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A Just Transition or a Downward Spiral? Land and Livelihood Transitions to and Away From Coal Mining in India

Patrik Oskarsson¹  | Suravee Nayak²  | Nikas Kindo² 

¹Swedish University of Agricultural Sciences, Uppsala, Sweden | ²International Institute of Information Technology – Hyderabad, Hyderabad, India

Correspondence: Patrik Oskarsson (patrik.oskarsson@slu.se)

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ABSTRACT

When coal mines expand across Central and Eastern India, agrarian groups typically object strongly to displacement. Meanwhile, and often in the immediate vicinity of the expanding mines, the previously displaced now working in the coal economy protest against mine closures. Additional millions are situated somewhere between attempts to protect agrarian livelihoods and keeping a coal job as their lives become increasingly conflated with, and dependent on, coal. In this article, we draw on long-term and recent engagements across two coal-producing states in India to reflect on difficult livelihood transitions to and away from coal mining among indigenous and caste Hindu groups. We focus on the enduring value of land for which there is no good substitute as means of social reproduction. When a mine inevitably closes, lacking skills and land holdings generate a downward spiral in enforced livelihood transitions towards insecure informality. This creates enduring tensions in the concept of ‘just transitions’ when applied to the Indian coal sector.

1 | Introduction

India's economic expansion in recent decades is powered by coal from its central-eastern region.¹ One consequence of the vast expansion of open pit coal mining is the forceful removal of large numbers of agrarian and forest-based peoples from their lands and livelihoods (Oskarsson et al. 2019). Such processes have resulted in tremendous difficulties for individuals and groups to find new ways of living as compensation has typically proved absent or inadequate. A large body of research has detailed how groups have organised themselves in social movements and via political parties to demand a better deal through improved compensation for land and other forms of loss (Lahiri-Dutt 2014; Kujur and Mishra 2020; Shah 2022). Over time, urban demand for increased electricity has ensured

continued coal expansions despite much delay and enormous contention. Mine-side groups have typically been forced to accept a transition away from agrarian livelihoods with monetary compensation and, at times, one mining company job per displaced household.

Although social and environmental mine-side disruptions are enormous (Ali 2009; Beynon et al. 2000), there is a different story focused on the coal sector as a locus of inward migration for jobs. Although unregulated and frequently dangerous, most migrants as well as locally displaced people end up in informal coal work. This sector may offer better possibilities for landless, marginal and typically lower caste agrarian groups compared to those in the preexisting rural economy of rain-fed agriculture and forest collection activities. Various service jobs in the coal

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towns next to the mines may also offer a relatively attractive alternative for the landless poor who otherwise survive as agricultural or industrial daily wage labourers (Lahiri-Dutt 2016; Nayak 2022). Compared to the formal coal mining workforce of a few hundred thousand, some 10–15 million people are estimated to work in the informal coal sector as truck drivers, coal sellers, brick kiln workers and in other related employment (Bhushan et al. 2020). Meanwhile, many of the displaced are compensated with jobs within the mining industry. This ensures life-time job security and even aspirations of middle-class lifestyles. Seen in this perspective, coal as a livelihood is attractive to many who campaign for additional formal jobs while carrying out informal work often termed illegal.

Fuelling the vast landscape and livelihood changes of central-eastern India's coalfields is a national goal to achieve energy security and economic development, termed by Chatterjee (2020a) as 'fossil developmentalism'. To a limited extent, international climate change negotiations also play a role, with India committing to net zero by 2070 (Haldar et al. 2023). Plans for India to join other Global South countries receiving World Bank support to transition towards low-carbon energy further indicate a potential change to the currently expanding coal extraction sector (Aggarwal 2021). Across these high-level national and international frameworks, discussions and initiatives, however, are a lack of grounded research to explain how millions of coalfield workers and residents will cope with widespread coal mining closures and find new ways of living in landscapes turned upside down by open pit extraction.

A wide body of literature has analysed India's 'land wars' (Levien 2013) over the past two decades when mines and industries along with many other large-scale activities usurped agricultural and forest lands (Nielsen et al. 2022; Sud 2021). Such changes affected a wide spectrum of rural groups—with a disproportionate impact upon lower caste and Adivasi groups—and were usually depicted as enforcing a shift away from agrarian livelihoods into a 'modern' economy with little ability to absorb new workers. Taking a longer view of these processes, the aim of this article is to understand the enduring value of land in enforced livelihood transitions at mine openings and closures. We explore livelihood transitions to and away from coal mining across two coalfields in Jharkhand and Odisha states, respectively, drawing on long-term and ongoing research. The cases allow for contrasting land and livelihood relations in coal extraction—on Adivasi and non-Adivasi land, given that the Jharkhand coalfield is on lands reserved for Adivasis, whereas the Odisha coalfield is on general area land affecting mainly caste Hindu groups.

The article starts with a discussion of land-based livelihoods in coal-abundant regions and how we can theoretically understand livelihood transition processes. Following this is a methods and materials' section that presents the two case studies, followed by two empirical sections on the agrarian resistance to new coal mining and the experience of mine closure among a largely informalized workforce decades later. We end the article with a concluding section on livelihoods' change resembling a downward spiral as the landless, coal-dependent majority is further marginalised at mine closure.

2 | Livelihood Transitions and the Indian Coal Sector

A significant body of research has examined wide-ranging livelihood changes when extractive industries commence operations in rural areas across different sociopolitical settings, different types of extractive operations and under varied forms of governance. Since the seminal article by Godoy (1985), the literature has cohered around the proposition that changes proposed by mining go much beyond material changes to landscapes and livelihoods to affect entire lifeworlds and ways of living in previously isolated locations (Bebbington 2018). Key in the arrival and expansion of mining activities in the Global South is the distortion of agrarian social structures and the enforced livelihood transitions of affected groups (Borras et al. 2011). The violent process of agrarian transformation in general mutates property relations, labour conditions, rural production processes and the distribution and appropriation of agrarian incomes and surpluses (Borras 2009). For instance, neoliberal policy interventions in India such as the withdrawal of agricultural subsidies, changes to environmental regulations and land use patterns to accommodate mining and related industries have unleashed profound agrarian distress for its rural world (Shah et al. 2018). This may offer benefits to some, for example, land-owning, rural elites, but typically also escalate land based social inequalities (Dietz 2023). As a consequence, a vast majority of the labouring poor 'directly or indirectly depend on the sale of their labour power' and 'combine self-employment in farming and other branches of the informal economy with wage labour' (Bernstein 2010, 110–113).

In these processes, land plays multidimensional roles in the lifeworlds of rural peoples (Sud 2021) but remains historically tied to a hierarchical, unequal and exploitative social system (Bandyopadhyay 1993) with land ownership structured around caste, gender and ethnic relations with lingering colonial era structures (Omvedt 1980; Agarwal 1994; Kujur and Mishra 2020; Roy 2023). The result is varied manifestations of land dispossession and uneven livelihood trajectories across space and time as rural groups can claim differentiated compensation and similarly have different abilities to cope with, or even benefit from, changes (Levien 2019; Agarwal and Levien 2020; Nayak 2023). The preexisting socioeconomically dominant classes and castes typically emerge as a neorentier class, whereas vulnerable populations, often Dalits and Adivasis, fall into bottom-most, precarious and informal livelihoods (Adduci 2017; Nayak 2023). Further, despite the gendered nature of agrarian change and patterns of livelihood transitions, and the key role of women's labour in production and reproduction of classes of extractive labour (Çelik 2023), mining and other industries in general externalise the reproductive costs of labour. This essentially implies women's unpaid labour (Mezzadri 2021) and ensures that women are particularly adversely included in the new rural livelihood structure (Nayak 2020a).

As relations between land and livelihoods are severed in extractive regions, these areas are often seen as spaces of suffering (Lesutis 2019) or even sacrifice zones (Shade 2015). However, given the preoccupation of mining research with indigenous groups, and the impossibility to provide work to the vast numbers displaced by open pit mines, it is perhaps not surprising

that the terms of work in mining operations have received less attention in recent decades (Lahiri-Dutt 2018; Nayak 2022) including specific research on, for example, the gendered effects of mining work (Lahiri-Dutt 2007; Serwajja and Mukwaya 2020). In this literature, formal mine workers with their protected jobs and supporting infrastructure at times appear as an enclave of luxury within impoverished surroundings (Appel 2012) or as working-class nobility compared to the majority of Global South mine workers who have to get by in the informal sector (Harriss-White and Gooptu 2001). It is clear that poor peasants, Dalits, Adivasis and women can be seen as a 'surplus population' (Li 2010) to extractive industries with easily exploitable labour. Informal jobs hold the majority of rural workers.

Coal mining has often been understood as more than a job to many of its workers in Global North settings. It has been a way of life shaping a sense of community, place and identity for generations (Kojola 2019) within a relatively homogenous, unionised and formalised labour force (Della Bosca and Gillespie 2018). In sharp contrast, Global South settings often see formal, extractive industry employment created by the mining companies mainly to reduce strong social protests because local leaders can often be appeased by good jobs. Meanwhile, a clear majority become incorporated into uncertain and poorly paid informal work (Geenen and Gleiberman 2023) with little possibility to create a consolidated working-class identity (Chandra et al. 2025). The literature shows the identity of coal miners as fragmented, highly dependent on local and regional socioeconomic context and usually crosscut along the uneasy spectrum of formality and informality (Nayak 2023).

Mining operations typically have three distinct stages: establishment, expansion and closure,² with each stage having its particular implications for rural, mine-side people. At mine establishment, legal principles like the right to land and livelihoods for agricultural groups immediately become tested. For indigenous people like the Adivasi, specific land rights provisions are supposed to ensure they are not separated from their lands. The overall intent of the legislation is clear—Adivasi land protection is a strong mandate. Non-Adivasis typically have weaker rights on paper but more often have the crucial private land titles that allow them to be registered as displaced by mining companies. In addition, their better educational and socioeconomic status supports better implementation of existing compensation and support programmes compared to the Adivasis. Actual implementation of land rights protection has been highly varied to date and usually depends on social movement pressure to ensure implementation of protection and compensation clauses (Kumar 2014).

As the mines expand, vast coal pits take shape accompanied by waste heaps that use up much larger areas of land compared to underground mining and prevent multiple land uses compared to underground mines. It is estimated that around 300,000 ha of agricultural lands and forests have become coal mines, or related waste, transport and similar areas across India's more than 50 coalfields (The Hindu Business Line 2022). Mandatory compensatory forest plantations elsewhere serve to further increase this considerable land use footprint (Menon and Kohli 2021). Relatively well-off farmers may lose fertile agricultural fields for monetary compensation because their land holdings are

not officially recorded. But the opposite may also occur when smaller farmers with low productivity fields can secure middle class lifestyles when land loss is compensated with a permanent public sector coal mining job. A majority of the dispossessed tend to be relatively marginal forest dwellers who remain unrecorded because they depend on forest or common lands or do not have the appropriate land papers to prove ownership. In these varied settings, livelihoods change come with a range of opportunities but also risks of marginalisation and impoverishment. For the peoples of the coalfields, change typically means an enforced transition from independent but marginal agrarian livelihoods to informal coal jobs in the shadow of the officially sanctioned, formal economy.

Due to the uncertainties they generate, new mining projects across India are typically met initially by resistance to change (Shah 2022). At times, such resistance mainly aims for a good compensation package or at minimum a place at the table to negotiate the uneven outcomes among mining-affected groups depending on class, gender, age and caste/ethnicity (Nayak 2023). Protest groups may also declare complete rejection of enforced land dispossession and extractive economy transformations shaped by previous mining legacies. The chain of reactions triggered by the establishment and expansion of coal mining shows us that responses among the displaced may take on a spectrum of possibilities between resistance, reluctant acceptance or active incorporation (Hall et al. 2015; Willow 2020). Responses are spatiotemporally and intersectionally dynamic as local populations slowly transcend into the 'politics of incorporation' where individuals and groups attempt to find some way of getting ahead or at least making a living in areas increasingly taken over by the coal sector (Nayak 2023).

The politics of incorporation is in a way inevitable because the state has the right to claim any land under the eminent domain principle. Initial protests against land dispossession slowly begin to change to 'demands for work' (Gardner 2018). The expansion of mining does not necessarily lead to a proportionate increase in better paid and secured formal jobs and invites private companies to become subcontractors (Nayak 2022). As a result, affected groups struggle to secure formal jobs primarily but rely mainly on a wide range of subcontracted or informal coal sector livelihoods (Chatterjee 2020b). This incorporation into the 'shadow economy of coal' (Phillips 2013) is more or less adverse.³ When land compensation in the form of monetary and job opportunities are exhausted, new possibilities emerge via Corporate Social Responsibility (CSR) primarily from private firms (Kale 2020) and government expenditure via local mineral revenue funds (Singh et al. 2022). Although compensation is preferable to CSR, different states show variations in compensation policies, how the dispossessed are defined and categorised and other ambiguities regarding land ownership and uses, which mean that the actual award of a job or other type of compensation is typically the result of a series of negotiations and forms of mobilisation carried out for extended periods of time, potentially stretching several decades.

At mine closure, entire ways of life have changed dramatically under conditions of far-reaching coal sector dependence, leading to great uncertainty once again (Toumbourou et al. 2020). Whereas the just transition literature based on Western cases

often projects a linear pattern of government support to retrain a formalised workforce with the mining company ecologically restoring lands (e.g. Harrahill and Douglas 2019), such expectations do not encompass the ground realities of Indian coal regions. Research on Indian coalfields suggests a need to articulate struggles around informal coal livelihoods and historical injustices in postcolonial settings characterised by multiplicities (Shah 2022). Compared to the initial displacement, a transition away from coal typically takes place with fewer assets like land to offer up for negotiations around compensation or as a livelihood falls back in often critically polluted coalfields. State planning, meanwhile, focuses on planting trees or inviting renewable energy projects and other privately-owned industrial facilities to the mined out lands.⁴ Although coal-side groups wait to fully comprehend the inevitable end of coal, national level discourses suggest reuse of land without taking account of perspectives of the affected.

Although an actual transition away from coal remains to be seen on the ground in India, the impending closure of some of the first generation of large, mechanised open pit mines established in the 1980s and 1990s opens up possibilities for research to understand the challenges for coal-dependent, previously agrarian groups to again change their means of living and ways of life. Research able to untangle what happens towards the end of the coal life cycle has to date not been carried out with the same level of precision as those relating to the land struggles during mine establishments. Mine closures are likely to instigate different 'reactions from below' and a series of negotiations between mine-side groups and various state actors about what a just transition to new livelihoods means.

3 | Methods and Materials

Recent government coal block auctions reinforce the overall picture that coal mining in India will continue to expand in the near future. Some open pit coal mines established in the 1990s are, however, exhausted, thereby allowing us to understand livelihood transitions from the old mines and additionally study new mines established nearby. Such an analysis set within the same coalfield may inform planning for the much-needed transition away from coal and do so with improved justice for vulnerable groups. We use a comparative case study research design of complementary livelihood transitions to and away from mining in two coalfields in central-eastern India. Our first case, the North Karanpura coalfield in Jharkhand state is considered a typical case of Indian coal expansions since the 1990s to present day with open pit mines on indigenous lands consisting mainly of forests. This allows us to see how agrarian and forest-dwelling indigenous groups largely lacking formal land documents have been affected by the establishment of mines and later become incorporated into the coal economy.⁵ Our second case, the Talcher coalfield in Odisha state, is an unusual yet complementary case because it is located on nonindigenous lands. This coalfield has mainly expanded on privately owned agricultural fields owned by caste Hindu farmers who have the official land documents that allow them to demand better compensation.

For both cases we study, open pit coal mining of a relatively recent and highly mechanised variety, which in India

commenced in the 1980s and 1990s, has since become the norm. To understand trajectories of livelihood change in relation to mine openings and closures, we draw on long-term ethnographic research by the authors complemented by historical documents. We seek generalizable conclusions across the cases on how different groups have engaged with mining companies and government bodies in attempts to 'extract' benefits from these nationally driven resource projects. This analysis is carried out over time to explore the different forces that shaped initial displacement, slow incorporation into the coal economy and the possibilities to transition to other livelihoods once the mines closed.

The North Karanpura coalfield spans four districts in Jharkhand state, featuring a diverse landscape encompassing dense forests and agricultural lands traditionally inhabited by a number of Adivasi groups. It was initially explored by British geologists in the 19th century but large-scale mining only commenced in the 1980s and intensified in the 1990s. The coalfield is divided into 59 planned mines (Central Mine Planning and Design Institute 2013) over 1230 km² and proposed to expand further through additional mine allocations. Central Coalfields Ltd. (CCL), a subsidiary of public sector Coal India, owns and operates a majority of the mines. The National Thermal Power Corporation, a public sector electricity company, holds four coal blocks and has recently acquired two more to serve its thermal power plants. Meanwhile, the first large mines have closed or are about to close.

The Talcher coalfield, first mapped in 1838, was a late entrant to the colonial coal extraction regime given its high transport costs, inferior quality of coal and lack of skilled labour. However, coal demand after World War I and the profit-making interests of local elites introduced the first underground coal mine Handidhua in 1921. At present, the Coal India subsidiary Mahanadi Coalfields (MCL) operates eight open pit and one underground mine in Talcher, and two more open pit mines are planned. The region was primarily an agrarian society before the arrival of coal mines, and parts of it still depend on agricultural activities.⁶ One-hundred-six villages have been affected by coal mines in Talcher with about 3700 ha of government land and 6000 ha of private land acquired.⁷ More than 5000 families lost agricultural land, and 7000 families were displaced and relocated.⁸

4 | Agrarian Resistance at the Coal Frontier

Our coalfields reveal complex tapestries of land relationships, rooted in historical processes like *zamindari* arrangements during colonial times where land governance was distributed to various local chiefs and agencies in return for taxes paid to the British colonial rulers (Rothermund and Wadhwa 1978). The commodification and titling of land thus came to vary significantly across these areas depending on the intentions and skills of local rulers. These effects remain visible until present day as land systems have not been fully homogenised, and comprehensive land reform processes have stalled (Deininger et al. 2009). Land ownership at present encompasses diverse categories of privately owned land for individual farmers, and lands for common use, with large tracts of land lacking formal

tenure recognition. A particularly dominant category of land, especially in North Karanpura, is forest, which is owned by the state government but often used inter-generationally by communities for farming, grazing or other purposes. It is only those with private land titles that receive compensation for land loss when mines expand.

In North Karanpura, Adivasi groups primarily practised rain-fed agriculture while relying significantly on forest products and common property arrangements. Lower caste groups were typically smallholders or landless labourers working for dominant caste landowners. Adivasis have engaged in mining since long as labourers mainly to supplement their agricultural earnings. In contrast, mining was an important escape from the exploitative control of large landholders for lower caste groups. Private mining expanded slowly in the area from the early 1900s largely via underground extraction. As coal mining was nationalised in the early 1970s, some farmers in the North Karanpura coalfield for the first time had the chance to gain formal employment in exchange for land. Mining was not a very large industry in the area at the time, however, and most people remained within farming and forest livelihoods.

In the wake of 1991 national liberalisation reforms, North Karanpura underwent significant changes, marked by the widespread introduction of industrialised, open pit mining using imported mining equipment like conveyor belts, with private sector coal handling plants and washeries established nearby and an expansion of rail and road transport networks. Australian and World Bank development funds were instrumental in turning the coalfield into an industrialised, large-scale coal producer with mines like Piparwar and Ashoka charting the way towards the land-intensive, high output, low employment model of coal mining that has since become the norm in the area as well as across the country. Initially, this expansion proceeded at a relatively slow pace with significant delays due to administrative uncertainties, various local and national court cases, and strong movement protests on the ground against Adivasi dispossession. Since the 2000s, a range of mines have been established in what Oskarsson et al. (2019) refer to as a process of incremental dispossession where land acquisition for mining was done in a step-wise manner across mines wherever social movement resistance allowed.⁹

The outsourcing of coal transportation and increased mechanisation provided higher skilled and better paid jobs for some but also introduced uncertainty for informal workers manually loading coal trucks and trains. Protesting workers demanded better and especially more plentiful jobs and were able to receive some political support.¹⁰ The informal workforce engaged in tasks such as coal sorting at depots, loading and unloading trucks and railway waggons, and construction-related activities, collectively known as ‘*collie kamanae*’—wage-earning through physical labour. The coal economy’s expansion also led to these groups’ employment in shops and local markets. Many Adivasis became vendors, selling vegetables and food products to settlements of CCL employees, integrating further into the local coal economy. The area also became attractive for migrants of mainly lower caste background seeking a way out of exploitative conditions in agricultural labour work.

As coal mining expansions in the 2010s proceeded at a scale previously not seen, long-running protests followed by coal-dependent groups primarily comprised of Adivasis who continued to be dispossessed and now additionally lost their jobs as daily wage workers due to mechanisation or found work taken by outsiders hired by private sector companies. Mechanisation processes have, however, only intensified over the years pushing more and more people into marginal and often illegal work related to coal, as, for example, coal peddlers who collect coal from loading points or closed mines or as workers in one of the hundreds of mine-side brick kilns, which rely on the illegal supply of coal. Today, the North Karanpura region stands as a vivid testament to the divergence between well-established mining compounds with sizable populations of professional workers and the rest who get by doing informal, dangerous and frequently illegal work.

Like earlier coal frontiers in the state 20 or 30 years ago, the new coalfield further West of North Karanpura is predominantly home to agrarian and forest-dependent Adivasis who find themselves entangled in complex land alienation and unequal labour exchange processes. Faced with the relentless expansion of coal operations, these groups respond with determined resistance movements aimed at safeguarding their lands and way of life and find some support from political parties and NGOs. Political parties seek compensation in the form of jobs since unable to go against the dominant coal economy, whereas NGOs have reduced freedom to operate in recent years and therefore less ability to bargain on behalf of affected groups. Meanwhile, there is a small but growing class of Adivasi coal workers with secure public sector jobs. The quality of these jobs varies depending on the (usually low) educational qualifications of the applicant but nevertheless represents major improvements due to the security of income and the added benefits of life within the coal company compound with its high quality educational and health-care facilities.

In the Talcher coalfield, land acquisition for open pit mines started in 1985 with strong resistance movements until the end of the 1990s. At that time, caste Hindu and OBC groups were farming mainly rice, pulses and vegetables, with a few men working as clerks or schoolteachers. Government jobs were viewed as high status and referred to as *chakiri* meant for educated and respected families. Disadvantaged castes like OBC groups engaged in caste-based occupations and labour work in underground coal mines along with cultivating their lands. Dalits, whether small landholders or landless, primarily did agricultural work. Dalit men also did ‘*mazdoor*’ work like manual loading of coal in the underground mines beside caste-based occupations such as scavenging, cleaning and washing clothes for more influential class and caste groups.

Caste Hindu and OBC¹¹ groups led the protest movements and were joined by Dalit smallholders and landless threatened with a loss of livelihoods. Multiple protests, blockades of roads and machines, and denied access to villages were among the many tools part of the resistance. This resulted in rounds of forced eviction, meetings and arrests of leaders as well as groups. The resistance slowly fractured when promises of jobs and infrastructural development were made to some who then left the mobilisation. The incremental progress varied legal

proceedings and separate stages of mine expansions meant that village resistance was split across different points in time rather than as unified villages. Resistance slowly changed into acceptance of the arrival of coal mines, and the early 2000s marked the beginning of incorporation with a focus on negotiations for jobs and monetary compensation, rather than seeking a complete halt to the mines.

When newer mines were established, villages displaced by older but still expanding mines started demanding improved compensation rates. However, there was no clear path to achieve such demands and outcomes varied considerably. The policy of CIL provided one highly attractive, permanent job per displaced household. The Odisha Rehabilitation and Resettlement (R&R) Policy of 1989 on the other hand placed the dispossessed into multiple categories, from A to D, and ranked their 'worthiness' of receiving monetary and job compensation based on the quantity and quality of land. This marginalised landless Dalits and women.¹² Ambiguities in compensation policies resulted in problems claiming jobs while successful claims often triggered inter and intra family disputes¹³ because only sons above 18 were eligible for employment leading to the exclusion of many in spite of often years-long court appeals and other processes.¹⁴ Many such disputes remain unresolved.¹⁵ Upper caste and OBC groups often preferred other strategies such as using false age certificates and bribery to secure compensation. Bargaining was frequently done through caste-based associations and village committees.¹⁶ Another way of securing employment among better off families was to buy land in villages where land was about to be acquired.

Over the years, the erstwhile agrarian society slowly transformed into dependence on coal-based formal and informal jobs. This escalated inequalities as is evident in Manda village, where land was acquired for the Balram mine. Here, many caste Hindu and OBC land-owning households (meaning sons) secured formal, as well as remunerative informal, jobs—over 80% work in the mines as machine operators, mechanics, fitters, electricians, clerks and *majdoors*. Meanwhile, less than 40% of Dalit households have gained similar employment. This does not mean that every working age member from dominant caste groups have a formal job. Rather, their economic and social capital are often mobilised to get better paid informal jobs via outsourcing or subcontracting to private companies. The 'contractual labour'¹⁷ jobs offer some opportunities for people aged 18–40 years from the affected villages: as drivers, security guards and mine supervisors for example. The wages of up to Rs. 15,000–20,000 per month (180–240 USD per month) are considered decent earning in the area. Moreover, self-employment like truck ownership, small-scale businesses, labour contractors or via so called Project Affected Persons societies earn individuals Rs 40–50,000 per month (480–600 USD per month). The situation remains, however, highly precarious for the landless Dalits of Manda village who are not considered for formal or (better) informal jobs. For such households, the only available work is as casual wage labourers in construction, coal washeries, coal loading, sweeping at offices and other manual labour. This earns them Rs. 150–200 per day (1.80–2.40 USD per day) at the very bottom of the local labour hierarchy in work broadly categorised as 'unskilled labour'.

Taking a wider view across our coalfields, we note that responses of dispossessed rural groups varied over time with close ties to local land relations. During the initial and typically oppositional phase, rural groups build wider solidarities across social categories, but this becomes difficult later as the area is further integrated into the coal economy. On the one hand, when rural groups depend on agriculture such as in Talcher and North Karanpura before coal mining, they use various tools and strategies to mobilise and resist the coal extraction. This is also true for newer coalfields like some in the states of Telangana (Oskarsson et al. 2024) or Chhattisgarh (Bose 2023). On the other hand, as the coalfield expansion progresses, dispossessed groups prefer to negotiate for jobs in exchange for their land once it becomes clear that the mining will proceed regardless. Across our two coalfields were thus shared experiences of slow and contested incorporation into the coal economy with different groups agitating for improved compensation and especially for permanent jobs over extended periods of time. To achieve these goals, they often sought support from political parties and NGOs while making use of court litigation.

Land and associated preexisting agrarian social relations in these ways remain critical in determining (a) the differential experiences of rural groups and (b) the possibilities for social reproduction. For example, the relatively few who had access to private land titles and received compensatory jobs did markedly better than the previous generation. The majority, however, was forced into informal and insecure work in settings undergoing enormous social, cultural and economic transformations alongside the dramatic landscape changes implied by large-scale coal extraction. Dalits in both the regions remain the worst affected, lacking land holdings and therefore being forced to rely on precarious informal coal jobs for reproduction.

5 | Mine Closure and Coal-Based Livelihoods

Coal mine closure typically occurs a few decades after mining commenced. It is dictated as much by economic as technical, resource availability considerations as the cost of for example keeping the mining pit dry from water to enable deeper coal deposits to be mined might be the deciding factor that it is time to close the mine. Although mining operations come to an end, many mines in India might not actually be closed, however, because this implies spending large sums refilling mine pits, stabilising slopes and waste pits, planting trees and landscaping the area. Instead, the mine is often kept in a limbo state between operations and closure, potentially even waiting for market prices to go up to allow reopening, or at the very least hoping to avoid taking on large mine closure expenditures. It is also possible that mine closure only happens once a new purpose for the land has been identified, as a new investor might come in to set up, for example, a solar power park or other industrial venture. There is no example of land return to previous owners despite legal requirements to do so (see, e.g., Oskarsson et al. 2024).

Open pit mines including those in coal are planned from the start with a legally mandatory, yet frequently unenforced, mine closure plan, which outlines how to restore the land to other uses in a stepwise manner. Such a plan needs to be implemented over time in mined out sections of the working mine to ensure

incremental closure before the complete closure of the entire mine. Several factors have inhibited implementation of the plans to date, including the demand for ever larger quantities of electricity generation. In many cases, increased demand required revising plans every few years not only for more mines but also for increased output among existing mines, thereby intensifying land use and shortening the lifespan of mines. Many mining plans across India with proposed incremental mine closure activities have become irrelevant, or at least not up to date, as land use plans changed.

Like mine establishments, mine closures are politicised in India with a broad spectrum of reactions and forms of mobilisation occurring among affected groups. The formal workers are typically transferred to another mine within or outside of the coalfield or offered retirement packages. Conversely, informal workers face immediate insecurity of income (see Table 1 below for worker experiences from mine closures). Some mine closures therefore see protests led by informal workers with blockades and strikes. Over time, a slow acceptance of the closure tends to set in when different fractions of the agitating groups receiving some form of rehabilitation or other support package in similar ways to mine establishment. Importantly, unlike at the time of original displacement, informal coal workers have no assets like land to use as a bargaining tool when demanding compensation or rehabilitation. They are also unable to block vital operations to more effectively exert pressure because the coal is exhausted and therefore no longer represents value. Many instead migrate for work in nearby mines or are pushed into illegal coal peddling in the now unguarded mines.

To date, the relatively few mine closures experienced across our two coalfields did not trigger organised class action among workers, formal or informal. Mass closure affecting a majority of formal and informal jobs could conceivably trigger a mass movement able to demand significant benefits. Signs of such coordinated demands occurred in Talcher during COVID-19 lockdowns when protests were jointly organised by casual wage workers, business owners, truck drivers and others in collaboration with local associations (Nayak 2022). These protests and negotiations with local authorities and the mine management resulted in a partial opening of mining operations and other economic activities in the area. Such incidents offer hope for postcoal movements coordination when closures become a more widely shared reality than at present.

The Piparwar mine of the North Karanpura coalfield opened 1994 with planned closure in 2029 (Bharat Jan Andolan & Nav Bharat Jagriti Kendra 1993), yet the actual closure occurred in 2020 due to a higher than planned extraction rate. Mine closure activities to date include a small ecological park over a few hectares and a 20-ha solar power plant (Ray 2023) out of the total area of 1120 ha, where 540 ha is the quarry pit. Such efforts notwithstanding, a comprehensive plan is missing for employment opportunities or other local economy support. Jobs at coal loading sites, primarily done by women earning around 300 rupees (3.50 USD) per day, have dwindled, forcing many to turn to illegal coal collection. The partial closure of the Rohini and Karkatta mines has had a severe impact with many small business owners leaving the area. Formal workers are transferred

to other mines and so are many informal workers employed through contractors—such as dumper truck operators, coal handling firms and construction workers. Informal, unskilled workers have been hit hardest, as they lack the option to relocate or find alternative employment within the coal industry. Some truck drivers, helpers and mechanics moved to iron ore mines in Odisha state where similar skills are required, though the pay is lower.

In Talcher virtually, all formal workers are elder sons from previously displaced households. However, many displaced in the second generation and younger sons were unable to secure formal jobs and instead work in coal-based self-employment or contractual jobs. In particular, they are truck owners or labour contractors for various smaller mining works. The Project Affected People society¹⁸ members transport coal within the mines. Formal workers can purchase trucks using borrowed money based on employment contracts and thereby secure work for other male family members. These are insecure jobs but have salaries often equivalent to formal jobs at 450–600 USD per month. Other smaller businesses like repairs, garment, grocery or tea shops and motels are also common among the previously displaced, as are contractual jobs with private companies such as drivers, security guards and labour supervisors.

In Talcher, like in North Karanpura, private companies have taken over many mining-related tasks, and some mines operate completely outsourced. The contractual jobs private companies provide differ from MCL in both quantity and quality; the jobs are fewer, temporary, lower paid and without social security benefits.¹⁹ Interestingly, these jobs are offered after negotiations between MCL, the private company, local political leaders and village groups²⁰ because MCL remains the principal employer by law also in subcontracting. Many young men from dominant caste and class backgrounds with Industrial Training Institute certificates²¹ or truck driving experience can earn 170–250 USD per month. Although half of a formal worker, young men prefer this compared to agriculture or migrating for industrial jobs in other locations. Other casual wage jobs in construction, coal washeries, coal loading and office cleaning earns Rs. 250–300 per day (3–3.6 USD per day) from private labour contractors. This work is primarily carried out by Dalits unable to secure other employment.

The wide range of formal and informal coal-related jobs in Talcher is evidence of a slow process of incorporation. This incorporation has been adverse for many, and it has created coal dependencies among agrarian groups. This expansive labour market becomes endangered when coal mines close down, for example, the underground Handidhwa and Dera mines and the South Balanda open pit mine. The Handidhwa mine closed after a serious mining accident, whereas the Dera mine was loss-making. Meanwhile, coal was exhausted at South Balanda in 2006, and many of its informal workers lost livelihoods after the closure. Although the land previously used for the Handidhwa and Dera mines remains with MCL in case they would like to restart mining, the South Balanda mine has become a tree plantation. Returning the land to the original owners never became a demand nor were alternative land uses in support of livelihoods discussed.

TABLE 1 | Workers, vulnerabilities and outcomes in coal mine closures.

Type of worker	Coal closure vulnerabilities	Closure outcomes ^a
Regular employment at public sector coal mine	• Loss of job, pension, gratuity and other social security benefits • Reduced salary and standard of living • Differential treatment according to age (above 50years vs. below 50years) • Loss of free education and medical care • Loss of accommodation	• Transfer to other mine with continued employment • Voluntary retirement plus other social security benefits (health insurance, unemployment compensation)^b
Contractual coal mine workers employed by private company		
Managerial	• Likely to be retained	• Transfer to other mine/plant by same company
Highly skilled (drivers, operators)	• Loss of job and retirement benefits • Negotiations for retaining their job • Negotiations for release of retirement benefits • Loss of free education and medical care	• Selective transfer to other mines/plants by the same company • Monetary compensation and retrenchment benefits • Likely recruitment by other company (coal or other sectors)
Semiskilled (mechanic)	• Loss of job and retirement benefits • Loss of free education and medical care • Negotiations for retaining job • Negotiations for release of retirement benefits	• Selective transfer to other mines/plants by the same company • Monetary compensation and retrenchment benefits • Likely recruitment by other company (coal or other sectors)
Unskilled (cook, cleaner, etc.)	• Loss of job (no retirement benefits) • Loss of free education and medical care • Negotiations for retaining the job or compensation	• No access to alternative job in the company • Less likely provision of monetary compensation or retrenchment benefits • Pauperisation and outmigration; other unskilled job • Full-time coal scavenging • Food, healthcare and housing via state programmes
Casual wage worker recruited by local contractor ^c	• Loss of job (no retirement benefits paid)	• Pauperisation, Outmigration • Shift to unskilled jobs in other sectors • Transition to full-time coal scavenging • Food, healthcare and housing via state programmes
Coal scavenger	• Difficulty to access coal • Increased risk of fatal accidents or injuries	• Continued scavenging in mines and theft of abandoned machineries/scrap • Food, healthcare and housing via state programmes
Self-employed ^d (local contractors and truck owners)	• Closure of business, loss of income and reduced standard of living • No claims can be made for compensation	• Self-employment in other sectors • Poverty and increased migration • Food, healthcare and housing via state programmes • Unskilled jobs, coal scavenging and theft of scraps in mines

^aClosure outcomes in the table are listed in most likely order based on the data from our two cases. The outcomes are not mutually exclusive.

^bThe likelihood of workers older than 50 transferring to a new mine is low. They are also more vulnerable to reduced income, loss of pension, access to education, medical care and housing. According to Pai (2021) about 500,000 people at present depend on coal industry pensions.

^cBeyond direct mine workers, a vast network of induced workers depends on the coal economy in for example iron mills, brick kilns and the extensive service sector—such as restaurants and repair shops. When coal mines close, these workers face challenges without direct compensation and are often forced to either migrate or scavenge coal. Further research should examine their vulnerabilities and closure outcomes in detail.

^dThe self-employed category includes a range of local business activities. It varies from quite wealthy business owners such as civil contractors to smaller shop and truck owners with heterogenous closure outcomes.

TABLE 2 | Gendered vulnerabilities and outcomes in coal mine closures.

Type of worker	Gendered coal closure vulnerabilities	Gendered closure outcomes
Regular employment at public sector coal mine	• Potential for differential treatment according to gender • Loss of financial independence and identity, implications for gender relations • Exposure to more domestic violence and emotional stress, anxiety with loss of livelihood • Loss of ability to transfer job to next generation	• Shift to underpaid/precarious work in gender stereotypical jobs, e.g., service sector • Increased wage differential • Additional burden of care responsibilities including emotional care
Housewives/miner's wives	• Exclusion from rehabilitation and alternative livelihoods provision by the government • Exposure to more domestic violence and emotional stress, anxiety with loss of livelihood • Deteriorating health with high levels of anxiety and stress There are no women workers in the managerial, highly skilled or semiskilled categories	• Additional burden of care responsibilities including emotional care • Outmigration, shift to underpaid and unskilled jobs
Contractual coal mine workers employed by private company ^a		
Unskilled (recruited by private companies and local contractors, e.g., head loading and casual wage labour)	• Loss of job (without gratuity paid) • Exclusion from compensation and alternative livelihoods provision by the state • Loss of work close to home • Responsibility to gather food • Risk for further malnourishment of women • Exposure to domestic and sexual violence • Deteriorating health with high levels of anxiety and stress	• Pauperisation, Outmigration and transition to unskilled jobs in other sectors, e.g., domestic labour, sex work • Displacement of labour caused by surplus male labour • Increase in Domestification when regular jobs disappear. • Risk for sex-trafficking and prostitution • Forced to full-time coal scavenging • Additional burden of care responsibilities including emotional care
Coal scavenger	• Difficulty to access coal • Increased risk of fatal accidents or injuries	• Risk for Sex-trafficking and prostitution • Additional burden of care responsibilities including emotional care
Self-employed ^b (local contractors and truck owners)	There are very few self-employed women in coal related/induced business activities	

^aWomen at our field sites and in available literature do not work for private contractors other than in the unskilled category. However, many women workers are likely to be categorised as 'induced workers', which are indirectly affected by coal mine closures. For example, many women work in brick kilns, which rely on coal as a primary energy source. These jobs are often informal, low paying and lack employment security, highlighting the gendered dimensions of labour in extractive economies. Although women may also be engaged in other forms of indirect employment linked to mining, their presence within formal contractual coal mine work remains limited.

^bAs outlined in Table 1, the broad self-employment category offers significant employment in the coalfields. These companies, shops and other establishments are, however, largely owned and run by men except for small shops where women help their husbands and contribute as unpaid family workers.

The socioeconomic implications of energy transitions and mine closures on women in coal communities are largely missing from just transition discourses in India (Nayak and Swain 2023). As outlined in Table 2, women across different social categories rarely have formal mining jobs due to gender inequality in the labour market. The few who do have formal, public sector jobs receive rehabilitation like the male formal workers, but the likelihood of an actual transfer to a different coal mine is reduced as their male colleagues tend to be prioritised. Women instead tend to do mainly casual labour and coal scavenging work at the lower end of the labour hierarchy. At closure, they face disproportionate livelihood insecurity and are additionally overburdened by care responsibilities including emotional care. They suffer from increased domestic violence and deterioration of health in part because of the loss of livelihoods of their husbands and sons. In spite of this, housewives are not considered part of the labour market and thus not discussed as directly affected. They are therefore not part of any transfer or compensation.

Both formal and informal women workers typically experience displacement from labour at mine closure, with increased wage inequality compared to men and an enforced engagement in unskilled jobs. For casual wage workers, coal scavenging typically becomes the only alternative unless choosing to migrate elsewhere. Sex trafficking remains a threat in absence of alternative livelihood provision and, more importantly, a lack of access to land and forests to protect against the socioeconomic shock of mine closure.

Across our cases, demands for jobs continue to be made, years and sometimes even decades after the initial mine opening. Those unable to secure a job may use a range of groups and institutions to further their claims, but we also see examples of how claims making, including mass protest meetings, is co-opted by powerful groups intent on furthering vested interests (e.g., securing a business contract) in the name of the poor or the displaced. The labour market across these coalfields has been remarkably able to incorporate large numbers of people, mostly on adverse terms, but nevertheless in ways that allow many to get by. And yet, at the time of closure, most people not in a formal job find themselves ill-prepared and struggle to make a new and difficult transition. At coal closure, they lack both the skills and the assets to find work beyond the local coal economy as large-scale operations end, or at least become dormant,²² and the formal workers are transferred elsewhere (see Table 1 for different transfer possibilities for coal workers). Above all, a lack of access to land and common property resources from forests in desperate times of mine closure instigates high levels of insecurity among affected groups in the coalfields. What remains for livelihoods are the now completely unguarded mines. Given the often missing land restoration activities improved opportunities for informal coal scavengers. Informal mining thus often remains as the only remaining option, whereas other informal workers are left to seek own work as best they can.

6 | Discussion and Conclusion: Uneasy Transitions to and From the Coal Sector

This article reflects on enforced and highly challenging livelihood transitions to and away from coal mining among indigenous and caste Hindu groups in India. As India's national energy production

increased enormously in recent decades, so did the land use from open pit coal mines in Central-Eastern India. But mining is a temporary activity, and after a few decades, coal mines will close. In recent years, closure of the first major open pit mines created the grounds for a comparative analysis of the implications for a just transition away from coal. Our analysis demonstrated that the connection between mine opening and closure is the enduring value of land for rural and previously agrarian groups. Land relations in this manner link the arrival of coal mining and ensuing agrarian decline with the end of coal. They reveal the precariousness of mine closures without land for the majority of households who depend on informal coal work on the margins of the officially recognised industry.

Our two cases of highly challenging transitions find support in the existing literature that shows how the preexisting agrarian social structure (intersectionality of land with caste, gender and class relations) shapes responses and uneven outcomes for coal, renewable energy and other industrial projects in India (Agarwal and Levien, 2020; Noy 2022; Nayak 2023; Stock and Sovacool 2024; Singh 2024). However, we also observe that coal-affected groups respond in differentiated ways over time across and within the coalfields. Mobilisation typically starts with claims over land and resistance to coal mining and later turns into bartering over formal and informal jobs using land holdings. The role of agrarian social structure remains critical in shaping the political reactions of mine-affected groups. As the agrarian economy is reconfigured over time into a mono-economy of coal, new sets of reactions, struggles and demands emerge. Notably, the further integrated the region is into the coal economy, the greater the likelihood of job demands in exchange for land with reduced antimining claims. Among other factors, the role of the state—including the coercive, persuasive and welfare strategies discussed by Subramanyam and Kudva with respect to special economic zones (2021)—defines the temporality of agrarian resistance.

Notwithstanding the frequent demands for jobs outside of agriculture, land remains critical in transition articulations. This is clearly demonstrated through acts, protests and strategies to retain land, or the demand for job compensation when dispossessed from land. At mine closure, land may serve as a backup and source of security when other ways of making a living become impossible. A lack of access to land makes agrarian groups vulnerable but in particular impacts informal workers and women who lack formal compensation mechanisms offered by the official coal sector.

This role of land as a means of social reproduction from the establishment of coalfields through to mine closures and the forthcoming energy transition, parallels its emphasis for agrarian groups and their lifeworlds established in other areas of agrarian studies (Mezzadri et al. 2024). In particular, the global energy transition literature to date is weak in its understanding of agrarian relations and fails to account for the role of land (Oskarsson and Chhotray 2021). Although the Global North dominates literature on decarbonisation, energy and just transition, it is yet to fully encapsulate sociospatialities and (re)territorialisations in energy transitions (Gailing et al. 2020) with particular effects on Global South agrarian societies and land relations (Chandra et al. 2025). As research shows, a majority of research and policy formulations coming from the Global North

perceive energy transition as a technomanagerial process of superficial shifts rather than a societal transformation (Newell 2019; Baranowski 2023). This understanding remains limited to enabling a technical switch from 'fossil to renewables'. The connections between emerging land grabs for 'green' forms of energy generation and the potential to return land to serve as a socially reproductive asset for groups affected by the closing down of fossil fuel extraction remain underexplored.

It is clear that green as well as black energy systems rely on land and the state's control over new and old energy geographies remains crucial (Bridge and Gailing 2020). Fossil fuel energy geographies are land intensive vertically through subterranean access, whereas horizontal access to land is essential for renewable energy geographies (Huber and McCarthy 2017). Policy studies do flag land availability as a major challenge for energy transitions across geographical contexts (Tran and Egermann 2022). The imagination of land, however, does not expand beyond landscape restoration and land use planning catering to the interests of investors and governments seeking to claim territories against the will and aspirations of the rural agrarian poor (McEwan 2017). Recent research identifies energy transitions consisting of four distinct processes: enclosure (capture of land or resources), exclusion (unfair planning), encroachment (destruction of the environment) or entrenchment (worsening of inequality or vulnerability) (Sovacool 2021). This leaves the indigenous and peasants as two large groups at the crossroads of ongoing energy transitions with heightened inequalities for 'land-connected peoples' (Sovacool 2021, Owen et al. 2022), as demonstrated through our two cases of previously agrarian groups in the Indian coal heartlands.

As international and national forums like the annual COP meetings increasingly use terms like just transition and sustainable energy, and in 2023 for the first time directly identified the need to reduce fossil fuel use, it is clear that a range of tensions and uncertainties remain in Indian coalfields. In the ongoing transitions that we study in this article, when coal mines become exhausted the mined out land remains with the coal company unless sold or leased to a new investor for big projects serving private interests.²³ When land is left out of the energy transition equation, coal-dependent rural groups experience increased inequality because of informal heterogeneities in labour, social inequalities such as gender, and the lack of investment in education, professional skills, healthcare and so on that could have supported and enabled new livelihoods. Coal mine closure in this manner typically results in a downward spiral for rural groups as the preexisting inequalities were exacerbated in coal expansions, and then resulted in further marginalisation during closure. Whether a return of land in support of the social reproduction of coal-affected groups will feature in any of the emerging global, national and subnational platforms and discourses, or rural groups themselves will articulate such demands to repossess their mined out lands and resist the downward spiral, is yet to be seen.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

- ¹ Coal-based power in 2021 accounted for 71.5% of India's electricity generation in spite of solar and wind power expansions (International Energy Agency 2024).
- ² The premining stage of geological exploration is not discussed here because coal deposits in India have been historically well mapped and the stage does not result in the same level of livelihoods change as others.
- ³ Similar patterns of 'adverse incorporation' emerged in the context of South Africa amid chronic poverty in Hickey and du Toit (2013) or in India as 'unfavourable inclusion' by Sen (2000).
- ⁴ It is clear that the coal expansion significantly reshapes lives and livelihoods but these are far from the only or necessarily the main changes affecting rural locations in recent decades marked by a gradual retreat of state functions and an increasingly distressed agricultural economy (see, e.g., Shah et al. 2018).
- ⁵ The Jharkhand case is a so-called Scheduled Area with special governance mechanisms to protect Adivasi land rights.
- ⁶ In 1981, about 70% of main workers were cultivators (Directorate of Economics and Statistics 1995), but this reduced to 6% cultivators and 9% agricultural labourers in the 2011 Census.
- ⁷ Data collected from MCL during fieldwork in 2015.
- ⁸ Fieldwork in Talcher was conducted by one of the authors in two phases between 2015 and 2020 for a MPhil dissertation over 4 months. It included a field survey and semistructured interviews in four villages. Follow-up ethnographic fieldwork for 18 months 2018–2020 was part of PhD research.
- ⁹ There is a link between resistance to new mines and the experience of mining. Movements fighting dispossession in large coalfields like North Karanpura have since the 1990s seen and resisted the ever-larger footprint of the industry as it came to rely on open pit mining and the reduction in jobs due to mechanisation. The closed Balanda mine in Talcher has been used as an example in resistance movements. It cautions mine-dependent groups about their future but also incentivises them to seek formal employment with job security after closure.
- ¹⁰ Protests to secure coal sector employment continue into the recent past (see, e.g., Jaipuria 2020).
- ¹¹ The official category Other Backward Castes is a large group of lower to middle-ranging Hindu castes seen as better off than Dalits, the lowest in the caste hierarchy, but nevertheless in need of affirmative action policies.
- ¹² The updated Odisha R&R policy of 2006 is considered more progressive for women and landless, but at this stage much of the land acquisition was complete.
- ¹³ Nayak (2020b) reports that more than 70% of households agreed to having inter and intra family conflicts.
- ¹⁴ Land acquisition can take many years to take effect on the ground after the date of notification. However, the date is used to fix the land rate.
- ¹⁵ Affected groups have to navigate different national and state-level compensation policies (e.g., the Odisha R & R policy of 1989 and 2006) along with company regulations. In October 2024, the national government created a Special Tribunal with the power of a civil court in Talcher for effective disposal of cases related to land acquisition.
- ¹⁶ This reproduction of intersected land and caste inequalities is observed in other parts of the country as well where dominant caste groups with better land access and control end up in relatively well-paid industrial jobs and also become contractors (Donegan 2018).
- ¹⁷ This commonly used term is misleading because many workers may not have a written contract.

- ¹⁸ This is a category of subcontractors hired for internal coal transportation within the mines premises. Seven to eight members (young men) from the landowning households can propose to form a society with the coal mining authority. This allows them to operate as coal transporters.
- ¹⁹ Such outsourcing and contractualisation practices nowadays affect all public sector establishments in India paving the way for labour flexibility with lower wages for the same task performed, longer working hours, reduced or no social security provisions like retirement and medical benefits. Other changes include strict surveillance and control of time (work and leisure) of the workers. Private mining additionally leaves little scope for unionisation of the workers.
- ²⁰ There are two ethnic (caste based) associations working as pressure groups specifically for this purpose.
- ²¹ Industrial training institutes are centres for practical skills development coordinated by the Government of India.
- ²² Official data detail a large number of 'abandoned or discontinued' mines, that is, coal mines not in active operation but also not with completed mine closure activities. Reasons for this might be speculative in expectation of higher coal prices to restart mining or in avoidance of the high costs of mine closure (Press Information Bureau 2022).
- ²³ For example, <https://energy.economictimes.indiatimes.com/news/renewable/coal-ministry-plans-pump-storage-projects-on-closed-mines-for-hydro-energy/103115292>

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