

Accounting for the Incalculable: Shadow Economies, Tax Losses, and Informal Mining in India

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Abstract

India's mining sector is marred by a vast shadow economy of illegal and informal operations that siphon off public revenue. This paper examines the scale and mechanisms of India's shadow mining economy – encompassing unauthorized extraction, output underreporting, tax evasion, and illicit trade – and estimates that over the past two decades, fiscal losses exceed ₹1 trillion. Through case studies of Goa, Odisha, Karnataka, and Jharkhand, we illustrate how regulatory failures, political patronage, and corruption have enabled this parallel economy. We review relevant literature on informal economies and the “resource curse,” situating India's experience in a broader context of governance challenges in resource-rich regions. The analysis identifies key evasion tactics, from mining outside lease boundaries and misreporting ore grade to fake invoicing and shell companies and documents their impact through official audits and judicial probes. We find that weak institutions and regulatory capture allowed widespread abuses, although recent reforms (e.g. electronic monitoring, stricter penalties) show promise in curbing illegal mining. The paper concludes with policy recommendations – including digital tracking of mineral supply chains, tougher enforcement, community engagement, and transparency measures – to reclaim lost revenues and strengthen accountability in India's mining governance.

Introduction

India's mineral wealth is often described as a shared inheritance of the people, with the state acting as trustee to ensure that the “full value of the extracted minerals is received” by the public exchequer (Indian Bureau of Mines, 2019). However, a significant portion of this wealth has been siphoned off through a sprawling shadow mining economy operating outside legal frameworks.

This informal sector of mining – encompassing illegal extraction, underreporting of output, tax evasion, and illicit trade – has led to incalculable losses in government revenue and severe socio-environmental consequences. Over the past two decades, multiple official investigations and audits have exposed the staggering scale of the problem. For instance, the Justice M.B. Shah Commission’s inquiry into illegal iron ore mining estimated that Goa alone incurred around ₹35,000 crore (approximately USD \$5 billion) in lost revenues due to widespread mining violations (Press Trust of India, 2014). In Odisha, a state richly endowed with iron ore, illegal mining was found to have caused roughly ₹59,000 crore in losses, creating political shockwaves when revealed (Press Trust of India, 2022). Comparable illicit operations in Karnataka’s Bellary district – once synonymous with “Republic of Bellary” lawlessness (The Telegraph, 2011) – were estimated by the state Lokayukta to have cost the exchequer over ₹16,000 crore, while in Jharkhand the Shah Commission unearthed about ₹22,000 crore worth of iron ore mined without authority (Press Trust of India, 2014). These figures, though astonishing, likely only scratch the surface of a shadow economy whose transactions are deliberately off the books and hard to quantify.

This paper examines the anatomy of India’s shadow mining economy and its fiscal consequences through both a national lens and state-specific case studies (focusing on Goa, Odisha, Karnataka, and Jharkhand). It draws on a range of secondary sources – including government audit reports, judicial commission inquiries, data from the Indian Bureau of Mines (IBM), media investigations, and academic analyses – to illuminate how illegal and informal mining operations evade taxes and royalties, underreport output, perpetrate Goods and Services Tax (GST) frauds, and facilitate unaccounted mineral sales. The discussion analyzes key mechanisms of tax evasion and the regulatory failures that have allowed these “black” mineral markets to thrive. It also highlights the socio-political nexus that sustains the shadow mining economy, from corporate misreporting to political patronage and bureaucratic corruption. In doing so, the paper underscores the immense public wealth being lost due to unregulated mining and articulates why these losses are truly “incalculable” – not only in monetary terms but also in their developmental opportunity costs.

Following the analysis of the problem’s scale and mechanisms, the paper offers policy recommendations aimed at curbing fiscal losses and improving the traceability of mineral flows. These recommendations draw on best practices and recent reforms (such as digital tracking

systems and legal amendments) to suggest a multi-pronged strategy for more transparent, accountable, and sustainable mining governance. The goal is to reclaim the lost inheritance of mineral wealth for the public and future generations, aligning with the principles of India's mining policy and the broader imperative of responsible resource management. By accounting for the previously unaccounted, India can strengthen its fiscal position and uphold the rule of law in the mining sector, ensuring that the nation's mineral riches truly benefit its people rather than enriching a few in the shadows.

Literature Review

Research on informal and shadow economies provides a conceptual backdrop to India's mining predicament. Shadow economy (or informal economy) refers to all market-based production of goods and services, whether legal or illegal, that escapes official accounting and taxation (Schneider & Enste, 2000). Globally, such unreported economic activity is sizeable: studies estimate the average shadow economy to be about one-third of official GDP in developing countries (Medina & Schneider, 2018). India is no exception – estimates put India's shadow economy in the range of 20–25% of GDP in recent decades (Schneider et al., 2010), reflecting the country's large informal sector and widespread evasion of taxes and regulations. Within this broad informal economy, illegal mining represents a particularly pernicious segment because it involves the extraction of non-renewable resources that are legally owned by the state on behalf of the public. The notion of natural resources as a public trust (as articulated in India's National Mineral Policy) implies that clandestine removal of minerals without full payment is essentially theft of public assets (Basu, 2016). This aligns with the idea that the resource wealth should benefit all citizens – when that chain is broken by corruption and black markets, a form of “resource curse” can take hold.

The resource curse literature suggests that countries or regions rich in minerals often paradoxically suffer from poor governance and development outcomes due to rent-seeking and institutional erosion (Auty, 1994; Karl, 1997). Ample evidence globally links mineral booms to heightened corruption and conflict (Ross, 2001). In the Indian context, scholars have observed similar dynamics in resource-rich states. Chakraborty and Garg (2015) note that some of India's mineral-rich states (like Jharkhand, Chhattisgarh, Odisha) remained economically underdeveloped,

indicating a governance deficit in managing mining revenues. The phenomenon of political patronage and state capture by mining interests is well documented. For example, rent-seeking behavior in India's mining belt has been shown to distort political processes. Asher and Novosad (2023) provide empirical evidence that surges in mineral prices – and thus mining rents – led to significantly higher likelihoods of politicians with criminal records being elected in those areas, presumably as criminalized politicians are more willing to use illicit means to capture lucrative mining opportunities. They find that a doubling of local mineral wealth increased the probability of a politician facing criminal charges winning office by about 30%. This underscores a political resource curse at the subnational level: resource windfalls incentivize patronage networks and weaken accountability, as political actors seek to control mining rents even through illegal avenues.

Another relevant framework is regulatory capture theory, which describes how regulators can be co-opted by the industries they oversee (Stigler, 1971; Dal Bó, 2006). In the mining sector, regulatory capture may occur when agencies responsible for granting licenses, monitoring production, or enforcing environmental laws end up serving the interests of mining companies rather than the public. India's mining scandals exhibit many symptoms of regulatory capture – from mining officials turning a blind eye to violations in exchange for bribes, to politicians directly owning mining companies or receiving campaign donations from them (as later discussed in the state case studies). The result is a breakdown of the principal-agent relationship: instead of acting as agents of the state to ensure compliance, regulators become agents of the mining firms, allowing oversight failures that facilitate illegal mining.

Literature on informal and illegal mining also highlights the socio-economic complexity of the issue. Not all illegal mining is driven by large corporate greed; a portion is artisanal or subsistence mining carried out by impoverished communities. Lahiri-Dutt (2007) argues that in eastern India, “illegal” coal mining has gained local legitimacy as a survival strategy for the poor, who often have few livelihood alternatives. Such activity blurs the line between criminality and informality, suggesting that blanket criminalization without addressing underlying poverty may be ineffective or unjust. However, the focus of this paper is primarily on the large-scale shadow economy in mining – the kind that involves substantial revenue loss to the state – rather than subsistence digging, though the latter is acknowledged as part of the broader informal mining landscape.

Policy and governance studies provide insight into how states have tried to combat mining illegality. Globally, initiatives like the Extractive Industries Transparency Initiative (EITI) promote public reporting of mining revenues to deter corruption (Haufler, 2010). In India, recent institutional reforms such as the introduction of mining auctions (to replace discretionary allocation of mineral leases) and the establishment of District Mineral Foundations (to share mining benefits with local communities) can be seen as attempts to mitigate the resource curse and enhance accountability (Chakraborty & Garg, 2015). Nonetheless, as subsequent sections will show, even after reforms, ingenious forms of evasion and collusion have persisted – indicating that strengthening governance is a continual struggle rather than a one-off fix. This literature review underlines a key theme: the persistence of a shadow mining economy in India is rooted in structural factors identified in global research – high rents from resources, weak institutions prone to capture, and socio-political incentives that favor short-term gains over long-term public interest. With this context in mind, we now turn to the specifics of India’s case, examining the extent of the shadow mining economy and the concrete mechanisms through which it operates.

Methodology

This study is based on a qualitative analysis of secondary data and documentation. We synthesize findings from official reports (such as the Comptroller and Auditor General audits and the Shah Commission of Inquiry), court judgments, government statistics (e.g., Indian Bureau of Mines production data), and investigative journalism accounts to build a comprehensive picture of illegal mining operations and their fiscal impacts. By triangulating information from multiple reputable sources, we aim to ensure that all factual and statistical claims are well-founded. Each major claim – such as estimates of revenue loss or instances of evasion – is backed by references to sources like audit reports, news articles, or academic papers. The case study approach is employed for four states (Goa, Odisha, Karnataka, Jharkhand) known for significant mining irregularities, allowing a deep dive into state-specific dynamics while also drawing out common patterns.

No primary fieldwork or data collection was conducted; instead, the methodology involves a desk review and content analysis of existing records. Given the clandestine nature of the shadow economy, exact quantification is challenging – figures cited are often conservative estimates from enforcement actions or audits. Our approach is to treat these official estimates as minimum bounds

and discuss qualitative evidence of broader systemic leakage. We also incorporate theoretical perspectives (from literature noted above) to interpret the findings. By combining narrative evidence with quantitative estimates from credible reports, this research maintains academic rigor in substantiating claims, while retaining a narrative style to contextualize and humanize the issues. In the following sections, we first outline the overall scale of the shadow mining economy in India, then dissect the mechanisms of evasion, followed by the detailed state case studies and an analysis of governance failures that allowed the situation to escalate.

The Scale of India's Shadow Mining Economy

The illicit and informal mining economy in India burgeoned especially during the commodity boom of the 2000s, when soaring global demand (notably driven by China's industrial expansion) turned minerals like iron ore into highly profitable export goods. Amid this boom, many mining leaseholders and operators – as well as outright criminal networks – exploited regulatory weaknesses to extract and sell minerals far beyond legally sanctioned quantities, or entirely outside the lease system. The result was a series of mining “scams” across different states, each revealing a complex web of collusion and oversight failure, and collectively pointing to massive nationwide losses of revenue. The following paragraphs provide a snapshot of major illegal mining scandals uncovered in the past 15 years and their estimated fiscal impact:

- **Goa (Iron Ore):** In Goa, once India's largest iron ore exporting state, a government-commissioned inquiry led by Justice M.B. Shah in 2012 found rampant illegal mining by nearly all active mines. The commission's report accused both state officials and the Union Ministry of Environment of turning a blind eye to violations, leading to unbridled extraction without proper permits. It estimated that the unpaid royalties, fees, and taxes from illegal iron ore mining in Goa amounted to roughly ₹35,000 crore for the period 2006–2011. This jaw-dropping figure – equivalent to about one-third of the state's annual GDP – underscores how the shadow mining economy had effectively usurped the state's resource revenues. Notably, official export records revealed that 15.97 million tonnes of iron ore were exported from Goa between 2000 and 2011 beyond what was officially recorded as production – a clear indication of systemic underreporting. As the Shah Commission famously summarized, mining companies in Goa “excavated, transported and

exported more than permitted”, flouting every regulation in the book while the state “lost revenue and the nation its resources”. The fallout was severe: in September 2012, Goa’s state government halted all mining activities, and shortly thereafter the Supreme Court imposed a ban on iron ore mining. Although some operations briefly resumed under monitoring, the ban was reinstated in 2018 due to continued irregularities. To this day, Goa’s mining sector remains largely shuttered, illustrating the drastic measures taken to stem the tide of illegality.

- **Odisha (Iron and Manganese Ore):** Odisha is India’s top iron ore producing state, but it too has been a hotbed of illegal mining. The Shah Commission’s investigation into Odisha (2013) noted “large-scale illegal mining” by both small and big players, including encroachment beyond lease boundaries by major firms. A political furor erupted when the Commission’s leaked findings hinted at a ₹59,000 crore loss to the exchequer from iron ore and manganese ore illegalities in Odisha (a figure cited by opposition politicians based on the Commission’s unpublished report). Subsequent interventions by the Supreme Court corroborated these concerns: in August 2017, the Court penalized 131 mining leaseholders in Odisha for illegal extraction, directing them to pay 100% of the value of illegally mined ore since 2000 – an amount initially estimated at about ₹17,576 crore (Banerjee, 2017). This landmark ruling not only sought to recover lost revenue but also acknowledged the “megabucks” made by violators at the expense of destroyed forests and tribal livelihoods. Odisha’s government has since collected much of this compensation, channeling these funds into a dedicated fund for local area development and tribal welfare as per Court orders (Banerjee, 2017). However, even after these measures, recent audits suggest the problem persists in new forms, indicating that the shadow mining economy adapts to and often outpaces regulatory responses. In total, considering various forms of evasion, a 2022 Comptroller and Auditor General (CAG) audit found Odisha lost another ₹22,000+ crore in revenue in the seven-year period after 2015 due to ongoing malpractices (Press Trust of India, 2024).
- **Karnataka (Bellary Iron Ore):** The Bellary region of Karnataka became infamous for illegal iron ore mining during the mid-2000s, when rising iron ore prices and brazen political patronage turned the area into a “byword for plunder” (Suchitra & Juneja, 2013). The Karnataka Lokayukta (anti-corruption ombudsman), Justice Santosh Hegde, after an

exhaustive investigation, reported in 2011 that over 3.3 crore tonnes of iron ore had been illicitly exported from Bellary in just 7 years, costing the state about ₹16,085 crore in lost royalties and taxes. The details were startling: mining companies operating with impunity had encroached on forest lands, mined outside lease areas, and even extracted ore from abandoned waste dumps. The so-called “Republic of Bellary” was ruled by a nexus of mine barons (the Reddy brothers and their associates) and politicians who subverted the law – tellingly, by 2008 one of the key mining barons had become the state’s Tourism Minister and another the Revenue Minister. Regulatory oversight was virtually absent or complicit; for example, the Indian Bureau of Mines (IBM) kept approving vastly inflated annual extraction limits far above any rational domestic demand, enabling miners to legitimize huge outputs that were actually destined for illegal export. It took a combination of citizen activism (a public interest lawsuit by the NGO Samaj Parivartana Samudaya), the Lokayukta’s exposé, and Supreme Court intervention to finally crack down on Bellary’s shadow mining empire. In 2011, the Supreme Court imposed an outright ban on iron ore mining in Bellary (later extended to two neighboring districts) to halt the “unbelievable magnitude” of illegalities. Although mining was gradually reopened from 2013 onward under strict monitoring, the Bellary saga illustrated how deeply entrenched the shadow economy had become – to the point of **capturing state institutions** – and how significant the fiscal stakes were when illegal extraction bypassed the treasury. The subsequent court-led reforms in Karnataka have been somewhat successful in recovering revenue and instilling better practices, but substantial losses from the peak of the scam remain unrecovered.

- **Jharkhand (Iron Ore, Coal and Others):** Jharkhand, rich in iron ore, coal, and other minerals, has likewise seen pervasive illicit mining, though it received less national attention until recent years. The Shah Commission’s report on Jharkhand (2013) found that even reputable companies like Tata Steel and the Steel Authority of India (SAIL) had extracted iron and manganese ore “illegally and without lawful authority,” contributing to ₹22,000 crore worth of illegitimate mineral extraction (Press Trust of India, 2014). The Commission identified dozens of mining leases operating without renewal or environmental clearances and flagged a remarkable data discrepancy: IBM’s recorded iron ore production vs. state records differed by 53.41 million tonnes for the period reviewed.

The “missing” ore (worth an estimated ₹8,685 crore by the Commission’s calculation) was suspected to have been sold off-book to local traders and plants – a direct indicator of output underreporting on a grand scale. Beyond iron ore, Jharkhand has struggled with illegal coal mining (often in abandoned mine sites or through pilferage from active mines) and unlawful quarrying of minor minerals like stone and sand. In one high-profile case, the Enforcement Directorate (ED) in 2022 investigated a nexus involving a political aide of the state’s Chief minister allegedly controlling illegal stone and sand mining in Sahibganj district; the ED identified over ₹1,000 crore as the proceeds of this illicit mining racket (Press Trust of India, 2023). Such figures underscore that the shadow mining economy in Jharkhand spans from large corporate-driven iron ore scams to decentralized mafias in coal and stone – together constituting a parallel underground economy that drains public revenue. Notably, a federal audit (the “Coalgate” report in 2012) on coal block allocation irregularities pegged a notional loss of ₹1.86 lakh crore due to non-transparent allotments (Wikipedia, n.d.), highlighting the huge stakes involved in Jharkhand’s coal sector and providing context for why illegal mining of coal remains rampant.

- **Other Minerals (Sand, etc.):** While this paper focuses on major minerals, it is worth noting that illegal sand mining and other minor mineral operations form another significant part of India’s shadow economy. Sand mining, often controlled by local mafias, has been notoriously difficult to quantify; it becomes difficult to identify whether the sand was illegal once it leaves the site (Park, 2024). Nevertheless, some state audits give a glimpse: a recent CAG report in Odisha found ₹864 crore in revenue leakage from minor minerals over a few years, while another audit in Madhya Pradesh (2019) uncovered hundreds of cases of illegal sand mining with millions of cubic meters of sand unaccounted. The ED has also begun probing illegal sand mining as a predicate for money laundering – for example, in Tamil Nadu the ED conducted nationwide raids in 2022 against a sand mafia accused of large-scale tax evasion and laundering of illicit gains. These examples suggest that if aggregated nationally, the fiscal loss from illegal extraction of minor minerals (sand, stone, gravel) could plausibly run into many thousands of crores, compounding the losses from major minerals discussed above.

In sum, the shadow mining economy in India has reached colossal proportions, effectively hollowing out the tax base that should have been derived from the country's natural resources. Conservative tallies based on official inquiries peg the total losses to the exchequer in the past two decades in excess of ₹100,000 crore (₹1 trillion) when considering just a handful of states and minerals. The true figure, including unreported and ongoing illegal operations, is likely much higher – “incalculable” not only because of the challenges in detection, but also because of the cascading effects on the economy and environment that such figures do not capture. Every rupee of royalty or tax evaded through illegal mining is a rupee less for public investment in infrastructure, education or healthcare. Thus, the stakes in combating this shadow economy extend beyond accounting ledgers to questions of inter-generational equity and sustainable development. The following sections delve into how such extensive evasion has been carried out (mechanisms of underreporting and fraud), illustrate these mechanisms through state-specific narratives, and then analyze the institutional failures that enabled the situation to reach this scale.

Mechanisms of Tax Evasion and Output Underreporting in Mining

Illegal and informal mining operations have employed a variety of tactics to evade taxes, royalties, and regulatory scrutiny. These tactics range from outright theft of minerals on unlicensed properties to sophisticated financial frauds involving fake documentation and shell companies. Understanding these mechanisms of evasion is critical to formulating effective countermeasures. The key mechanisms are analyzed below:

1. Mining without Licenses or Outside Lease Boundaries: One of the most blatant forms of illegal mining is the extraction of minerals without any valid lease or permit, or beyond the sanctioned area of a legitimate lease. In many mining regions, operators have trespassed into forest land, public land, or neighboring lease areas to clandestinely mine high-value minerals, thereby completely bypassing the legal regime. For example, in Odisha, the Shah Commission reported “blatant encroachment” by several companies that mined iron ore outside their lease boundaries. Companies like Tata Steel and Essel Mining were found to have extracted ore from areas adjacent to their licensed sites, effectively enlarging their pits illegally. The Commission recommended that

in cases where more than 10–15% of the lease area was encroached, the leases should be cancelled and the full value of ore extracted from the encroached area recovered from the offenders. Similarly, in Karnataka's Bellary district, encroachment was rampant: mines encroached on reserved forest land and even crossed state boundaries – in one notorious case, a mine extended illegally to Karnataka from neighboring state of Andhra Pradesh. Dozens of mines had mined outside their approved areas, leading the Supreme Court to categorize some as “Category C” mines that deserved outright cancellation.

From a fiscal perspective, mining outside leaseholds is catastrophic: since these operations are completely off the record, no royalties or fees are paid at all on the extracted material. All such output is essentially “stolen” from the state's point of view, with the full commercial value lining private pockets. In Goa, it was documented that ore was mined from unleased areas and transported without paying the government a dime. The Shah Commission noted that many Goan miners operated without mandatory wildlife clearances (33 mines within 1.5 km of wildlife sanctuaries lacked permission) and even after their leases had expired. The former Director of Mines and Geology in Goa was found to have issued illicit permits and condoned excesses in cahoots with mining companies and was later suspended for his role in the scam. In Karnataka, a senior bureaucrat (M.E. Shivalingamurthy) was charged with issuing fake permits to enable the transport of illegally mined iron ore for a notorious mining firm linked to the Reddy brothers. These fake permits created an official façade for what was essentially contraband ore.

In all such cases, the tax leakage is 100% of what should have been paid on the illegally extracted quantity. Beyond the royalty (which is a production tax), other levies like the District Mineral Foundation (DMF) contribution and National Mineral Exploration Trust (NMET) fee – introduced in 2015 to share mining benefits with local communities and fund exploration – are also entirely evaded. Moreover, any profits earned from these off-the-books minerals are obviously not declared for corporate income tax, and if the ore is exported, export duties (where applicable) are dodged. The opportunity for rent-seeking in such scenarios is enormous; as the Supreme Court observed in the Odisha case, illegal mining fetched “megabucks” for violators while causing untold damage (Banerjee, 2017). Closing this basic enforcement gap – ensuring mining can only occur within valid leases and with all clearances – is a fundamental step to curtailing the shadow economy.

2. Exceeding Approved Production and Underreporting Output: Even where mining companies hold a legitimate lease, a common modus operandi has been to exceed the approved production quantity and hide the extra output from authorities. Mining plans and environmental clearances usually cap the annual production of a mine, and royalties are payable on the reported production. By underreporting the true output – for instance, by manipulating weighbridge measurements or trucking out ore at night without records – companies can sell the surplus “off-book” and avoid paying royalties and taxes on it.

The extent of underreporting in some cases has been startling. In Jharkhand, as noted earlier, a discrepancy of 53.4 million tonnes of iron ore production was found between the figures reported to the IBM and those in state records over a certain period. The logical inference was that this quantity – worth around ₹8,685 crore – had been mined but not accounted for in royalty payments. The commission surmised that such unreported ore was likely sold illegally to nearby private processing plants or traders. In Odisha, a 2022 CAG audit similarly uncovered that 1.48 crore tonnes of iron ore were transported from mines without e-transit passes, indicating that this ore was probably not declared at all (or was misdeclared) in official returns. The lost revenue from these undocumented transports was estimated at ₹1,473 crore in royalty alone, and an additional ₹1,200 crore loss was attributed to the state’s failure to verify the sales turnover reported by leaseholders – leading to under-assessment of royalty and taxes. These findings suggest systemic underreporting: miners understate both the volume and value of mineral sales in order to pay less royalty and tax.

Karnataka’s Lokayukta reports described how mining firms in Bellary would routinely extract far more than their permitted quota, bribing local officials to look the other way, and then smuggle the excess ore to ports using forged permits. In one instance, comparing port export data with mine dispatch data revealed huge gaps, confirming that large quantities of ore were never reported to the Mines Department at all. The Central Empowered Committee (CEC) of the Supreme Court, in its investigation, found that between 2003 and 2010 about ₹15,245 crore worth of iron ore was illegally exported from Karnataka – much of it presumably from licensed mines exceeding their limits or from sources never licensed in the first place.

Underreporting is often facilitated by poor monitoring infrastructure. In the past, paper transit permits and manual record-keeping made it easy to manipulate production figures. Check-posts meant to log mineral-laden trucks were frequently understaffed or corrupt. A CAG audit in one state observed that improbably few vehicles were recorded at certain forest check-gates, suggesting that hundreds of ore trucks had passed unchecked (i.e., the check-post staff were either absent or bribed to turn a blind eye). Before recent reforms, many states did not have an integrated electronic system to reconcile mining output with transport and sales, creating ample room for data fudging and “missing” minerals.

The fiscal impact of output underreporting is direct: since royalty is typically levied as a percentage of the mineral’s value or on tonnage, any underreported ton is royalty (and related tax) lost. For instance, iron ore royalty is 15% of the sale price (ad valorem) in India; if one million tonnes of iron ore (worth say ₹4,000 crore) is extracted but not reported, the state loses roughly ₹600 crore in royalty right away, aside from corporate income tax on the profits. In aggregate, underreported output across mines leads to significant leakage in state revenues. The new audits in Odisha showing ~₹2,673 crore (1,473 + 1,200) lost to underreported dispatches and sales in just a two-year period (2020–2022) highlight how contemporary this issue remains. Curbing underreporting requires better surveillance of mining operations (e.g. weighbridge automation, CCTV, drone surveys) and strict reconciliation of data from pithead to end-use or export point. Encouragingly, technologies like GPS tracking of ore trucks and real-time online royalty payment systems have been piloted in states like Goa and Karnataka to address this, showing some success in reducing discrepancies (as discussed later in the case studies).

3. Misclassification of Ore Grade and Product Mislabeling: Beyond quantity, mining companies have also manipulated the quality parameters of mineral production to evade taxes and royalties. In the mining sector, the taxable value of output often depends on the grade or composition of the mineral – higher-grade ore commands higher market prices and thus yields greater royalty per tonne (since royalty for many minerals is ad valorem, i.e., a percentage of value). By misclassifying high-grade ore as lower grade, or by mixing ores to reduce the reported grade, some companies have managed to significantly reduce their royalty and tax liabilities. This practice is a form of undervaluation or mispricing that directly impacts revenue.

A striking recent example comes from Odisha's iron ore mines after the introduction of competitive bidding for mining leases. When many iron ore leases were auctioned to new private players in 2020 (a reform aimed at eliminating discretionary allotments), the new lessees were obligated to pay not only the usual royalty but also a hefty auction premium (a percentage of the sale value of ore) to the state. However, the CAG's 2024 audit observed an "abrupt and abnormal decline in the grade of iron ore" reported by these new lessees (Express News Service, 2024). Before auction, over 83% of production from the sampled mines was high-grade (62% Fe and above), but post-auction this fell to merely 16%, with a huge shift to lower grade categories. In one mine, the share of premium-grade lump ore ($\geq 60\%$ Fe) dropped from 77% under the old owner to $<10\%$ under the new owner in a single year, and then to 0% the next year. It is "highly improbable," the CAG noted, that the ore body's quality would naturally deteriorate so sharply within a year or two. The more plausible explanation is deliberate misreporting: the new miners were downgrading the ore's reported grade to fall into lower royalty brackets and to reduce the calculated value on which the auction premium is paid. By declaring more of the product as, say, 55% Fe ore rather than 65% Fe, the company pays substantially less per tonne. The CAG quantified the revenue implication of this grade misreporting at ₹4,162.77 crore lost in just 2020–2022, across six audited mines (Press Trust of India, 2024). The Odisha government belatedly noticed some of these anomalies and has since demanded around ₹471 crore from a few lessees for grade discrepancies, but that is only a fraction of the suspected shortfall. In essence, misclassification of iron ore grade became a method to avoid paying full royalties and premiums, directly hurting the state's income.

Another form of mislabeling was observed with iron ore "fines" versus "lumps." Royalty rates historically differed for lumps and fines (and in Odisha, a 2010 state order set higher royalty for "crushed fines" vs. "screened fines"). Following this policy change, companies suddenly started reporting a much larger proportion of their output as screened fines (of lower market value) instead of lumps or crushed fines, thereby attracting a lower royalty rate. An investigative report by *Newslandry* on the 2024 Odisha CAG findings notes that **undervaluation of ore by mis declaring product type or grade led to an estimated ₹10,294 crore in lost revenue from 2015–2022 in that state** (Deep, 2024). Similarly, some lessees were flagged for showing an unusual drop in average sale prices, not in line with broader market trends, which hints at collusive

underpricing in reported sales – possibly selling to related parties at artificially low prices to reduce royalty and GST, a tactic closely related to misclassification.

Misclassification is essentially a fraud against the assessment system. It exploits the fact that government relies on company-provided data on grade and sales volumes. Unless regulators physically verify the ore quality through testing or have a robust independent assay system in place, companies can lie about the grade or value without immediate detection. The failure to catch such deception in a timely manner (in the Odisha case, the misreporting went on for two years before the audit detected it) is a regulatory lapse in itself. The fiscal loss from grade misreporting is twofold: (a) immediate loss of royalty/premium (since lower-grade ore has a lower benchmark price for royalty calculations), and (b) downstream loss of corporate income tax if the misreporting is part of profit-shifting. For example, a company might actually sell high-grade ore at ₹6,000/tonne but report it as low-grade sold at ₹3,000/tonne; it then pockets the difference off the books. The state gets royalty on ₹3,000 instead of ₹6,000 (halving the royalty due), and the company conceals the extra profit of ₹3,000/tonne from its taxable income. Such trade mispricing is a form of transfer pricing abuse and can be intertwined with money laundering when the undeclared profit is siphoned to shell companies or tax havens.

4. Fake Invoicing, Shell Companies and GST Evasion: As India’s tax system has modernized – moving to electronic reporting and the GST regime – illegal mining operations have also adapted by creating fake paper trails to launder illicit minerals into the market. One pervasive mechanism is the use of fake invoices and shell companies to document transactions that never occurred, or to hide transactions that did occur.

Under the GST framework, every sale of goods (including minerals) should be accompanied by a tax invoice and an e-way bill for transport. Illegal miners, who operate outside this net (often selling for cash), need to inject their product into legitimate supply chains to reach end-users like factories or exporters. They do this by generating bogus invoices through shell firms – paper companies that exist only to issue bills without actual material. For instance, if an illegal miner has 10,000 tonnes of coal to sell, they might collude with a shell trading firm to issue GST invoices as if the coal were acquired legitimately (often mis-declaring it under some low-tax category or as recycled material), allowing the coal to be transported with “proper” paperwork. The GST shown

on such fake invoices is typically never actually remitted to the treasury (the shell firm vanishes or claims fake input credits to offset it). This results in GST evasion and generation of unaccounted cash. Indian authorities have uncovered multiple GST fraud rings of this nature across various sectors. It is likely that a portion of these scams involved commodities like minerals and scrap, though specific breakdowns by sector were not made public.

Another aspect is input tax credit fraud on mining inputs. For example, mining companies could purchase machinery or explosives and then route the invoices through dummy entities to claim input GST credit without corresponding output GST, but such practices are more technical and less documented in public sources. More directly relevant is GST evasion on the output (minerals) by suppression of sales. If an illegal miner sells iron ore domestically to a steel plant entirely in cash, neither side will report the sale or pay GST (which is 5% on iron ore). If challenged by authorities, they might produce false invoices showing the ore came from a legal mine or was imported scrap, etc., to mask the origin and make the transaction appear legitimate.

A concrete example illustrating financial engineering is from the Bellary illegal mining case. Investigators found that the Reddy-owned firm Obulapuram Mining Company (OMC) used a one-dollar Singaporean shell company named GLA Trading International to route iron ore sales. OMC sold ore at artificially low prices to GLA – thus showing minimal profit in India and hence owing lower income tax, and also lowering the royalty since at that time royalty was a fixed rate per tonne that could be gamed by underreporting the grade/value. GLA then sold the ore onward at full market price, pocketing the profit abroad.

The Income Tax Department's investigation concluded that OMC's arrangement with GLA was "convoluted and devised to evade tax payment in India" (Aiyappa, 2010). The probe found evidence of under-invoicing of exports by OMC and identified ₹86 crore in taxes evaded in just a short period, making it one of the biggest tax fraud cases at the time (Aiyappa, 2010). Essentially, the Reddy brothers laundered their illegal mining profits through an offshore account, illustrating how the shadow mining economy often goes hand-in-hand with illicit financial flows and black money. In this case, not only were royalties underpaid (due to undervaluing the ore on paper), but corporate income tax and possibly export duties were dodged via trade mis-invoicing. Investigators

confirmed the malpractice by comparing OMC's export shipping documents with those of other companies exporting similar grade material, finding glaring discrepancies.

GST-related fraud in mining can also involve bogus export claims. Since exports are zero-rated under GST (no output tax), an entity could pretend to export iron ore (to avoid GST on sales) while actually diverting the goods in the domestic market – or conversely, falsely claim GST refunds/credits on mining-related purchases against non-existent exports. While specific instances of GST fraud in mining have not been widely reported yet (given that GST came into effect in 2017, after the biggest mining scams of the 2000s), the potential is clear. The structure of GST means that any underreported production directly translates to GST evasion on the sale of that production, in addition to royalty evasion. Thus, the underreporting mechanism discussed earlier leads to a double hit: loss of state royalty and loss of central (and state) GST.

In summary, the shadow mining economy uses financial engineering and fraud to hide its tracks: fake invoices to create a paper trail for illicit minerals, shell companies (often controlled by the same owners) to shift profits and avoid taxes, and false reporting under tax laws to minimize liabilities. These activities make it challenging for authorities to link illegal mining to tax evasion without extensive forensic audits. They also convert what should have been public revenue into private illicit wealth, which is often laundered into assets like real estate, luxury goods, or even political funding. At least ₹6,962 crore of mining revenue loss in Odisha was linked to companies that subsequently donated around ₹601 crore to political parties via opaque electoral bonds (Deep, 2024). This suggests a troubling cycle where proceeds of mining evasion fund political interests, which in turn may fuel further collusion and regulatory laxity. The interconnected nature of these evasion mechanisms highlights that the shadow mining economy is not merely about rogue miners or isolated gangs – it is entrenched in the economic and political fabric of the sector, requiring systemic reforms to uproot.

State-Specific Perspectives: Case Studies of Mining Shadow Economies

While the broad patterns of illegality and tax loss recur across India, each mineral-rich state has experienced the shadow mining economy in distinct ways, shaped by its geology, politics, and governance. Here we examine four states – Goa, Odisha, Karnataka, and Jharkhand – to see how the evasion mechanisms described above played out on the ground and what the consequences have been.

Goa: From Boom to Ban – Iron Ore’s Shadow Economy

Goa presents a textbook case of a resource boom fueling a shadow economy. In the 2000s, Goa’s low-grade iron ore (mostly fines with ~55% Fe content) became highly sought after in Chinese markets, as China’s steel mills could mix it with higher-grade ore. Goa’s iron ore exports rocketed, and so did illegal mining. The Shah Commission’s report on Goa (2012) exposed that virtually every mine in the state was flouting regulations. Companies habitually mined beyond their lease limits, extracted ore far in excess of approved quantities, and did so without necessary clearances (tellingly, none of the 90 active iron ore mines at the time had the required wildlife clearance). Government agencies supposed to monitor mining – the state Mines Department, IBM, pollution control boards – either willfully ignored the red flags or were undermined by political interference. According to the Commission, illegal extraction and export of iron ore from Goa between 2006 and 2011 led to a revenue loss of about ₹35,000 crore. This figure included unpaid royalties, export duties, cess and other taxes. To put it in perspective, the loss was over five times the state’s annual mining revenue around that period, indicating that a large portion of mining activity was outright illegal and not reflected in official accounts.

A closer look reveals how the aforementioned evasion mechanisms were rampant in Goa. Underreporting was evidenced by the gap between export volumes and reported production – over 15 million tonnes of ore were essentially unaccounted for in official records, implying that this quantity was mined and sold outside the legal books. Encroachment was endemic, with mines operating in nearby forests and even on community lands beyond their leases. Transport fraud was

another facet: investigations found that a local mining family ran an elaborate operation with fake transport permits and manipulated weighbridge records to truck ore to ports without detection. It was common for thousands of truckloads to move at night outside permitted hours, evading state checkpoints (some of which were deliberately kept non-functional by design or bribe). Collusion at high levels became apparent when two former Chief Ministers of Goa were named in the Commission's findings for either facilitating illegal mining or turning a blind eye. In fact, one ex-CM (Digambar Kamat, who had also been the Mines Minister earlier) was alleged to have approved mining leases and expansions in contravention of law, and he faced investigations for his role.

The fallout in Goa was dramatic: in September 2012, the Goa government halted all mining activities, and shortly thereafter the Supreme Court imposed a ban on iron ore mining in the state. The ban lasted 18 months, during which expert committees assessed the environmental damage and the inventory of mined ore lying at pitheads. Although mining was allowed to resume in 2014 under stringent monitoring and with an annual cap (20 million tonnes for the state), the relief was short-lived. In 2018, the Supreme Court quashed the second renewal of 88 mining leases in Goa, citing rampant illegalities and the failure of the state to curb violations, effectively shutting down mining again. This sequence – boom, abuse, and ban – left Goa's economy reeling (mining had been a key revenue source and employer), but it also highlighted an important policy dilemma. On one hand, the shadow economy had to be stopped to uphold the rule of law and recover dues; on the other, an outright ban also meant loss of even the legitimate revenues and considerable economic pain for dependents on the industry. As of 2023, iron ore mining in Goa remains largely dormant awaiting fresh auctions of leases, and the state has had to forego mining-related income (royalties, local taxes, GST from mining operations, etc.) during this period. Arguably, if better governance had been in place earlier, Goa could have sustained mining activity in a regulated fashion and earned income without needing such a disruptive blanket ban.

For Goa, key lessons emerge. Traceability and transparency were grossly lacking – until the scams came to light, there was little independent tracking of ore from mine to ship. Post-scandal, Goa implemented an ambitious digital monitoring system: all mining trucks were fit with GPS trackers, mines installed CCTV cameras and electronic weighing systems, and a centralized monitoring platform (developed by a tech firm, Telematics4U) was launched in 2014 to track iron ore

movement in real time. This system included features like SMS alerts to truckers to schedule trips and was touted to eliminate the need for bribing police at checkpoints. It was reported that when mining briefly restarted, about 7,000 trucks were brought onto the GPS platform and all pithead weighbridges were networked to the system. The initiative helped detect unauthorized trips (GPS would flag off-route or after-hours movement) and ensured that each tonne leaving a mine was accounted for. The economic logic is simple: if you can measure it, you can tax it. Goa's experience underscores that without robust measurement and oversight, a resource boom can quickly turn into a curse of plunder – with the state exchequer left empty-handed even as millions of tonnes of ore are shipped overseas. The Goa case also demonstrates the importance of judiciary-led enforcement when executive oversight fails: Supreme Court interventions in 2012 and 2018, though harsh, were pivotal in breaking the cycle of rampant illegal mining.

Odisha: Riches and Regulations – Ongoing Challenges in Curbing Illegal Mining

Odisha, endowed with abundant high-grade iron ore (as well as bauxite, coal, chromite and other minerals), provides a contrasting scenario to Goa. Mining in Odisha has been dominated by big corporates and a few influential families, and the scale is immense – in recent years Odisha has contributed over half of India's iron ore output. The shadow mining economy in Odisha came under the scanner slightly later than Goa's, but when it did, the revelations were equally astounding. The Shah Commission's Odisha investigations (circa 2012–13) hinted at widespread illegal extraction and export of iron and manganese by both legal leaseholders and unauthorized operators. One headline-grabbing figure was a conjectured **₹59,203 crore loss** (mentioned by opposition politicians citing the Shah Commission's draft findings) – a number that created a political storm in the state assembly. While that figure was never officially confirmed in a public report, the subsequent Supreme Court case *Common Cause vs Union of India* firmly established that there were extensive violations by mining companies in Odisha between 2000 and 2010 (Jha, 2017). The Court's judgment in August 2017 noted that out of 187 mining leases in the major iron ore districts, 102 leases were operating in violation of at least one major law – either without forest clearance, without environmental clearance, or beyond approved limits. These 102 leases were eventually ordered to pay 100% compensation for all production outside the law.

Odisha's case is instructive because it shows multiple layers of evasion. First, many companies simply mined more than their approved limit (some mines extracted 2–3 times their annual sanctioned tonnage during the peak boom years). Second, a significant number did not have the required clearances – meaning their entire output during those periods was technically illegal (thus no royalties should have accrued, and whatever royalty was paid could be considered underpayment because the mining itself was unauthorized). Third, as later evidenced by the CAG's 2024 audit, even after the crackdown and the introduction of auctions, new forms of evasion emerged, such as the grade-downgrading scam and the transport pass evasion described earlier. The CAG's findings from 2015–2022 paint a picture of continuing ingenuity in cheating the system: roughly ₹22,000 crore of revenue was lost due to undervaluation of ore, wrongful grade declarations, exceeding output limits, and unaccounted mineral dispatch in just seven years. Specifically, eight iron ore mines were found to have exceeded their mining limits, costing ₹3,619 crore in lost revenue (royalty and premium). Undervaluation and grade fudging together cost over ₹14,000 crore. Additionally, mining beyond environmental clearance limits (even if within the lease area) caused a ₹1,600 crore loss, reflecting that production above the EC cap wasn't supposed to happen and thus royalty on that excess is effectively illegitimate.

One reason Odisha continues to face challenges is the nexus between miners and the political establishment. (Deep, 2024) highlighted that many of the companies flagged by the CAG as top violators are also major political donors in the state. The ruling party (BJD) and even the main opposition (BJP) received hundreds of crores through electoral bonds from these mining entities in recent years, potentially dulling the incentive for stringent action. This nexus can manifest in softer enforcement or delayed penalties. For instance, despite clear evidence as early as 2020–21 of grade downgrading by the new auctioned lessees, the state government only formed a committee in 2022 to look into it. Even when ₹471 crore was finally assessed as due from a few mines for misreporting, the lessees filed appeals and the matter dragged on, during which time fresh violations may have continued. Meanwhile, the revenue losses piled on. Such delays suggest that political will at the state level has been ambivalent – strong on paper due to court pressures, but tepid in practice when influential business houses are involved.

On a positive note, Odisha has been a pioneer in e-governance in mining in some respects. It developed an Integrated Mines and Minerals Management System (i3MS) which digitizes permits,

production reporting, and transport dispatches by issuing electronic transit passes. The fact that the CAG could identify 1.48 crore tonnes moved without e-pass implies that the system is at least logging all legitimate movements – hence the discrepancy was detectable by comparing logs with actual activity. The challenge is ensuring compliance (i.e., that no truck moves without a valid e-pass in the first place). Odisha also experimented early with GPS tracking of ore transport: as of the mid-2010s, the state mining PSU (Odisha Mining Corporation) was piloting GPS trackers on ore trucks. Additionally, Odisha was among the first states to operationalize a satellite-based Mining Surveillance System (MSS) in collaboration with IBM and the Ministry of Mines, to detect illegal mining via remote sensing (reports indicate that suspicious excavation activity outside authorized lease areas is flagged to district authorities through this system).

The Odisha story underscores that regulatory tightening can yield results, but violators often find new loopholes. The Supreme Court’s imposition of the ₹17,000+ crore penalty in 2017 was a game-changer – it sent a message that large-scale illegal mining would not only be halted but also severely penalized financially. The state’s coffers did receive a significant infusion (media reports indicate around ₹12,000–13,000 crore was realized by 2020 from these penalties, which were placed in a special fund for the benefit of mining-affected areas). This money is earmarked for community development and tribal welfare, partly compensating local populations for the past harm. However, even as one chapter closed with those penalties, another opened with the post-auction malpractices. Thus, Odisha teaches us that **constant vigilance, periodic audits, and quick follow-up actions** on audit findings are essential. It’s not enough to have rules on the books; enforcement and timely punishment are key, as is breaking the political patronage system that shelters the mining lobby. Odisha’s ongoing challenges highlight that the shadow mining economy is adaptive – as one avenue is blocked, another may emerge – requiring regulators to continuously innovate and maintain integrity.

Karnataka: Breaking the “Republic of Bellary” – Enforcement and Aftermath

Karnataka’s battle with illegal mining, centered on the Bellary-Hospet region, is a dramatic tale of excess and correction. By the late 2000s, Bellary’s iron ore rush had reached fever pitch – driven by Chinese export demand and abetted by a complicit state apparatus. The Reddy brothers (one of whom was a cabinet minister in the Karnataka government) along with their allies created an

empire of mines (through companies like OMC and associated firms) that operated with impunity. As detailed earlier, the Lokayukta reports (2008 and 2011) documented how this group, in collusion with officials, engaged in “massive underpayment of state mining royalties” and systematic violations of mining and environmental laws. The Income Tax department raids in 2010 further peeled back the curtain on the financial side, exposing under-invoicing of exports and the use of offshore entities (like the Singapore shell company) to evade taxes. The uncovered tax evasion of ₹86 crore was likely just one slice of a much larger pie of undeclared profits.

The turning point was the intervention of the Supreme Court via its Central Empowered Committee (CEC). In 2011, reacting to public interest litigation and the mounting evidence of chaos in Bellary, the Court imposed a blanket ban on mining in Bellary (later extending it to two adjacent districts). This bold step halted legal and illegal mining alike, providing a breather to assess the situation. The CEC then undertook a comprehensive survey and categorization of mines based on their level of illegality: Category A for mines with no or minimal violations, Category B for mines with significant violations (like moderate boundary encroachment or some overproduction), and Category C for mines with egregious violations (large-scale encroachments, operating without any clearances, etc.). In its final order in 2013, the Supreme Court cancelled all 49 Category C leases outright and mandated their reallocation via fresh auctions. It severely penalized some Category B mines (with fines and partial suspensions) and allowed only the most compliant Category A mines to restart, that too under strict monitoring and production caps. The Court also set an annual production cap of 30 million tonnes for the entire Bellary-Hospet region to prevent future over-exploitation.

From a fiscal perspective, Karnataka post-ban instituted mechanisms to ensure that revenue from any continuing mining was properly captured. A Court-appointed **Oversight Committee** supervised all sales of iron ore from the region for a period, implementing an electronic auction system. All iron ore produced or stockpiled had to be sold through periodic e-auctions conducted by the state-owned company MSTC, with proceeds transparently routed. Buyers had to bid online, pay through official channels, and royalties and taxes were directly deducted at the point of sale. This reduced opportunities for under-invoicing or off-book sales – essentially, it forced the trade into the open. The system also inventoried and auctioned off large quantities of seized illicit ore (lakhs of tonnes that had been mined illegally and confiscated during the crackdown), thereby

converting contraband into public revenue. Additionally, Karnataka imposed an interim “forest development fee” on ore sales to fund environmental rehabilitation in the degraded mining areas. Over time, these measures helped recover some of the losses – for example, by 2013, the Karnataka government had collected over ₹1,000 crore from e-auctions of stockpiled ore and from penalties on errant miners.

In terms of traceability, post-ban Karnataka, like Goa, invested in technology and institutional reforms. The state introduced GPS tracking for all mineral transport trucks and bolstered its computerized permit and transit pass system. Notably, mine lease boundaries in Bellary were re-surveyed using Differential GPS to eliminate any ambiguity and prevent future encroachments; this exercise revealed the extent of previous encroachments and allowed precise digital maps to be drawn for monitoring compliance. The state also empowered its Lokayukta and constituted a specialized mining task force to conduct surprise checks on mining operations and transport routes. Though the Reddy network was politically influential, the crackdown saw one of the Reddy brothers, G. Janardhana Reddy, arrested by the CBI in 2011, and several bureaucrats who had facilitated the scam were disciplined or prosecuted. The deterrence effect was significant: from a peak of lawlessness, Bellary’s mining industry was forced to toe the line under close scrutiny or risk losing leases and facing jail time.

However, one must also note the economic impact of this enforcement in Karnataka. The mining ban and subsequent restrictions caused a raw material shortage for local steel and allied industries and led to job losses in the mining sector. Sponge iron plants and small transport businesses in the region suffered, underscoring that sudden enforcement, while necessary to restore law and order, comes with adjustment costs. This highlights the importance of continuous governance – had regulatory oversight been effective from the start, such a severe shock might have been unnecessary. By 2021, Karnataka’s iron ore mining had stabilized under the new norms, and the Supreme Court began easing some of the stringent restrictions, citing improved governance and the need to support the local economy. Illegal mining, at least as an organized large-scale racket, has been largely contained in the region – a major success compared to the situation a decade prior.

Karnataka’s experience shows that strong legal action and institutional reforms can indeed rein in the shadow economy, but it requires sustained commitment and oversight. It also illustrates that

the fruits of such action are not just in immediate revenue recovery, but in intangible gains: restored rule of law, improved environmental conditions (it was noted that the pervasive red dust haze over Bellary literally cleared up during the mining ban), and greater public trust that the state will enforce the law in the public interest. Karnataka's case has often been cited as a model for other states – for example, the concept of categorizing mines by compliance level and the use of independent monitoring committees were recommended for adoption in Goa and Odisha as well. The message is that it is possible to break an entrenched nexus of illegal mining, but it demands bold interventions and the creation of new governance structures to keep the industry transparent.

Jharkhand: Hidden Minerals, Visible Corruption – Struggles in Enforcement

Jharkhand's mining sector has a dual character. On one hand, large public sector and private mines (for coal, iron ore, etc.) dominate official production. On the other, there is a vast underbelly of unorganized, illegal mining – from makeshift coal “rat-hole” mines and pilferage in the Jharia and Dhanbad coalfields, to illicit quarrying of stones and sand in the state's rural areas. The state also hosts some major steel plants and mineral industries which historically enjoyed cozy relations with political elites.

The Shah Commission's findings for Jharkhand (2013) pointed to malpractices by even the big players. It named Tata Steel, SAIL, Usha Martin, Rungta Mines, and others for a range of violations: operating mines on “deemed renewal” for years without formal renewal or updated clearances, mining more than approved limits, and not adhering to environmental and forest safeguards. The Commission highlighted a regulatory gap wherein many leases were in a perpetual state of pending renewal – companies took advantage of this ambiguity by continuing operations without scrutiny, essentially mining on expired licenses under the excuse that renewal was in process. Additionally, Jharkhand had the peculiarity that a large portion of its iron ore output comes from a handful of big mines (such as SAIL's Kiriburu-Meghahatuburu mine or Tata's Noamundi mine). When even these major, supposedly well-regulated mines were found to have extracted ore beyond limits or during periods when their clearances had lapsed, it underscored that illegal extraction wasn't just the realm of obscure small operators but was happening at the heart of India's industrial mining operations.

However, where Jharkhand's shadow economy really stands out is in the area of coal and minor minerals. Illegal coal mining has been rampant – often carried out by local mafia groups or splinter criminal outfits who either scavenge leftover coal from abandoned mines or even clandestinely extract coal from active Coal India leaseholds by bribing local officials. This “coal mafia” economy not only robs the state of royalty (coal royalty rates are substantial given coal's value) but also funds other criminal enterprises and sometimes militant insurgencies. Parts of Jharkhand (and neighboring eastern states) have seen proceeds from illegal coal and iron ore trade flow to insurgent groups (Maoist-Naxalite rebels), who “tax” these activities to fund their operations – a classic case of natural resources fueling conflict and violence instead of development. A study on local incentives in mining noted that when local governments or communities do not visibly benefit from legal mining, they have fewer incentives to curb illegal extraction, sometimes even abetting it for a share of short-term gains (Chandra & Rudra, 2015). In Jharkhand's remote areas, lack of alternative livelihoods makes illegal mining an attractive albeit dangerous option for many villagers, who get sucked into the informal mines as diggers, carriers, and coal peddlers.

Corruption in the state machinery has further compounded the issue. A sensational case unfolded in 2022–2023 involving Pankaj Mishra, a political aide of Jharkhand's Chief Minister, which revealed how high-level patronage can drive local illegal mining rackets. The ED accused Mishra of running an extortion and illegal mining racket in Sahibganj district, controlling everything from inland ferry services to numerous stone quarries and sand mining sites. Investigators alleged he siphoned off at least ₹42 crore (traced) and potentially over ₹1,000 crore in illegal assets through these activities (Press Trust of India, 2023). The case painted a vivid picture: proceeds from illegal stone and sand mining were being funneled into luxurious properties, benami bank accounts, and political slush funds, implicating individuals at the highest level of state politics. This suggests that even in recent years, with all the national attention on mining scams elsewhere, Jharkhand continued to struggle with deeply entrenched local corruption enabling illegal mining.

From a revenue perspective, Jharkhand's losses due to illegal mining are not as well quantified in public reports as those of Goa or Odisha, but they are undoubtedly significant. The underpayment of royalties by big companies (through grade misdeclaration or volume underreporting as discussed earlier) would directly hit the state's mining revenue. Meanwhile, illegal operations by smaller players, especially in coal, mean lost central royalties and taxes (since coal royalty goes to

the central pool and is shared). The Union Government's coal block allocation scam report in 2012 (though it dealt with allocation rather than extraction) gave a sense of the stakes: it estimated a notional loss of ₹1.86 lakh crore due to non-transparent allotment of coal blocks (a figure from a draft CAG report) – this was money that enterprises stood to gain by getting coal blocks cheaply, which one can analogously consider lost to the public. While that was a policy corruption issue, on the ground illegal coal mining itself likely runs into hundreds of crores of rupees annually in lost royalties and taxes in Jharkhand.

Jharkhand has been trying to tighten enforcement, albeit with mixed results. The state mining department periodically launches drives to seize illegally mined coal and arrest smugglers. There are often news reports of raids where trucks carrying smuggled coal or stone are confiscated. In recent years, Jharkhand has also started using some of the digital tracking tools adopted elsewhere – for example, issuing e-permits for mineral transport and installing RFID tags at some highway check-posts to track mineral-laden trucks. Yet, the vast, rugged terrain of the state and the socio-economic backdrop of poverty and lawlessness in many pockets make it a daunting task to fully stamp out illegal mining. Enforcement is also impeded by the thin presence of state institutions in remote areas and, as noted, by local complicity. The human cost of the shadow mining economy in Jharkhand is high: frequent accidents and deaths occur in the illegal coal pits (unofficial mines are prone to collapses and carbon monoxide poisoning) and in unsafe stone quarries where laborers work without any safety gear. These tragedies rarely make it to the fiscal ledger but are part of the true cost of the shadow economy – essentially, the poor bear the risks with their lives and limbs, while powerful actors reap most of the financial gains.

In summary, Jharkhand's case reinforces the complexity of the issue: it is not just a matter of plugging tax loopholes, but also addressing governance and development deficits. The shadow economy thrives where institutions are weak and people are desperate for livelihoods. So, while technical fixes like better audits, e-passes, and tracking systems will certainly help, deeper political will and socio-economic interventions are needed to root out the incentives for illegal mining at the local level. Until those underlying drivers are addressed, in Jharkhand the earth will be eaten away in broad daylight, but the state would end up waking only when the hole is too deep.”

Regulatory Failures and Governance Gaps Enabling the Shadow Economy

The pervasive scale of illegal mining and tax evasion in India's mineral sector points to systemic regulatory failures. It is crucial to dissect why existing institutions and laws were unable to prevent or promptly detect these activities. Several interrelated failures can be identified:

- **Institutional Collusion and Corruption:** Perhaps the most fundamental problem has been collusion between mining interests and those expected to regulate them – politicians, bureaucrats, and even police or judiciary in some cases. In each state case, we saw allegations or proof of high-level involvement: Goa's mining scam implicated two former Chief Ministers and the state Mines Department chief; Karnataka's scandal had ministers themselves owning mining companies and exerting influence to cover up violations; Odisha's ruling party and opposition both benefited from donations by offending miners (Deep, 2024); and Jharkhand's ruling elites were directly accused of running illicit operations (Press Trust of India, 2023). Such collusion erodes the checks and balances that are supposed to catch illegalities. For example, forest department officials who should have reported encroachments were bribed or pressured to stay silent; auditors who found discrepancies could be leaned on to tone down reports; local police often acted as enforcers for mining mafias rather than law enforcers (the term "goonda tax" emerged in some regions (The Times of India, 2021), referring to extortion by thugs for each truck of illegal material, operating under political patronage). In short, corruption created an environment of impunity. The cost of bribing was just factored into the business of illegal mining – a relatively small operating cost – and as long as profits far exceeded the costs, the racket thrived. This indicates a need for strong anti-corruption action and de-politicization of the regulatory apparatus as part of the solution. Reforms might include stricter asset monitoring for officials, rotation of staff in sensitive posts, and independent oversight bodies, some of which we suggest in the policy recommendations.
- **Fragmented Regulatory Framework:** Mining regulation in India is shared between central and state authorities, which often leads to gaps in coordination. The central government (through the Ministry of Mines and agencies like IBM) sets overall policy,

approves mining plans, and oversees major minerals, while state governments are in charge of lease administration, collecting royalties, and monitoring day-to-day operations. Environmental clearances come from the central Ministry of Environment, while forest clearances involve both state forest departments and the central ministry. This fragmentation can lead to poor coordination. A miner could exploit the gaps – for example, starting mining operations after getting a state lease renewal but before obtaining the required central environmental clearance, citing one authority's permission while another's process is pending. The Shah Commission noted that several mines in Odisha and Jharkhand were running under deemed extension from the state (allowed to continue as their lease renewal applications were pending) even though their environmental or forest clearances had expired. No single authority was checking all compliance boxes together. Even data wasn't systematically shared: IBM collected production data from mines, state departments collected royalty payment data – when the Shah Commission compared the two, huge gaps emerged that neither side had flagged for years. This indicates a governance failure where integrated data systems and joint inspections were missing. The Commission recommended better inter-agency coordination (e.g., a unified database and combined inspection teams), but implementation has been slow. Recent moves, such as the central government's Mining Surveillance System and efforts to link IBM and state data, are steps in the right direction but need to be expanded and institutionalized.

- **Outdated and Lenient Legal Provisions (Historically):** Until amendments in 2015, the penalties under the Mines and Minerals (Development & Regulation) Act (MMDR Act) for illegal mining were relatively mild. For instance, violating the Act could result in a fine of only up to ₹50,000 and/or imprisonment up to 2 years – penalties that were seldom enforced. The Act was also somewhat vague on actions against mining beyond lease boundaries or mining after lease expiry. This weak legal deterrence emboldened violators – the worst that usually happened was seizure of a few truckloads of ore or a minor fine, which was a pittance compared to the profits from illegal mining. Moreover, government officials found complicit were rarely punished; internal departmental actions were tepid and prosecutions rarer still. The turning point came when the Supreme Court, invoking Section 21(5) of the MMDR Act, affirmed in the Odisha judgment that the full value of illegally mined ore (not just royalty) can be recovered from miners (Banerjee, 2017). This

set a precedent that illegal mining isn't just a minor regulatory offense but effectively theft of national assets warranting full restitution. Following this, the MMDR Act was amended in 2015 to beef up penalties: illegal mining was made a cognizable offense (so police can register cases directly), fines were increased substantially, and repeat offenders could face higher sentences. Still, laws are only as good as their enforcement. Many of the legacy cases dragged on in courts or bureaucratic appeals. Implementation rests with state machinery, which brings back the issue of local will and capacity. For example, even after 2015, one finds instances where states prefer to levy a compensatory penalty and let a violator continue operations ("penalty and continue") rather than cancel the lease – possibly because of political pressure or the revenue interest in keeping mines running. This leniency can blunt the impact of the law. Therefore, legal provisions, while strengthened on paper, need to be coupled with unwavering enforcement by authorities to truly deter illegal mining.

- **Inadequate Monitoring and Use of Technology (Until Recently):** For years, the oversight of mining operations in India remained **manual and trust-based**, which proved woefully inadequate. The system of transit passes for mineral transportation was paper-based, making it easy to forge, reuse, or obtain duplicates. Weighbridges at mine sites could be tampered with – there were cases of magnetic devices or software hacks used to under-report weight measurements. Many mines didn't even have functional weighbridges or would bypass them by trucking out at night. There was scant use of modern surveillance tools – something as straightforward as GPS tracking on trucks wasn't adopted widely until after the big scams were exposed. The Mining Surveillance System using satellites was launched only in late 2016 at the national level, well after the damage was done in many states. Prior to that, illegal mining could go undetected for long periods unless a whistleblower or a surprise inspection happened upon it. Check-post infrastructure was weak; many states did not have computerized vehicle tracking or CCTV at key transit points. In the absence of modern systems, detection relied on human vigilance which was vulnerable to corruption or simple evasion (e.g., using village roads to avoid checkpoints). This was a governance failure to invest in **preventive and detective infrastructure**. The situation is slowly changing – as noted, places like Goa and Karnataka have shown that technology (GPS, RFID, digital logs) can sharply cut down illegal mining if properly

implemented. The lag in adopting these tools, however, cost heavily in the preceding decade. It demonstrates that regulatory agencies need to modernize and use data analytics proactively; otherwise they will always be reacting to scams after enormous damage has already been done.

- **Judicial Delays and Weak Enforcement of Accountability:** In many cases, even when illegal mining was identified, bringing the perpetrators to justice proved difficult. Legal cases – whether criminal prosecutions or appeals against penalties – dragged on for years or even decades. Powerful mining barons often obtained **injunctions or stay orders** from courts to stall investigations or punitive actions. In some instances, inquiries were shut down prematurely due to political pressure – a notable example being the Shah Commission itself, which was abruptly wound up in 2013 by the central government before it could finish probing all assigned states (it completed Goa, Odisha, Jharkhand, and part of one or two others, but not Chhattisgarh or others). A report in *The Guardian* noted that the Commission’s termination “reeked of government complicity,” implying that its revelations were becoming too uncomfortable for those in power (Newsome, 2013). Additionally, very few government officials faced meaningful consequences. An exception was Goa, where the Mines Director was suspended and charged, and Karnataka where a few officers were jailed. But these remain rare; the norm has been for errant officials to be transferred or allowed to quietly retire. This lack of personal accountability means there was little deterrence for the next officer who might be tempted by bribes to ignore illegal mining. Thus, strengthening internal vigilance units in departments and fast-tracking prosecution of corruption cases in mining agencies is crucial. Some experts have called for specialized fast-track courts for mining-related offenses (both for companies and officials) so that cases don’t languish indefinitely. Without timely and visible consequences, the risk-reward calculus for illegal mining remained skewed in favor of bad actors for a long time.
- **Community Exclusion and Lack of Local Oversight:** Local communities are natural allies in detecting illegal mining – after all, they are on the ground and directly witness the extra truck traffic, the blasting, and the environmental changes. However, traditionally, India’s mining governance did not empower communities in oversight. Until recently, locals had little stake in legal mining revenues (royalties went entirely to state/central treasuries) and often bore only the negative externalities. This sometimes led to a degree

of tacit acceptance of illegal extraction as a form of local compensation – for example, villagers might informally allow or partake in small-scale coal scavenging because it provided income, a scenario Lahiri-Dutt (2007) describes in eastern India. The establishment of **District Mineral Foundations (DMFs)** in 2015, which mandate that a share of mining revenue is set aside for local development, was partly intended to make communities stakeholders in legal mining and thereby reduce support for illegal activities. Before DMFs, locals often felt exploited while outsiders (distant companies, urban governments) took the wealth; this resentment could translate into either support for militant opposition (like the Naxalites in some coal areas) or participation in illegal mining for survival. Another gap was the lack of formal channels for community monitoring – there were no social audit processes for mining akin to those in say, rural employment schemes. Grievance redressal mechanisms for environmental violations were weak. In recent years, some states have introduced telephone hotlines and mobile apps for citizens to report illegal mining sightings. Participatory oversight is still in its infancy but is a needed innovation to crowdsource vigilance. Ultimately, a vigilant civil society and media have played a significant role in uncovering mining scams (many scams broke because of local activists or whistleblowers), so creating protections and incentives for them is vital. The bottom line is that community inclusion in governance – sharing benefits and information – can create local sentinels against illegal mining rather than local accomplices.

In summary, the shadow mining economy thrived because governance failed at multiple points: from the allocation of licenses, to the monitoring of extraction, to the auditing of transport, to the prosecution of violations. It was a breakdown (or absence) of what should have been a robust chain of accountability. Any meaningful solution, therefore, must reform and strengthen each link of that chain. The solutions to the problems faced in mining sector due to the shadow economy requires addressing of exactly these points – aiming to seal the loopholes, bolster institutions, and ensure that India's mineral wealth is managed in a transparent and accountable manner consistent with the public trust doctrine expressed in the National Mineral Policy (IBM, 2019)

Policy Recommendations: Curbing Fiscal Losses and Improving Traceability

Transforming India's mining sector from a hotbed of illicit flows to a model of transparency and accountability is no small task – but the analysis above points to clear directions for reform. The following are actionable policy recommendations, drawing on the lessons learned and best practices emerging from various states, to curb fiscal losses and improve traceability of mineral flows:

1. Strengthen Digital Tracking and Data Integration: Implement a nationwide, real-time digital system for monitoring mineral production and transportation. Building on systems like Goa's GPS/RFID truck tracking and Odisha's i3MS, the Ministry of Mines (in coordination with state governments) should mandate all states to adopt an integrated IT platform where each mine's output is recorded and reconciled, each truck carrying ore is GPS-tracked, and each shipment has a verifiable electronic permit. Weighbridges at mine heads must be tamper-proof (with periodic calibration audits) and linked via IoT to a central server that both IBM and state authorities can access. Every transport of minerals should carry a QR-coded or RFID-tagged e-permit that enforcement personnel (police, road transport, forest check-posts) can scan using a mobile app to verify authenticity and details (similar to the e-way bill system in GST).

By unifying databases – linking IBM's production reports, state royalty payment data, GST sales data, and port/railway export dispatch records – discrepancies will stand out automatically. For example, if a mine reports 100,000 tonnes produced but weighbridge/GPS data shows 120,000 tonnes moved, an alert can be generated in real time for inspection. Regular reconciliation between Indian Railways freight data, port export figures, and mine dispatch reports should be institutionalized, ideally automated via data-sharing agreements between Railways, port authorities, and mining departments. The central system could also employ basic analytics: e.g., flag if a mine's average ore grade suddenly drops beyond a plausible range, or if transport occurs during odd hours or along unusual routes. Embracing technologies like blockchain for supply chain tracking could be explored for high-value minerals to create an immutable ledger from mine to end-user, though simpler database integration is a nearer-term priority. The core idea is end-to-end

visibility: every tonne mined should be traced until it either is processed domestically or leaves the country, with digital records at each step. This drastically reduces the space for theft or ghost transactions.

2. Enhance Transparency and Public Reporting: Adopt the principles of the Extractive Industries Transparency Initiative (EITI) – even if India doesn’t formally join the EITI, it can voluntarily implement its standards of disclosure. This means publishing annual (or more frequent) reports of mineral production, royalties and taxes paid, and where that money is going (e.g., into state treasury, DMFs, etc.), broken down by company and by mine. When companies know that their declared figures are public and possibly scrutinized by media and civil society, they are less likely to deviate grossly from reality. Some states like Telangana already have mobile apps that show real-time sand mining permit usage to the public; similarly, a user-friendly public portal could show how many tonnes each major mine has reported producing, how much royalty was paid, and how the funds were allocated, updated quarterly or annually. This citizen-facing transparency adds an extra layer of accountability. Additionally, all mining leases and associated clearances should be available on a public GIS map (the Ministry of Mines’ portal already hosts lease boundary maps for many states). This way, anyone can see the official lease area and report if mining is observed outside that boundary (crowdsourced enforcement). Whistleblower protections must be strengthened so that officials or locals who expose illegal mining do not face retaliation – this may involve legal protections and dedicated hotlines where identities can be kept confidential. The more “eyes” on the process, the harder it is to hide illegal activity. Public hearings and social audits should also be integrated into mining projects’ life-cycle, making it routine for independent auditors (including local community representatives) to verify on ground that mining and transportation align with reported figures.

3. Tighten Legal Penalties and Close Loopholes: While the 2015 MMDR Amendment significantly raised penalties, consistent enforcement is key to deterrence. The central government should urge and assist states in invoking Section 21(5) of MMDR Act (recovery of full value of illegally mined ore) in all proven cases of illegal mining, not just the big Supreme Court-directed ones. This creates a strong financial disincentive: if caught, a miner stands to lose all the revenue from illegal extraction, not just pay a fine or royalty difference. Specialized fast-track courts or tribunals for mining and environmental offenses could ensure cases don’t languish – for instance,

expanding the mandate of existing commercial courts or setting up dedicated benches in mining-intensive regions to handle illegal mining cases and related corruption cases swiftly. Moreover, make it standard practice to immediately suspend or cancel leases where egregious violations are found (as recommended by Shah Commission), rather than allowing them to operate under “penalty and continue” arrangements which may be seen by violators as merely a cost of doing business. Regulators should also close the “deemed extension” loophole: amend rules such that if a lease’s term expires and renewal is pending, the mine must obtain at least provisional clearance from environment and forest authorities to continue operating, or else pause operations until all clearances are in place. This would avoid scenarios like Jharkhand’s where mines ran for years on old permissions. Another legal reform could be to introduce liability for company directors and officials in cases of proven illegal mining – similar to how company law holds directors accountable for fraud. Also, any public servant complicit in illegal mining should face not only departmental action (suspension, etc.) but also criminal charges under anti-corruption laws and for abetment of theft of resources. Making a high-profile example of a few corrupt officials through successful prosecution will have a deterrent effect on others in the bureaucracy.

4. Deploy Advanced Surveillance: Satellite Monitoring and Drones: Scale up and upgrade the Mining Surveillance System (MSS) launched in 2016. Thus far, MSS identifies suspicious excavation activities around known leases by analyzing satellite imagery every few months. This should be expanded in frequency (e.g., imagery analysis done monthly or even bi-weekly, rather than quarterly) and scope (covering minor minerals and smaller lease areas too, not just major mines). Invest in higher-resolution satellite imagery for key mining districts to improve detection of smaller-scale illegal operations. Furthermore, empower state authorities with drones and trained personnel to conduct surprise aerial inspections of mining sites and transit routes. Drones can help in multiple ways: they can overfly a mining area to independently estimate quantities (e.g., volumetric analysis of mine pits or stockpiles), observe active mining in real-time (especially useful to catch people mining in prohibited areas or beyond hours), and even track trucks from the air. Some states like Madhya Pradesh have piloted drone use for monitoring river sand mining at night, with considerable success in catching illegal sand dredgers. The imagery and video footage from drones and satellites can serve as evidence for enforcement and legal cases, making prosecutions easier. A centralized analytics cell at the Ministry or state level could use artificial

intelligence to compare satellite images over time and flag expansions of pit areas or creation of new mining pits in forbidden zones, then alert enforcement teams on the ground. Having this technological “eye in the sky” ensures that even if ground-level officials are compromised, there is independent intelligence on illegal operations. It also increases the perceived risk among violators that they are being watched and could be caught even in remote areas.

5. Financial Tracking and Tax Intelligence: The mining shadow economy ultimately exists to generate illegal profit, so following the money is crucial. Financial regulators and tax authorities should create special cells focusing on the natural resources sector’s illicit flows. The Income Tax Department can strengthen its mining-sector intelligence to detect anomalies such as companies reporting high volumes of mineral sales but unusually low profits (possible transfer pricing or under-invoicing), or mining contractors suddenly showing large wealth disproportionate to known income. The GST authorities can use data analytics to flag, for example, any shell companies that are trading large quantities of minerals on paper without physical assets, or cases where e-way bills for minerals are generated in suspicious patterns (like multiple small traders shuffling ores among themselves to obscure origin). The Directorate of Revenue Intelligence (DRI), which traditionally monitors international trade, should actively track mineral exports for under-invoicing or misdeclaration. In the past, DRI has flagged cases like over-invoicing of coal imports by power companies. For iron ore exports, the government could use reference price benchmarks (such as the global Platts index for iron ore of a given grade) to challenge exporters who declare far lower prices than the norm – a tactic to detect under-invoicing. Banking regulators (RBI) should enforce strict KYC and due diligence on accounts of mining trading companies to curb shell conduits – for instance, any small firm suddenly transacting crores in mining payments should trigger scrutiny. Where the Enforcement Directorate (ED) finds evidence of laundering of mining proceeds (as in the Pankaj Mishra case in Jharkhand), they should swiftly attach assets and seek custodial interrogation of kingpins to unravel the wider network. This creates a disincentive for politicians and businesspeople to partake in such schemes if they know specialized financial sleuths are watching. Essentially, make it as risky to hide the *proceeds* of illegal mining as it is to conduct the illegal mining itself.

6. Community Engagement and Benefit-Sharing: A long-term antidote to illegal mining is to make local communities partners in legal mining’s benefits, thereby reducing their tolerance for

illegality and increasing public pressure against it. The District Mineral Foundations (DMFs) now exist in all mining districts and collect a percentage of royalties for local development. Ensure these DMF funds are functioning transparently and that projects financed by them are tangible and visible to locals (schools, health centers, drinking water, roads, etc.). If people see real improvements funded by legal mining revenue, they are more likely to report or oppose illegal operations that would steal those benefits from them. Initiatives like forming village vigilance committees in mining areas could be tried – for example, communities could be given basic training and simple tools (even a smartphone app or a GPS camera) to monitor and report mining activities: Is a truck passing through their village at 2 AM? Is a mine operating on a hillside that is supposed to be a protected forest? They could then alert authorities through designated channels. Some states have experimented with giving a small reward or informer fee for tips leading to seizure of illegally mined minerals – formalize and publicize this to incentivize public participation (akin to how customs departments reward informants for smuggling tips). Moreover, consider formalizing artisanal mining in certain areas: for example, allotting small plots or leftover mineral dumps to local cooperative societies under supervision. This way, those dependent on informal mining can work legally and pay royalties, rather than continuing a cat-and-mouse game with authorities. Formalization has worked in some countries for artisanal gold and diamond mining, reducing black market trading. In India, states could identify minor mineral hotspots where many villagers engage in illegal collection (like sand or river pebble gathering) and see if a licensing or permit system for micro-operators can bring it into the light and under regulations.

7. Political and Administrative Reforms: Addressing the political nexus may be the hardest but is essential for sustained change. One recommendation is to ban or strictly limit political donations from mining companies, or at least enforce full disclosure of such donations. While corporate donations are legal in India (including through electoral bonds until recently) which anonymize the donor, enhanced transparency could mitigate policy capture by mining interests. For instance, mandating that any company with a mining lease must publicly declare all political contributions would allow watchdogs to see potential conflicts of interest. Another idea is to strengthen conflict-of-interest rules: politicians or their immediate family members should not have direct stakes in mining businesses, and if they do, those should be publicly disclosed and perhaps put in blind trusts. On the administrative front, implement a policy of periodic rotation of officials in sensitive

posts (e.g., district mining officers, regional transport officers in mining hubs, heads of pollution control in mining areas). This prevents local networks from becoming too cozy. Also, conduct regular audits of these officials' asset statements to detect any sudden wealth that might indicate bribery income. Setting up independent ombudsman or whistleblower channels specifically for the mining sector at the state level could provide an outlet for conscientious officers to report undue pressures or malpractices by superiors or ministers without fear of career reprisal. This could be analogous to a Lokayukta but focused narrowly on mining and environmental issues, or even a special cell within the Lokayukta for mining. Overall, improving governance ethics – through codes of conduct, vigilance, and example-setting – is needed so that the regulatory machinery is not undermined from within by collusion.

8. Sustainable Mining Practices and Certification: Encourage mining companies to adopt traceability and undergo third-party audits as part of a move toward sustainable mining certification. For instance, the Indian Bureau of Mines has started a Star Rating system for mining leases on environmental and social parameters. This could be expanded to include a track record of compliance on production reporting and tax payments. Mines with a history of violations should be ineligible for higher star ratings or any government incentives, and conversely, those consistently compliant could get fast-tracked clearances or other ease-of-doing-business perks. Additionally, explore developing a market mechanism for “clean minerals” akin to the idea of conflict-free diamonds or certified sustainable palm oil. Large end-users (like steel companies or exporters) could be encouraged or required to source only from leases with no outstanding illegalities or from e-auctioned ore that has passed through official channels. This kind of market pressure, if built (possibly via import/export regulations or corporate social responsibility frameworks), will compel companies to self-police their supply chains. It aligns with global trends where investors and consumers are increasingly mindful of Environmental, Social, and Governance (ESG) issues – demonstrating compliance and transparency in sourcing could become a competitive advantage for companies. Internationally, frameworks like ISO certifications for environmental management could incorporate production traceability as well. While this is a softer measure compared to enforcement, it helps change industry culture to view compliance not just as an obligation but as part of their social license to operate.

9. Capacity Building in Regulation: A recurring issue has been the lack of capacity in regulatory agencies. We need to invest in better equipping and staffing these bodies. This means hiring and training more mining inspectors, foresters, and pollution control staff dedicated to mining areas, and equipping them with modern tools. For example, providing hand-held XRF analyzers (portable devices that can estimate ore grade on-site) can help inspectors verify if high-grade ore is being misdeclared as low-grade. Equipping officers with body cameras during raids or inspections can both deter interference and provide evidence of what they find. Improving the Mines Department's IT infrastructure and data analytics capability is essential if they are to manage the digital tracking systems mentioned. The CAG audits repeatedly found that part of the issue was simply workload vs. staff – in one state, just a handful of mining inspectors were responsible for hundreds of mines and thousands of truck movements, an impossible task without tech support or more manpower. By increasing manpower (perhaps creating more sanctioned posts and filling vacancies promptly) and making regulatory careers attractive (ensuring honest officers are rewarded and not constantly pressured or punished for doing their job), compliance will improve. Training programs can also expose regulators to how other countries manage mining oversight, fostering new ideas. Donor agencies or companies could be roped in to fund training on GIS, remote sensing, and forensic accounting for mining regulators.

10. Regular Audits and Social Accountability: Mandate periodic third-party audits of production and dispatch for all large mines. Just as companies undergo annual financial audits by independent auditors, mines could be required to have an annual or biennial audit by empaneled experts (e.g., mining engineering departments of reputed universities or certified auditing firms with mining expertise) to verify that the production reported aligns with pit measurements, that dispatch records match royalty payments, etc. These audit reports should be shared with tax authorities and possibly made public (at least the summary) for transparency. In parallel, leverage constitutional audit bodies like the CAG to conduct performance audits of state mining departments every 3–5 years, with a focus on whether due revenue is being collected and regulations enforced. The fact that a 2022 CAG report in Odisha found ₹22,000+ crore revenue loss indicates huge room for improvement – such audits should not be one-offs triggered by scandal, but a regular feature that prompts continuous improvement in systems. Additionally, Parliament and state legislatures should exercise their oversight roles: for instance, parliamentary committees or state assembly

committees can conduct inquiries or hearings on mining revenue leakages and illegal mining, keeping the political spotlight on the issue. Civil society and media should also be encouraged (via access to information and data) to play a watchdog role. In essence, audit and oversight mechanisms create sustained pressure on the executive to plug holes, rather than sporadic attention only when a crisis hits.

By implementing these recommendations in earnest, India can significantly clamp down on the shadow mining economy. The experience of states like Karnataka (post-ban) and the new monitoring systems in Goa suggests that when political will aligns with technological tools and strict accountability, illegal mining can be curtailed by an estimated 80–90%. It is worth emphasizing that the goal is not just to punish wrongdoing after the fact, but to proactively reclaim the lost revenues for public benefit and prevent future losses. Minerals are a non-renewable resource; every tonne extracted should translate into some lasting value for society – be it infrastructure, social programs, or environmental restoration. When those tonnes are siphoned off illegally, the public loses doubly: once in the immediate lost revenue, and again in the externalities of mining done with no oversight or mitigation. Therefore, curbing these losses is a matter of both economic justice and inter-generational equity. The above recommendations, spanning technology, legal reform, community involvement, and institutional change, together form a comprehensive approach to ensure that India's mineral wealth is mined responsibly and accounted for in the public ledger.

Conclusion

The story of India's shadow mining economies – from the iron ore ridges of Goa and Karnataka to the coalfields of Jharkhand and the ore belts of Odisha – is a cautionary tale of how valuable natural resources can be pillaged when governance falls short. Over the past two decades, India has learned at great cost that accounting for the incalculable requires diligence, transparency, and the courage to confront powerful vested interests. Tens of thousands of crores in public revenue have been lost to illicit mining operations, money that could have funded schools, hospitals, and infrastructure for India's citizens. Instead, it fueled luxury mansions, foreign bank accounts, and even the corruption of democratic institutions. The fiscal loss, as staggering as it is, represents only part of the damage. Equally significant is the erosion of the rule of law, the environmental

destruction of landscapes and livelihoods, and the betrayal of communities who have rights to their local resources.

Yet, there are hopeful signs that India is turning a page. Judicial interventions have set important precedents asserting that natural resources are truly public assets and must be guarded as such (for example, the Supreme Court's doctrine in the 2G and coal block cases, and the mining judgments, emphasize public trust). Policy reforms like the 2015 auction mandate for mineral leases and the institution of DMFs aim to make mining more transparent and beneficial to the people. Technology is being deployed to illuminate the once murky supply chains of minerals, through e-permits, GPS tracking, and satellite surveillance. Perhaps most importantly, public awareness and media scrutiny of mining issues are at their highest – the fact that we can speak today of ₹35,000 crore or ₹59,000 crore mining scams in exact figures (rather than vague suspicions) is itself a victory of transparency over the old norm of hidden dealings.

To consolidate these gains, the recommendations outlined – from digital tracking to stricter enforcement to community engagement – must be pursued with unwavering political will. Curbing the shadow mining economy is not a one-time project but an ongoing process of strengthening institutions and closing loopholes. It calls for a holistic approach: tightening laws, empowering honest officials, engaging communities, and leveraging technology and data analytics. It also demands an acknowledgment that every stakeholder – government, industry, civil society, and the general public – has a role in this transformation. Mining companies must embrace compliance as non-negotiable, viewing it as part of their social license to operate. The government must prioritize integrity over short-term revenues – as seen when mining bans were imposed despite economic pain, ultimately for a larger long-term good. Communities and activists, on their part, should continue to shine light on malpractices and insist on accountability.

The case of India's informal mining and its fiscal consequences is fundamentally about **equity** – ensuring that the wealth under the soil benefits the many and not a predatory few. If India can implement the necessary reforms to capture the true value of its minerals (as envisioned in the 2019 National Mineral Policy's shared inheritance principle), it stands not only to gain enormous revenue for public welfare, but also to set a global example in resource governance. The road ahead will at times pit reformers against powerful lobbies, and progress may be incremental. But the

trajectory is clear and hopefully non-reversible: the era of unaccounted mineral wealth must give way to an era where every tonne is traced and every rupee accounted for in the public ledger.

“Accounting for the incalculable” is as much a moral imperative as a technical one. By reclaiming the dues from the shadow economy and preventing future leakages, India affirms the principle that its natural resources are a sacred inheritance of its people. Achieving this will be a tribute to the tireless work of whistleblowers, auditors, honest officers, journalists, and citizens who refused to accept that illegal mining was an inevitable reality. Instead, they showed it can be challenged – and with collective effort, defeated. The task now is to build on that momentum and ensure that the incalculable becomes calculable, the hidden is brought to light, and India’s mining sector emerges as a cornerstone of accountable development rather than a source of plunder.

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