



Original article

Mine closure policy and elusive just transition in a central Indian coalfield

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ABSTRACT

Land dispossession due to industrial mining has formed an influential part of global land grabbing literature across the Global South. Mine closure, on the other hand, is at present typically left to environmental experts and mining companies in spite of its possibilities to regenerate the land for new environmental and social purposes once a mine inevitably closes. While Indian coal mines are yet to close to contain fossil emissions, some of the first large, open pit mines from the 1990s have closed in recent years for economic reasons. In this article we explore Indian coal mine closure policy and its implementation in the coal town Korba. To do this we draw on national policy, international best practice in mine closure, mine closure planning documents, and ethnographic fieldwork in Korba. Our analysis shows how large funds and significant technical expertise are put to practice governed by voluntary mine closure guidelines. The results of this under-regulated approach are highly mixed with a focus on forest plantations and, in places, aquaculture or tourism parks. Rural, previously mining-dependent communities may receive short-term jobs working on closure activities but are otherwise excluded from closure plans intent on continued privatisation and industrialisation. We conclude with a set of policy recommendations based on the international principles and standards of the Society for Ecological Restoration to firstly make regulations mandatory for all sectors and types of mining, and secondly ensure community participation in the regeneration of mined out landscapes.

1. Introduction

The closing down of large open pit mines generate opportunities to revive landscapes turned upside down from mining, and repair ecosystems as well as social relations (Young et al., 2022; Bainton and Holcombe, 2018). Advanced restoration ecology activities, to date mainly carried out in richer Global North settings, point to significant potential for cleaning up lands, containing waste, and revitalising severely degraded areas with wide-ranging benefits for biophysical environments and previously mine-dependent communities (Palmer et al., 2016; Tiemann et al., 2022). Restoration activities in exhausted coal mines are in this perspective not only necessary to contain waste and repair ecologies ravaged by mining activities, they are also essential in rebuilding community relations, recreating a sense of place and generating new livelihoods beyond mining in support of just, low carbon futures.

The imperative to close coal mines to contain irreversible climate change has never been clearer (Edwards, 2019). And yet, the ongoing shift away from coal in the Global North (with Australia being the main exception), continues to be negated by increased extraction and use of

coal in a few very large countries in Asia (Gellert and Ciccantell, 2020). In one of the main coal producers, India, some of the first generation of open pit coal mines established in the 1990s are closing in recent years for technical and financial reasons (Oskarsson et al., 2025). As international conventions and programs have failed to enforce cuts to overall coal use, national approaches on how to close down coal mines take on great importance (Edwards, 2019). Mine closure legislation based on national legal frameworks dictate future land uses including remediation and ownership in post-extraction landscapes, and may additionally provide socio-economic support to enable mine-side populations to transition away from the coal economy.

Mine closure planning is the main policy tool for governing the end of mining. It is an environmental science activity usually part of mine planning and environmental approval processes, with ongoing checkpoints and updates to manage and implement activities until the time of complete closure. Part of mine closure is also post-mining monitoring to ensure implemented activities are adequate and proceeding according to plan. While variable depending on type of mining, climatic and other site-specific conditions, legislative context as well as the technical and

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financial ability of mining proponents, closure activities typically focus on securing toxic and dangerous waste, landscaping and repurposing remaining areas, carrying out environmental remediation via different forms of plantation activities, and, finally, long-term monitoring (Young et al., 2022). While best practice in restoration ecology shows enormous possibilities in mine closure, careful, long-term and site-specific work is required to learn and develop the techniques of specific places and ecological niches. Such work has been carried out over decades in many rich countries but typically remains to be done in poorer, Global South settings (Ballari et al., 2020; Toumbourou et al., 2020). Closed mines in the Global South are therefore often left abandoned in an unsafe and degraded condition likened by Toumbourou et al. (2025) to a 'deathtrap landscape', while mine-dependent groups lack adequate support to find alternative employment and frequently migrate elsewhere once mining ends due to the contaminated and dangerous closed mining zone (Bainton and Holcombe, 2018; Oskarsson et al., 2025).

The conventional goal of mine closure, to restore biophysical environments to what they were before mining commenced, remains dominant in legislation and mining company policies around the world (Young et al. 2022). This dominance is increasingly challenged by social demands for activities and forms of land use that can generate new jobs or provide other socio-cultural benefits post mining, particularly for mine dependent groups who lose their incomes when mining ends. Restoring pre-existing environments and returning to past ways of living is often neither possible nor desirable as landscapes and societies are transformed over decades of extractive operations (Bainton and Holcombe, 2018).¹ Projected climate change additionally means that ecological restoration to past ecosystems is often not feasible due to warmer temperatures and changed precipitation patterns (Butterfield et al., 2017). Present day mine closure activities therefore typically encompass additional components intent on combining environmental and social goals.

In actual practice, the rapid advancement of vast open pit mines, particularly in the Global South, in recent decades has been carried out with scant attention paid to inevitable closures a few decades later. Massive ecological and social debt from typically inequitable land transfers, and poorly controlled and regulated mine operations, are thus further escalated rather than ameliorated during mine closure (Toumbourou et al., 2020, 2025; Bainton and Holcombe, 2018; Knierzinger and Sopelle, 2019). A typical scenario in India once coal mines close is to find semi-deserted and ravaged landscapes with the empty mine pits filling with water, and some amount of tree plantations in remaining, flatter areas (Oskarsson et al., 2025). Such restoration does not provide for the wider ecology with reduced environmental benefits, and offer highly limited livelihood opportunities for previously mine-dependent communities situated in regions typically lacking alternative economic sectors beyond mining. Abandoned infrastructure and inadequate waste management with no to little oversight add to the neglect with potentially dangerous and toxic environmental conditions. In this article we build on Toumbourou et al. (2020) by analysing Indian mine closure policy and its implementation as a relatively typical Global South case of closure of vast, open pit and increasingly mechanised coal mining. In such settings technical and top-down bureaucratic approaches continue to dominate environmental and social impact planning including that of mine closure. We analyse existing regulations and available mine closure plans, and explore implementation in Korba coal mines of central India.

This article commences with a discussion of the literature on mine closure and land restoration seen through a political ecology lens,

¹ The rapid changes enforced by mining on rural and low-educated populations, a post-colonial legacy and inadequate governance, technical and financial capacity makes these questions particularly relevant, but also particularly challenging, in Global South settings only recently starting to grapple with how to close open pit mines operating at industrial scale.

followed by a methods and materials section. Following this are two empirical sections which in turn interrogate national mine closure policy in India and its site-specific implementation in Korba, central India. Drawing on international best practice in Young et al. (2022) we provide policy advice for improved closure outcomes. We end with a broader reflection on the possibilities and limitations of mine closure policy for restorative justice – seeking to reverse historical ecological as well as social injustices – in post-mining landscapes of the Global South.

2. Political ecology perspectives on mine closure

The lack of research on mine closure in the Global South represents something of a conundrum; mining has been one of the main causes of land grabbing in recent decades with highly contentious acquisition of large land areas (Correia, 2023; Huff and Orengo, 2020; Lahiri-Dutt, 2023; Monosky and Keeling, 2021; Perrault, 2012). And yet, when mines inevitably close, the possibilities to restore or repurpose damaged environments, and potentially even return the land to previous owners and users, have been largely left to companies and environmental science experts (Bainton and Holcombe, 2018; Correia, 2023; Huff and Orengo, 2020; Knierzinger and Sopelle, 2019; Monosky and Keeling, 2021). The large costs and the specialised technical expertise required to turn ravaged and potentially toxic extractive landscapes into new, ecologically and socially productive landscapes are likely to be part explanation for these silences. And a lack of good examples showing the possibilities of building new land uses in areas typically viewed as sacrifice zones also plays a part, particularly in Global South settings where industrialised, open pit mining is often a relatively new experience.

A political ecology perspective on mine closure allows us to see the contested 'work' done in defining mine closure policy, and implementing it via 'scientific' plans in different ecological and social settings (Toumbourou et al., 2020). Such policy work including its implementation is by necessity influenced by political choices and power differentials as landscapes turned upside down by mining are repaired or abandoned, in the process producing certain kinds of preferred natures and land uses over other possible alternatives (Huff and Brock, 2023). The result to date has been a large, industry-led and practice-based literature largely based on the experiences of richer countries with many examples of significant advances in restoring damaged ecosystems, and a growing emphasis of also including local communities in such activities (Young et al., 2022; World Bank Group, 2018).

Mine closure planning remains focused on the idea of returning disturbed landscapes to their previous ecological state. The development of the practice is however such that a range of other considerations have come to influence outcomes. One is the recognition that even the best efforts typically fall short of returning past biodiversity completely, therefore creating a need for offsetting elsewhere (Young et al., 2022). In addition, a set of social criteria from benefits sharing, to participation in decision-making, and support for workers to transition to other occupations after mine closure, have been added in recent years (Bainton and Holcombe, 2018). In this manner mine closure continues to evolve, while continuing to depend on place-specific ecological and social practices in different parts of the world.

A Global South perspective on mine closure will by necessity differ from more affluent regions of the world in a number of important ways. To start with, implementing post-mining plans and restoring damaged landscapes to new uses are set within inter-generational forms of injustice. Related to mining, colonial and post-colonial authorities have since long claimed resources and dispossessed populations based on ideas like development and energy security (Lahiri-Dutt and Oskarsson, 2026). Applying restorative justice principles (see e.g. Pali et al., 2022) to mine closure means being aware of pre-existing injustices prior to and during mine establishment (Walsh, 2021), and working to undo these based on plural notions of the meaning of justice (Sovacool et al., 2023).

While the global industry struggles with implementation since most mine closure activities occur towards the end of extraction, when mine

Table 1
Key responsibilities in Indian mine closure governance.

Responsibility	Mineral	Approach to mine closure
Ministry of Mines	Iron ore, bauxite, copper, zinc etc. (all minerals except petroleum & natural gas; coal, lignite; and minor minerals)	Mandatory rules (Mineral Conservation & Development Rules 2017) using a framework developed by the Indian Bureau of Mines. ¹⁾
Ministry of Coal	Coal, lignite	Mandatory mine closure plan, suggested guidelines for implementation.
Department of Atomic Energy ²⁾	Uranium and other radioactive minerals	No regulations
State governments	Minor minerals	State governments may have rules for minor minerals in their respective jurisdiction (according to the Mineral Conservation & Development Rules 2017)

Note: 1) The Indian Bureau of Mines is a technical centre of expertise under the Ministry of Mines. It supports institutional capacity building, provides technical consultancy services and advise the government of India on mining operations. 2) The Department of Atomic Energy is a separate office directly under the Prime Minister of India. There is also a separate ministry for petroleum fuels, the Ministry of Petroleum and Natural Gas, not discussed here.

Table 2
Actors in Indian coal mine closure governances.

Institution	Mandate
Ministry of Coal	Preparation of guidelines for mine closure; overall planning and governance
CMPDI (Central Mine Planning and Design Institute), Coal India Ltd.	CMPDI as the research wing of Coal India acts as official technical experts to all mining public and private sector companies drafting mine closure plans. A few other government research organisations can also act as experts.
Coal Controller Organisation (CCO), Ministry of Coal	Vetting and approval authority for private sector mine closure plans, certifying authority for mine closure activities, conducting physical site inspections
Coal India Ltd. (and its subsidiaries)	Responsible for mine closure implementation for their mines; ensuring technical and financial requirements are fulfilled Board of the company approves the mining plans.
Private coal mining companies	Responsible entity for ensuring mine closure guidelines are followed for their respective mines; ensuring technical and financial requirements are fulfilled
State governments	Active in post-coal projects such as forest plantations, eco-tourism parks etc. Responsible for the governance of land, water, forest and other resources.

profitability is low for mining companies, such implementation is compounded in the Global South due to inadequate legislation and weak institutional mechanisms (Bainton and Holcombe, 2018). Furthermore, since a majority of those losing work and income from mine closure in the Global South are semi-skilled, informal workers they are not covered by official compensation and reskilling mechanisms. They may lack formal education and therefore be unable to train for new professional jobs in the same manner as formal mine workers with professional degrees (Chandra et al., 2025; Oskarsson et al., 2025). In this article we examine mine closure policies in Indian coal mining as a way of interrogating the possibilities to build new land relations and seek new forms of community life beyond mining.

3. Methods and materials

A good mine closure plan should oversee the implementation of the

post-mining transition to non-mining land uses, and ensure that the required financial and other capabilities to implement the plan are in place (World Bank Group, 2018). Mine closure planning needs to be part of initial mine proposal vetting, and continue throughout the lifecycle of the mine. Mine closure activities should proceed in a stepwise manner during active mining to ensure that mined out sections are restored. In addition, social and environmental risks as well as effective mitigation strategies, should be identified early, and actively worked on and updated if necessary (Young et al., 2022). Common challenges in this work include a lack of funds at the end of mining, operations in remote regions, the large volumes of waste with often inherent toxicity, and the need for technical skills and laboratories for analysis of e.g. heavy metal or radioactive contamination.

In this article, we study mine closure legislation and practice in the Korba coalfield² in Chhattisgarh state as a typical case of industrialised coal mining in India. Expansions of mining operations are currently taking place, but examples of closed mines also exist. This allows us to study the conception and implementation of mine closure policy across the mining life cycle. Coal mining in Korba is carried out by public sector Coal India via its subsidiary South Eastern Coalfields Ltd (SECL) in increasingly mechanised and outsourced operations.³ Spread across about 1000 km² the Korba coalfield includes two of the world’s five largest coal mines on what is officially indigenous lands.

The research design combines a review of applicable, national legislation in India with site-specific implementation in the Korba coalfield in order to see beyond the legal text to actual practice. The main method is document analysis based on a close reading of 6 key policy documents for Indian coal mine closure governance since the first legislation was passed for coal mining in 2009 until the most recent amendments in 2025 (Ministry of Coal, 2009, 2022, 2024, 2025; Indian Bureau of Mines, 2025).⁴ Indian mine closure policy is evaluated in relation to international best practice by Young et al. (2022). We combine this policy analysis with an examination of implementation based on 7 publicly available mine closure planning documents including 4 mines in the Korba coalfield (South Eastern Coalfields Limited, 2016, 2017a, 2017b, 2023),⁵ combined with recent site visits by some of the authors in December 2022, November 2023, May 2024 and December 2024.

A total of 30 key informant interviews were conducted during fieldwork in Korba. Given that two authors have worked in Korba for more than a decade, we used existing contacts to initially identify respondents. During field visits we identified additional respondents via snowballing to incorporate perspectives from: mining company officials (2), lawyer (1), journalists (3), government officials (4) and local mine-affected residents (19). Moreover, while identifying and interviewing local residents, we tried to include diverse and representative voices of

² Korba is both a town and the name of the surrounding District. The main mines are located immediately next to the town.

³ Outsourced operations to private companies relies on contractual workers which the mining company does not need to include in closure planning. Permanent workers tend to keep their jobs at closure by moving to a different mine (Chandra et al., 2025).

⁴ This article analyses mine closure in the active mining lease area but not the compensatory forest plantations

elsewhere. See Menon and Kohli (2021) for details on the national program of compensatory forest plantations.

⁵ Limited transparency in mine closure planning means that many key documents are not in the public domain. The Ministry of Coal’s mine closure portal monitors activities (<https://minecl.cmpdi.co.in/>), but do not share mine closure documents. Detailed plans can, to an extent, be found on other sites, primarily from the Ministry of Environment, Forests and Climate Change (MoEFCC). Collecting a coherent set of planning documents for specific mines is, however, not possible on any single platform or even via searches across sites. The analysis in this article of mine closure planning is thus constrained by the limited access to information.

people belonging to different localities (residing near operational mines, near areas planned for acquisition for expanding mines, as well as closed mines), occupation (associated with agriculture, mining, non-mining, formal and informal labour), age and gender. The interviews were semi-structured with an indicative set of guiding questions.

4. Mine closure policy in India

Indian mine closure legislation is, like the wider regulatory ambit of mining in India, based on an extensive set of national regulations with frequent amendments over time. These regulations are implemented across a wide array of institutions at national and state level. The Indian Constitution confers national, regulatory responsibility, including that for mine closure, for so called major minerals (like iron, coal and uranium), while the state governments regulate so called minor minerals (like sand, granite and limestone) (see [Table 1](#) below). Within the national government, multiple ministries and departments govern specific major minerals to create a very advanced, but also overly distributed and complicated governance framework where regulatory responsibilities are difficult to pinpoint. Further complicating institutional accountability is the practice of shared governance across federal India since the state governments are responsible for governance of related spheres like land and forests.

The Ministry of Mines developed initial mine closure regulations from 2003 onward ([Ministry of Mines, 2003](#)) with mandatory planning, maintenance and implementation of mining plans under the supervision of the national government agency the Indian Bureau of Mines. Since 2009 the Ministry of Coal follows the general intent and structure of these regulations, with mandatory mine closure plans, but importantly only voluntary guidelines for implementation ([Ministry of Coal, 2022, 2025](#)).⁶ Depending how far along its useful life a specific coal mine is, either a temporary (for mines with continued mining in the near future) or a final mine closure plan (for mines planning complete closure) is prepared.

Mine closure is funded by mandatory, annual contributions by the mining companies into an escrow account in a state-owned Indian bank ([Ministry of Coal, 2022](#)).⁷ Official information states that in 2025 621 coal mines have deposited 122 billion Indian rupees (approximately USD 1.4 billion) of a planned total of 268 billion Indian rupees (approximately USD 3.1 billion) ([CMPDI, 2025](#)). Together with funds set aside for local, social development in the so called District Mineral Foundations (estimated at 1,030 billion INR, approximately USD 12 billion) ([iFOREST, 2025](#)) and forest plantation funds (513 billion INR, approximately USD 6 billion⁸) ([PIB, 2023](#)), it is clear that significant sums are available for post-mining closure activities.⁹

The Ministry of Coal's mine closure guidelines have, compared to those of the Ministry of Mines, to date been much more limited in scope based on voluntary implementation with self-accreditation of completed measures by company boards. This reduced regulatory ambition may be traced to the coal sector's past insularity as a state sector operating supposedly for the benefit of the nation rather than the profit-seeking which dominates in the metals mining governed by the Ministry of

Mines ([Lahiri-Dutt, 2014](#)). As of October 2024 only three coal mines had been officially closed ([PIB, 2024](#)). A further 299 mines have been identified for closure, but only 8 had applied for formal closure leaving most mines in an uncertain limbo state between operational and closed ([IndiaSpend, 2025](#)). Given the fluctuating price for coal, the dense bureaucracy and frequent contestations over land acquisition, incentives seem to exist to keep coal mines mothballed for potential rejuvenation when coal prices go up, or at least to avoid spending large funds on closure activities.

The mandatory mine closure plan is made as part of the initial government approval process, and later updated once the mine moves closer to the end of extraction ([Indian Bureau of Mines, 2025](#)). The mine closure plan focuses on physical and biological reclamation of the mined out land. A range of related documents have over the years come to be important additions to the mine closure plan, especially the Compensatory afforestation plans which detail how lost forests may be recreated, Environmental Impact Assessments (EIAs), Just transition programs, Corporate Social Responsibility plans, and other documents. Unlike for example the EIA, mine closure regulations are voluntary with different applicability to different coal mining actors in the public and private sector. This results in serious accountability concerns for a sector extracting >1 billion tons of coal per year over an area of >100,000 hectares of active open pit mining.

The socio-economic aspects of the mine closure guidelines are brief and rely in the latest 2025 update (see [Ministry of Coal, 2025](#)) on broad terms like 'just transformation' and 'sustainability' which are yet to gain clear definitions or meaningful implementation. This is especially the case since there are no stakeholder or public information sharing clauses in the legislation, unlike for example the Environmental Impact Assessment legislation which mandates that each report is shared and discussed in the local language at the project site prior to implementation (see [Jha-Thakur and Khosravi, 2021](#)). Overall, the question of community participation as well as planning for jobs and livelihoods after mining, and the prevention of distress out-migration remain unregulated and omitted from available reports. There are consequently no specific details about how to ensure that the poor and historically marginalized – such as women, indigenous, lower caste and ethnic minority groups with less political and social influence – are addressed in planning processes. This lack of focus on the differential social impact exacerbates the adverse local consequences of mine closure in areas where coal is the dominant aspect of the economy.

The most recent guidelines provide a list of indicative post-coal interventions with potential social benefits including agriculture, pisciculture, eco-park, recreational, landscaping, waterbody conservation, and irrigation ([Ministry of Coal, 2025](#)), but do not mention the role of coalfield communities in any activities from initial planning before a mine opens, updates toward the end of mining, or in the implementation and post-closure monitoring phases. Thus, it appears that even after official closure of a coal mine, either the state itself or private sector actors will continue to control resources like land, water and forests in the former coal mine, further depriving local communities of a fair and secured post-coal future. The addition of just transformations to the guidelines appear as little more than a buzz word in this context.

From a close reading of the amended guidelines from 2009 to 2022, it appears that amendments were mainly for administrative purposes (e.g. changes in number of mining plan copies to be submitted to the authorities). Amendments have attempted to address that mining companies were not following guidelines – evident from the introduction of time limits for implementation of mine closure plan activities. Over the years, certain thematic clarifications and targeted guidelines were also released, for instance the classification of mines into discontinued, abandoned and closed in 2022. We outline the key institutions and their mandates for coal mine closure governance in India in [Table 2](#) below.

Mine closure planning and implementation in India is in this manner designed as a mining company affair with minimal oversight from regulatory agencies or the general public. As outlined in [Table 2](#), for state-

⁶ Mines which commenced prior to the first guidelines in 2009 have separate guidelines ([Ministry of Coal, 2022](#)) which categorise mines into three types – discontinued (likely to resume mining in the future); abandoned (no intention of future re-operationalisation) and closed (notice of closure submitted by mine operator).

⁷ This account is legally mandated to ensure that mining companies perform mine closure activities in a time-bound manner. Money is supposed to be released from the account only after verification of on-ground mine closure activities by the Ministry of Coal with potential penalties ([Ministry of Coal, 2025](#)).

⁸ Forest offsetting is caused not only by mining activities but also by for example infrastructure, dams and industrial facilities.

⁹ There is no independent estimate of the likely coal mine closure costs.

owned coal companies, the Ministry of Coal detail guidelines, the mining companies prepare mine closure plans with support from CMPDI, the mining company board approves the plan, and eventually the Coal Comptroller (another subsidiary under the Ministry of Coal) evaluates implementation. For private mining companies, the only difference is that the company's board cannot approve its own mine closure plan which instead is approved by the Coal Comptroller. Both mine closure routes lack public sharing of planning documents or the possibility to discuss these and request changes by mine-affected communities or other groups external to the coal industry. There is similarly no external accountability related to updated plans or their final implementation (IndiaSpend, 2025).

The onus of implementing mine closure activities is on mining companies that seem to be hesitant about just transformation principles. This was evident in a stakeholder consultation event organised by the Ministry of Coal in New Delhi¹⁰ where one mining company representative stated that

We are already fulfilling such [just transformation] requirements in Environmental Impact Assessment reports that we submit to obtain environmental clearance before opening any mine. We furbish our environmental and social endeavours in our annual reports as well. Why overburden our compliance tasks with yet another concept of just transformation now?¹¹

Industry representatives at the workshop appeared to prefer self-certification to improve social outcomes from mine closure. We notice that Indian regulations are on the one hand vast and continuously updated with significant funds to ensure activities are carried out. On the other hand, implementation is voluntary based on public sector self-certification and unknown private sector reporting to the Coal Comptroller without risk of fines or other punishments in case of non-compliance. This means highly variable implementation depending on intentions and abilities to do mine closure.

In addition to the mine closure process is other overlapping legislation which may add pressure to actually complete mine closure activities, but also further serve to obfuscate accountability. The environmental clearance process¹² may contain additional regulatory requirements for mine closure activities like the removal of overburden dumps, the restoration of land for post-mining agricultural use as well as "compensatory ecological restoration" of waste and degraded lands (SECL, 2017b). One compliance report for the Gevra coal mine in Korba states that the closure process is an "ongoing series of activities" intended to return a "suitably restored" site to the community (SECL, 2017a: 28) without specifying the meaning of restoration or who the intended community is. A compliance report for the Manikpur mine in Korba discusses several lapses in implementation. Publicly available documents of this sort, scattered and few and far in between as they are, suggest that mine closure in Indian coalfields is loosely enforced and monitored, even as it remains focused on reporting financial outlays on plantations and biophysical reclamation.

In Table 3 below, we compare Indian mine closure guidelines (as of June 2025) with international best practices outlined by Young et al. (2022) based on long-term work of the Society for International Restoration. On ecological as well as social aspects, there exists a lot of scope for further improvement in the Indian context for adapting context-conscious social and ecological elements with clear indicators of success. We recognise that simply adopting global best practices into national mine closure frameworks will not suffice. But existing clauses present in the Indian mine closure framework, and available funds,

¹⁰ Event organized by the Ministry of Coal, New Delhi 1 July 2024 to discuss proposed mine closure guideline amendments.

¹¹ Notes from stakeholder consultation organized by Ministry of Coal at SCOPE Complex, New Delhi 1 July 2024.

¹² Governed nationally for all large-scale mining by the Ministry of Environment, Forest and Climate Change.

technical knowledge and institutional skills indicate possibilities for significant improvements to enhance the quality, scope and scale of meaningful, sustainable and inclusive mine closure policies and practices which far exceeds the present state.

5. Mine closure planning and practice in Korba

In this section, we explore how mine closure planning is implemented in India. We do this by drawing on available mine closure plans combined with fieldwork in Korba, one of India's largest coal-producing districts accounting for 16 per cent of national coal extraction (iFOREST, 2022). About 95 per cent of this production comes from three large open pit mines officially run by the Coal India subsidiary South Eastern Coalfields (SECL) but in practice outsourced to private companies. Mining in the district began in the early 1940s, but truly large-scale mining arrived in the 2000s with highly mechanised open pit mining. The three biggest mines Gevra, Kusmunda and Dipka are located side by side over 13 km of continuous mining on the Western fringes of Korba town. The haphazard and rushed coal mine expansions of recent decades as India was going through an energy crisis¹³ ensure that a planned step-by-step mine closure procedure becomes impossible.

Available mine closure plans (SECL 2016; 2023), focus on "technical and biological reclamation and repurposing" prescribed by the national guidelines (Ministry of Coal, 2024). The overall focus in the closure plans are on technical processes, such as securing overburden dumps, provisions for water courses including check dams, and top soil preservation followed by final plantation and environmental monitoring. Given India's well-educated engineers across mining, forestry and environment the plans do contain significant details based on a solid, even if under-developed, technical understanding with indicators similar to those of international frameworks like the one by Young et al. (2022).

The demographic and socio-economic profile, and the ecological specificity of the region are mentioned in mining plans as mandated by official policy. However, the proposed reuse of mined out land in the plans do not take this into consideration, lacking social or ecological site specific implementation.¹⁴ The mine closure plans in Korba suggest that a substantial proportion of the mined out land (10–25 per cent) will become water bodies. This is perhaps not surprising as vast open pits stretching across many kilometres will be very expensive to landscape or level completely. These water bodies are planned to become local water sources for communities (SECL, 2016, 2023). The closure plans mention technical processes required to ensure that the void/water body is reclaimed in an 'appropriate' fashion, including the creation of gentle slopes for a safe approach to the water body, maintaining turbidity, controlling suitable pH value and improving dissolved oxygen levels required for aquatic life (see Table 4 on post-mining land use).

The remaining areas, particularly the waste materials of the overburden 'hills', will be 'biologically' reclaimed through forest plantations. These spaces, which dot the margins of the current and expanding mines, host trees in various stages of growth (SECL, 2023, 2016) intended for economic benefits, but also as compensation for proposed new mines on forest lands elsewhere.¹⁵ As of now, the lack of public information and access to the sites prevent independent analysis of the status of forest plantations. The closure plans do not detail future local

¹³ See Chatterjee (2012) and Dubash et al. (2018) for details about India's electrical energy crisis.

¹⁴ Similarly, plans for repurposing mined out land in other examined mine closure plans fail to recognise ecological and social variations across the country (NCL, 2023; SCCL, 2019; CCL, 2021).

¹⁵ Based on a 2006 Supreme Court order all projects which remove forest lands need to compensate for this by planting new forests (Menon and Kohli, 2021). Mine closure appears to be closely integrated with the expansion of new mines via the planting of forests in closed coal mines.

Table 3
Indian coal closure legislation compared to international best practice.

Criteria ¹	Indian legislation ²	Best practice ³
<i>Ecological benefits</i>		
Species composition	Determined by the mining company while formulating the mine closure plan. 'Best suited species of plantation' in consultation with a mine closure advisory committee.	Species diversity to be encouraged. Site should reach 80% of reference model. ⁴ Wide diversity of native species should be ensured. Low occurrence of invasive species.
Structural diversity	Singular focus on tree plantations for 'greening the mining project area'.	High degree of structural diversity desired implying - all stages of vegetation (nesting and denning habitat) and demographic, faunal trophic and spatial heterogeneity.
Ecosystem function	Focus on longevity and economic productivity of tree growth.	All functions and processes (including appropriate disturbance regimes) are on a secure trajectory toward the levels of the reference and are showing evidence of being sustained.
External exchanges	No explicitly laid out linkages to other habitats.	Positive exchanges, as similar to reference model, with surrounding environment in place for all species and processes and likely to be sustained.
Physical conditions	Biophysical reclamation of the mining landscape to the best possible pre-mining condition.	Landforms, physical and chemical conditions of substrates and hydrology (e.g., soil structure, nutrients, pH, salinity, hydrological conditions) highly similar to reference model and suitable for sustained growth and recruitment of all characteristic species and processes.
Absence of threats	Project proponent to prepare a 'safety management plan' and undertake 'safety and health management audits' which includes monitoring of biophysical reclamation works and top soil stabilisation.	Threats from direct degradation drivers (e.g., erosion, substrate instability, active contamination) minimal or absent. Best practice states that land tenure status is secured.
<i>Social benefits</i>		
Stakeholder engagement	No broader consultation or engagement with general public. Ministry of Coal officials, State Forest Department, local government authorities and companies detail and discuss plans without sharing documents with the general public.	Number and diversity of stakeholders, support, and involvement optimal. Deep involvement of the local community, aiming towards community control of reclaimed sites for sustained continuity.
Benefits distribution	Forest department (area under forest cover, economic benefits from plantations), mining company (quantifiable progress on sustainability interventions, potential income from land transactions) are the major beneficiaries, along with certain Corporate Social Responsibility (CSR) projects undertaken by the mining company. Direct community benefits not discussed.	Benefits to locals and equitable and intergenerational distribution very high, with optimal integration of any traditional cultural elements, substantially contributing to reconciliation and social justice.
Knowledge enrichment	No specific mention of indigenous knowledge. However, as per new mining plan and mine closure	Implementation enriched by many types of relevant knowledge and results from the project disseminated widely

Table 3 (continued)

Criteria ¹	Indian legislation ²	Best practice ³
	guidelines 2025, the project proponent is advised to 'actively engage with the local communities and self-help groups to collaboratively envision and co-create sustainable ideas and solutions'	including to others with similar projects.
Natural capital	Focusing on building tree stock	Land and water management systems resulting in very high level of recovery and conservation of natural capital (including carbon and biodiversity positive status).
Community wellbeing	Impact on formal labour to be accounted for while formulating mine closure plans. The majority of informal workers are not covered.	Community identification of the site as having wellbeing benefits and return of ecosystem services including recreation or other cultural values.
Sustainable economies	Just transformation as a principle aims to integrate local economic development and community livelihoods with mine closure planning. Details are lacking at the moment.	Sustainable business employment models with strong levels of success supported by evidence of longevity. Of unclear relevance for the Global South, where high levels of informality and marginality characterise labour relations.

Note: (1) Based on the Mine Site Restoration Standards (Young et al., 2022:17). (2) Based on Mining Plan and Mine Closure Guidelines for Coal & Lignite Mines 2025 (T. Ministry of Coal, 2025) and Guidelines for Management of Mines discontinued/abandoned/closed before the year 2009 (Ministry of Coal, 2022). (3) Young et al. (2022).

(4) Reference model describes the approximate condition of the site had mining not occurred accounting for ecosystem change in response to changing background conditions like climate change (Young et al., 2022).

community access or uses for the tree plantations. They do not detail how the plantations could be made more accessible and useful for communities, through planting of tree species that could provide crucial food, fuel and fodder support. This approach to creating forest plantations run counter to decades-long programs in joint forest management

Table 4
Post-mining land use in Korba mines.

Mine	Post-mining land use (in hectare)	
Gevra	Void/water body:	659
	Reclaimed overburden:	1,858
	Green belt:	6
	Rehabilitation site:	134
	Infrastructure:	1,093
	Road diversion:	6
	Safety zone:	428
	Total:	4,184
Kusmunda	Void/water body:	355
	Reclaimed overburden:	1,570
	Built up area/Infrastructure:	470
	Road diversion:	10
	Safety zone:	166
	Unused area:	421
		Total:

Note: Based on SECL (2016, 2023).

as well as the Forest Rights Act of 2008 with its intent to place forest-dwelling communities at the centre of forest governance (Kumar and Kerr, 2012).

A substantial proportion of the land acquired for mining operations across coalfields, including in Korba, was agricultural land used by smallholders prior to mining (Kohli and Menon, 2016). Also this land

use is not recognised in closure plans in spite of occasional regulatory demands to return land to farmers for other coal mines in India (Oskarsson et al., 2024). When the mine closure plans do not address restoring and returning mined-out agricultural and forest lands to local communities it is clear that mine closure processes have little to offer the local economy. The result is in Korba likely to be what Oskarsson et al. (2025) detail for other mine closures in India – continued informal coal mining once the industrialised mining ends, or migration for work elsewhere, as the local mining-based economy collapses and no alternative opportunities are generated.

Interviews with local residents next to the Manikpur mine in Korba, which ended operations in the early 1990s, allows us to explore the legacy of incomplete mine closure. Today the area is dominated by a large water body surrounded on three sides by reclaimed overburden heaps (see Fig. 1). While the plantations on the overburden heaps are extensive, residents in the area tend to stay away:

We can't go there. There are huge snakes and some wild animals like boars too. Young men in the village have taken photos of the huge snakes found here; these snakes even come out of the forest and into the village. It's not safe. The forests are of no use to us.¹⁶

A visit to SECL's main office in Bilaspur, Chhattisgarh, provided some mining company perspectives including plans to convert the closed Manikpur mining area into an eco-tourism park in collaboration between SECL and the Korba Municipal Corporation (see PTI, 2023). This project, however, has been stalled because experts in the Municipal Corporation objected to the poor slope stability of the reclaimed plantations necessary to ensure safe public access to reclaimed spaces. In an interview the Commissioner of the Korba Municipal Corporation stated that "we have already informed SECL that the eco-tourism project is not feasible. There are technical issues".¹⁷



Fig. 1. Picture taken by one of the authors at the Manikpur Pokhri mine on the outskirts of Korba town proposed to become an eco-tourism park on 11 November 2024.

The water body at the Manikpur Pokhari mine has similar safety and

access concerns. One local resident stated in an interview that "[t]his *pokhri* [pond] has claimed many lives. It's not safe".¹⁸ While fishing happens here, there are concerns that the creation of the eco-tourism park will block local access:

Perhaps we won't be able to fish here if an eco-tourism facility comes up. This eco-tourism park will help only outsiders, some local entrepreneurs and the government which will get more revenue. It won't help people dependent on the *pokhri* for their livelihoods.¹⁹

The banks of the *pokhri*, on one side, have however been partially reclaimed as a public space – as a *ghat*²⁰ for celebrating the annual *chhath* festival.²¹ Local residents, however, reveal that the site is often used by teenagers for public smoking and drinking and therefore many locals feel that it has become unsafe, especially women, to spend time in the area after sunset.²²

Around Korba there are additional examples of closed mines and related infrastructure not dealt with appropriately by the official closure process. One example of this is the Banki Colliery, an abandoned mine since 2015. As of now, this site hosts dilapidated structures and machinery including a security officer's empty hut that reads 'you have already taken my chair, please don't take this bed now' (see Fig. 2). Apart from the dilapidated security hut our visit did not indicate other mining company presence or notice mine closure activities at the time of fieldwork. When asked about future plans for this abandoned mine site, local residents expressed a lack of concrete information. Some mentioned they had heard of plans for new industries but this was met with scepticism:²³

We were cheated into giving our lands to the mining company back in the 1960s and 70 s. They lured us with verbal promises of returning back our lands once coal is exhausted, providing us with basic infrastructure facilities, better roads, jobs, but it all turned out to be a lie. I am sure they want to keep our lands with them till the end of the world.

Adding to the mine-side communities' lack of clarity about the future of closed mine sites, a junior SECL land acquisition employee spoke of the lack of clarity on regulatory frameworks and implementation also within the coal mining company:

I asked them during a question-and-answer session, how do we govern, monitor and actually conduct mine closure so that it is environmentally and socially sustainable. Unfortunately, no senior official present there gave a satisfactory response.²⁴

Given policy and implementation lacunae, it is not surprising that the main approach to mine closure is to plant new forests on the land. This is since such forests can be presented as visual accomplishments in mine closure documents, annual reports and social media statements of the mining companies, and additionally enable new coal mine proposals elsewhere by compensating for new loss of forest lands. Our examination of the planning documents and site visits to closed mines did not provide examples of locally meaningful closure activities around Korba.

6. Discussion: extensive legislation implemented via voluntary measures and self-certification

Based on our examination of Indian mine closure policy and its practice in Korba, this section discusses a number of potential policy improvements on the social criteria of mine closure. Our baseline is the

¹⁸ Interview in the old Manikpur mines, 30 November 2024.

¹⁹ Ibid.

²⁰ *Ghat* refers to a flight of steps leading down to a river.

²¹ *Chhath* is a Hindu festival that celebrates the Sun God and *Chhathi Maiya* (Mother). This festival involves a ritual of worshipping these Gods and bathing in rivers, and '*Chhath ghats*' are constructed to enable this.

²² Interview in the old Manikpur mines, 4 November 2023.

²³ Interview in Banki Region, Madhwadhoda Village, Korba, 23 November 2023.

²⁴ Interview at SECL Office in Korba, 29th November 2024.

¹⁶ Interview in the old Manikpur mines, 30 November 2024.

¹⁷ Interview with Pratistha Mangain, then Commissioner of the Korba Municipal Corporation on 24 May 2024.



Fig. 2. Picture taken by one of the authors of a security hut at the abandoned Banki Colliery on the outskirts of Korba town on 23 November 2023.

international mine closure standards by Young et al. (2022) which provide six principles in its social benefits wheel to evaluate social outcomes from mine closure on a five star scale of continuous improvement. These are: (1) Stakeholder engagement, (2) Benefits distribution, (3) Knowledge enrichment, (4) Natural capital, (5) Sustainable economies and (6) Community wellbeing (see Table 5 for a summary of our findings). Three of these categories do not at present meet even the basic one star level in India due to the lack of local area community consultation and participation. These are: (1) Stakeholder engagement, (2) Benefits distribution and (6) Community wellbeing. International best practice as well as Indian legislation related to areas such as community forestry and environmental impact assessment provide ample evidence of the usefulness of public participation in resource governance. As coal mines inevitably close, participation is needed especially for the majority of informal mine workers who will otherwise be left impoverished and without any form of social protection.²⁵

The category (3) Knowledge enrichment requires “[a] diversity of relevant sources of existing knowledge identified...” (Young et al., 2022: 14) at the one star level. Here Indian regulations need to include local and culturally relevant forms of knowledge. At present mine closure planning relies on environmental science without site-specific social considerations, and thus also does not meet the one star quality measure. Category (4) Natural capital at the one star level demands that “[I]and water management systems to reduce overharvesting and restore and conserve natural capital being put in place on site” (Young et al., 2022: 14). In India there is no independent evaluation of agricultural or aquaculture harvests from closed mining lands. Forest plantations managed by local forest departments do however appear to be making progress, although knowledge is also scarce here, in terms of timber production in mined out areas. There is thus some amount of productive capacity from some closed mines meaning this category may be seen as reaching the one star level.

Finally, category 5, Sustainable Economies, means implementing “[s]ustainable business and employment models (applicable to the

²⁵ Most of India’s coal mining is carried out in indigenous territories to create a further need for broad-based consultation and participation.

Table 5
Indian mine closure practice compared to international best practice.

Social criteria	Present level	How to reach the next level
(1) Stakeholder engagement	0*	Level 1: Identify diverse and representative stakeholders. Engage in ongoing communication.
(2) Benefits distribution	0*	Level 1: Make community participation mandatory
(3) Knowledge enrichment	0*	Level 1: Include diverse forms of knowledge beyond present environmental science focus, particularly drawing on local and indigenous knowledge.
(4) Natural capital	1	Level 2: Low levels of land and water natural capital recovery
(5) Sustainable economies	1**	Level 2: Implementing sustainable business and employment models
(6) Community wellbeing	0*	Level 1: Identify diverse and representative stakeholders. Engage in ongoing communication.

Note: Based on the Social Benefits Wheel of Young et al. (2022), Indian legislation (Ministry of Coal, 2025) and fieldwork by the authors.

* Present mine closure practice does not even meet the minimum level.

** Identified as reaching level 1 since formal public sector workers are either transferred or offered a retirement package on closure. Seen across the wider spectrum of contractual and informal workers, or wider community closure support the present approach is not going to reach the minimum level.

project or ancillary businesses) planned” (Young et al., 2022: 14). Even though the most recent amendment to the mine closure guidelines by the Ministry of Coal (2025) mention ‘just transformation’ as a key element, it remains unclear how principles of justice and equity will be upheld as the guidelines fail to expand on the meanings of the term. At the moment permanent public sector coal mine workers are transferred to a different mine on closure, or offered a retirement plan. The vast majority of informal and contractual coal mine workers lack this company protection, however, and there is no example of alternative government support for poor and marginalised workers left on their own at the end of mining without alternative work or other assets to make a living. Given the lack of livelihood support and overall community benefits, the most likely outcome of mine closure is therefore no mine closure at all, but instead continued informal mining once the coal company and its security guards leave, with questionable justice, ecological restoration and forest plantation outcomes. Category 5 on Sustainable Economies may therefore reach level 1 in India if understood as only relating to formally employed public sector workers. It will not reach level 1 if assessed across all mine workers.

While overall our policy analysis indicate significant shortcomings, short-term improvements appear feasible given sufficient political and institutional will. At present missing stakeholder engagement and public participation components builds on widespread experiences from related environmental and resource governance practices within the country with significant potential to ensure locally suitable, and socially acceptable ways of closing mines. The recent policy amendment by the Ministry of Coal (2025) which introduced the term ‘just transformations’ may in this manner meet meaningful implementation via local consultations.²⁶

Longer-term mine closure improvements to reach higher levels of the international mine closure principles and standards appear more difficult to implement at present. As discussed above, the technical expertise across for example soil and ecology sciences to especially put in place tree plantation programs have been backed up by funds to do significant

²⁶ Any such changes would, however, have to counter the recent policy trajectory of reduced transparency and public participation in environmental matters in India over the past decade (see e.g. Kohli and Menon (2016), Menon and Kohli (2021).

closure work in recent years. Seeing this work collaboratively developed together with local community beneficiaries across different coalfields would represent a significant stretch which appears entirely unfeasible at the moment. Institutional cultures within mining companies and state government departments, as well as national and local policy goals, do not seek social goals such as just transitions at the moment, nor do they aspire to restoring pre-mining ecologies. Realigning mine closure work toward locally accountable social and ecological goals will therefore have to remain a distant goal.

7. Conclusion

In this article we examined mine closure policy and practice in Indian coal mining to understand the governance of post-mining landscapes as the first generation of large open pit mines started to close. We focused on accountability and transparency within a densely complicated legislative setting with responsibilities divided across ministries depending on type of mineral, and, within coal mining, different rules for public and private sector companies. A key factor in the policy analysis is the voluntary implementation of the guidelines which provides highly limited scope for accountability. In addition, fieldwork in Korba showed vast and rapidly expanding open pit mines unable to implement the planned, stepwise mine closure activities given frequent changes to the mining to increase extraction rates as well as overall land use compared to the original plans. Fieldwork also showed the legacy of abandoned coal mines with highly restricted closure activities, at best having tree plantations to stabilise the overburden waste.

The overall picture which emerged of Indian mine closure governance is thus very weak if compared to the international best practice and standards of Young et al. (2022) where Indian mine closure practice does not meet even the lowest requirements on most of the social criteria. The relatively recent mine closure guidelines from 2009 onward do, however, represent a significant level of detail which have been complemented by major allocated funds which carry out significant closure work in the coalfields. The question of what kind of mine closure is, however, difficult to determine at a larger scale when implementation relies on voluntary measures without external accountability mechanisms or public transparency. Field visits to Korba indicated highly limited knowledge among mine-affected communities. A starting point for meaningful mine closure implementation is thus to make not only the mine closure plan but also its implementation mandatory. This plan, furthermore, needs to be shared and discussed with the general public and particularly communities of the local area which are affected in a number of different ways at the mine opening, operations and closure stages, with potential long-term consequences continuing much beyond the life-time of the mine given the neglect of landscaping and waste containment activities.²⁷

Indian mine closure policy needs to develop and improve into a set of coherent regulations under the oversight of independent institutions including courts. Existing regulations, technical expertise and institutional structures do imply significant capacity to detail scientific plans and generate the funds to implement them. The challenge to actors working in the field is to do better, to utilise the large resources that are available for meaningful mine closure activities for socio-ecological restoration, and to attend to what appears to be a gap in perceptions among coal-side communities that closed mines can and should be repurposed for new productive as well as ecologically supportive land uses.

²⁷ Environmental assessments in India have since 2006 required public EIA reports but recent amendments limit transparency (Jha-Thakur and Khosravi, 2021).

CRedit authorship contribution statement

Patrik Oskarsson: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Sarthak Shukla:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Radhika Krishnan:** Writing – review & editing, Writing – original draft, Formal analysis.

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