witnessed now in many countries is that support services have even been cut off completely to certain groups of now 'criminalized' mining communities; NGOs interested in funding from donors and support from governments (and sometimes from companies) are 'disciplining' themselves by working only in locations deemed politically acceptable to elites.

In short, the MCM was shaped by a vast and fluid sector involving a wide array of producers and trade intermediaries; the target was mercury-using artisanal and small-scale gold miners. Several powerful mercury-emitting industries (particularly representing American and Chinese business interests) were able to weaken the text of the convention when it came to their own responsibilities (Selin, 2014; Söderholm, 2013). Seeking to end the use of mercury in ASGM through shutting down supply sources, the MCM has been decried for lack of

engagement with the underlying drivers of ASGM as a livelihood, narrowly prioritizing the more economically well-off and elite actors in ways that can deepen economic hardships and labour marginalization, and for its unintended effects on multiplying mercury (illicit) mining and trafficking (Spiegel et al., 2018; Hilson et al., 2018). While government discourses often refer to mercury being a reason for treating artisanal miners as illegal, power relations abound in how certain 'middlemen' may exploit languages of technical progress to their advantage. Globally, an overemphasis on narrow technical fix intervention mindsets rather than navigating varied types of power relations through long-term community-based approaches has had the effect of empowering elites. While it could be noted that the Minamata Convention is a state-centric mechanism, not a private sector (or civil society sector) mechanism, its design and implementation outcomes have nonetheless been conditioned by private sector influences – including those relating to control over territory and resource access opportunities, those relating to the allocation of resources and the development of policy and decision-making priorities, and those conditioning (or influencing) the relation between economic exploitation in ASGM contexts and specific actors such as military and police.

4. Discussion: Reflections on certification, transparency, and formalization 'solutions'

Each of the technical fixes discussed above were presented as 'solutions' that could 'clean' mineral sectors and help bring peace (CMCS), integrity and prosperity (EITI), or a safer environment (MCM). Each of these technical fixes has particular characteristics (Table 1) and some hidden costs (Table 2), which in turn contributed to political economies of exploitation. Overall, the three cases studies point not only to the hidden costs of these initiatives but also to how these costs were hidden, from whom, and with what consequences.

[Insert Table 2 here]

Global regimes for governing minerals are almost by definition hegemonic, having emerged out of arrangements that came from consensus-building among elite actors, even if portrayed at times as emerging from critical NGOs rather than powerful industries. Understanding the flows of power and market-based logics inflected in each of the above global schemes requires understanding the propensity of powerful actors to regain hold over processes of transition and change over time. Perhaps unsurprisingly, after the KPCS was critiqued for failing to expand the

definition of 'conflict' beyond the original narrow definition of violence of rebel groups against legitimate states, violence committed by state agents and multinational companies continues to be exonerated. Consequently, as in the case of the KPCS, even some of the earliest and strongest proponents of the scheme withdrew their support later on.

The above cases each highlight the perils of regulatory abstractions in approaching such questions, in ways that revalidate the caution voiced by Bridge (2000) - that "conventional applications of regulation theory…often reduce the complex interactions between the environment and processes of accumulation to a homogenous surface on which the institutions of social regulation are inscribed" (p. 237), and that regulations are often constructed globally in a "discursive dialectic which simultaneously erases socioecological histories and re-inscribes space in the image of the commodity" (Bridge, 2001, p. 2149). Arguably, today, with the ever-increasing proliferation of 'expert' documentation around transparency, conflict, violence, and environmental issues (through a mixture of monitoring reports, satellite analysis and 'on-the-ground' assessment techniques), the challenges are about both *erasing* histories and *selectively narrating* histories that suit and re-amplify particular agendas and interests (Le Billon and Sommerville, 2017). Speaking of violence can help certain interests to continue to subordinate others. If structural violence speaks to the ways in which systemic exploitation, conflict and labour struggles are deepened over time, a range of material control and semiotic processes make this possible. Global donor funding regimes continue to dictate which stories need to be told (with NGOs often succumbing to the simplified stories of how poorer artisanal miners need to 'upgrade' their negative situation, rather than more systemic calls for reconfiguring economic relations at structural levels). The rise of global supply chain solutions has partially redrawn relationships between governance actors, including corporations, states, and civil society; yet, inequality-producing trends of capitalist production modalities persist. The world economy is becoming more unequal, not more equal, and spaces for alternatives to the conventional extractive solutions relying on technical fixes do not appear to be widening significantly in mainstream policy circles. Moreover, despite the rise in struggles against extractive industries over the past decade (particularly recently, where Indigenous land rights movements and broader ecological movements are coalescing in unprecedented numbers of climate protests and fossil fuel extraction protests), global mineral supply chain 'solutions' run the risk of legitimizing extractive regimes and undermining these very movements.

5. Conclusion

This article has put global mineral supply chain technical fixes in conversation with growing concerns about international political economies of exploitation and hidden costs. As Diemel and Hilhorst (2019) suggest, supply chain solutions may sometimes be more about "giving buyers a clear conscience…than addressing the root problems that first gave impetus to these initiatives" (p. 453). Generally, audits and supply chain solutions are becoming a lucrative approach for the industries and consultancies they service (Dougherty, 2019; LeBaron et al., 2017). Rejecting the false dichotomy between state-focused and private sector-focused schemes, we call for attention to be paid to how technical fixes have been instrumentalized, serving the interests of some above others, creating costs that become part and parcel of the processes of governing value chains, and asserting control over people, territory, resources and economies.

Conceptualizing extractive sector relations and networks as being embedded in fluctuating processes of exploitation and uneven accumulation therefore becomes a vital foregrounding priority when approaching efforts to clean mineral supply chains. Whether implementation agendas are dominated by discourses of stopping environmental harms, ending conflicts, eradicating corruption or otherwise, diverse social actors may be differently positioned and framed in the 'solutions' given, at times serving interests that may be far from their own. Paying attention to *structural* processes gives focus to understanding the reproduction of societal inequalities and relations of population subordination over time, and rethinking histories of global technical instruments allows for a critical engagement with bureaucratic limitations and uneven (at times highly selective) implementation.

The cases we explored indicate how hidden costs are unintentional and intentional – and at times counter-productive to the aims of stated goals or entirely consistent with some of those goals. They call into question processes of exploitation as linked to class-based inequalities and racialized, gendered, and politically mediated inequalities. They also call for the need to pay greater attention to the design and implementation of supply chain solutions and the relative influence that stakeholders have on their trajectory. One cautionary reminder is the need to resist the instrumentalization of these solutions by dominant interests and the invisibilization of their costs on marginalized populations and the environment. Further research should consider other cases within the broader universe of ethical minerals initiatives specifically attempting to address injustices within production process and supply chains (see Supplementary Material), such as gold mining cooperatives and certification schemes (see Sippl, 2020), brand companies' direct

involvement through ‘on-the-ground’ responsible sourcing projects, and the development of technology-based chains of custody systems (e.g. blockchain; see Hastig & Sodhi, 2020).

Finally, it should be stressed that ‘salvaging’ the image of the mining sector is now an ever-more contentious objective of national governments and industry executives globally, particularly in an age in which climate change crises are demonstrating the need for a more radical post-extractivist future. It thus runs contrary to the interests of many elite actors to speak of ‘costs’ unless the solutions are already the ones they wish to emphasize, where the process of narrating the hidden costs is circumscribed by arrangements that do not disrupt business as usual. Not all hegemony is all-encompassing and devoid of moments of opening for more radical change; yet, avenues may be differently constrained at different points in time. Making hidden costs visible is far from a pointless task: it can drive seismic changes in public opinion, if not smaller changes that incrementally add up to wider movements and solidarity-building. In an age of unprecedented extraction, radical approaches are needed that depart firmly from existing ideologies underpinning global supply chain solutions, and that can challenge the mechanisms through which they displace more transformative social and economic governing alternatives.

Table 1 – Main characteristics of supply chain 'solutions'

Categories	**CMCS**	**EITI**	**MCM**
Minerals	Diamonds, gold, tantalum, tin, tungsten	Fossil fuels, metals, other minerals	Mercury, gold
Political economies	Diamond monopsony until early 2000s; limited competition among producers and refiners.	Concentrated sector dominated by large state-owned and private oil and mining companies.	Vast and fluid sector involving a wide array of private sector producers and trade intermediaries.
Lead firms and key regulatory actors	Major mineral trading and electronics companies, governments, NGOs, due-diligence consultants.	Western international oil and mining companies, UK and Norwegian governments, World Bank, PWYP.	International NGOs, governments, medium and large private sector companies.
Targets	Armed groups taxing minerals; companies using conflict minerals.	Resource-rich governments suspected of corruption and mismanagement.	Mercury-using artisanal and small-scale gold mining (ASGM).
Threats to lead firms	Reputational risk and consumer boycott of brand-related retail products.	Reputation of extractive companies and legitimacy of their operations in 'corrupt' countries.	Socio-environmental 'problems' of ASGM activities, conflicts with large-scale projects.
Technical fixes	Certification of supply chain integrity, including through audits.	Transparency and accountability based on audits, disclosure and multi-stakeholder governance.	Multi-pronged ASGM formalization and mercury use restriction.

Table 2 – Hidden costs of supply chain solutions

Solutions	**Hidden costs**
CMCS	- Racialized commodities. - *Ignored some types of human rights abuses.* - Oversimplified conflict narratives obscuring other causes, including more fundamental ones. - Collapsed local mining livelihoods through *de facto* embargo on mineral purchases from targeted regions. - Lowered prices, and hence income, for miners. - Fragmented public authority and engendered more corruption / instrumentalization of reforms. - Engendered brutal and ineffective military crackdown on mining sites. - *Reduced policy options.*
EITI	- *Boosted unwarranted 'reformist' reputation of authoritarian and corrupt regimes.* - *Legitimated large-scale extractive companies by visibilizing the revenues they generate while not accounting for their negative environmental and social impacts, including on artisanal mining.* - Exacerbated tensions among civil society organizations. - Delayed more universal and mandatory anti-corruption schemes.
MCM	- Increased mercury mining and trafficking. - Furthered social and economic marginalization of artisanal and small-scale gold miners, especially women. - Undermined local health and environmental governance by prioritizing the formalization of medium-scale businesses' resource/territorial claims over peasant communities' claims and access. - *Prioritized NGO work (for global donor funding) on artisanal mining issues with a pre-determined issue of pollution, rather than rural community development.*

Note: *Intentionally* hidden costs are in italics.

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[1] We use scare quotes for 'solutions' to reflect the truth-effects of this term and naturalization of these initiatives as serving broad interests rather than revealing some of their intentions and limits.

[2] Our conception of 'exploitation' refers to multiple forms of marginalization within the global economy. This encompasses but also goes beyond mistreatment of individuals employed by companies in global commodity chains to include diverse forms of forced transfer of productive powers from more socially marginalized groups to the advantage of already more powerful groups (McKeown, 2016; Suwandi et al., 2019).

[3] As noted by a reviewer, 'costs' could be unintended, perverse and unacknowledged (by at least some actors) without being obviously 'hidden'.

[4] Angola, Belgium, Cambodia, Colombia, DR Congo, France, Indonesia, Kenya, Peru, Qatar, Sierra Leone, South Africa, Tanzania, United Kingdom, United States, and Zimbabwe.

[5] By structural violence, we seek to emphasize the harm caused by the inequities of political economies and institutional structures, while also acknowledging their more direct, symbolic and political forms (Scheper-Hughes and Bourgois 2004). We see violence as an unfolding process, rather than an 'act' or 'outcome' (Springer and Le Billon 2016), and thus include the 'slow', or temporally dispersed, violence of health risks resulting from mineral sector related pollution (Nixon 2011).

[6] The oil sector accounted for about 65% of this overall figure, with coal and natural gas representing around 11% each, and non-fuel minerals 13%. See World Bank Wealth of Nations database (http://data.worldbank.org/data-catalog/wealth-of-nations).