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INTEGRATED SYNTHESIS REPORT

DIAGNOSTIC ASSESSMENT OF GOVERNANCE, SECURITY, AND CONFLICT RISKS IN SMALL-SCALE GOLD MINING ZONES

SOCIO-ECONOMIC PROFILING AND MAPPING OF ARTISANAL AND SMALL-SCALE GOLD MINING SITES

ECOLOGICAL AND HEALTH RISK ASSESSMENT OF ARTISANAL SMALL-SCALE GOLD MINING SITES AND IDENTIFICATION OF "NO-GO" AREAS

IN WEST GONJA, BOLE, AND SAWLA-TUNA-KALBA DISTRICTS (SAVANNAH REGION)

GOLD FOR GOOD BASELINE STUDY SERIES

JULY 2026 · GOLD FOR GOOD PROJECT ·
INCLUSIVE GROWTH AND STABILITY THROUGH RESPONSIBLE ARTISANAL AND SMALL-SCALE MINING IN GHANA

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Project

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Reference

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Geography

West Gonja, Bole and Sawla-Tuna-Kalba Districts — the Black Volta tri-border corridor with Côte d'Ivoire and Burkina Faso

Evidence base

953-respondent survey across 30 communities · 74+ laws and institutional mandates reviewed · 26 key informant interviews and 9 focus group discussions · 60 water, 49 soil, 3 fish, 5 plant and indoor dust samples · 94 geo-referenced ASM sites over 1,001.79 ha · satellite land-cover change 2017–2025 · probabilistic US-EPA Monte Carlo health-risk modelling

Validation

Findings were examined and endorsed by regional stakeholders — district assemblies, traditional authorities, regulatory agencies, security services and mining community representatives — at the Regional Validation Workshop, Damongo, 14–17 July 2026, which also proposed some priority sites for the construction of border security posts and mined land rehabilitation sites validated by the Steering Committee and endorsed by the concerned natonal authorities

Companion volumes

Technical Report 1 of 3 (governance, security and conflict) · Technical Report 2 of 3 (socio-economic profiling and mapping) · Technical Report 3 of 3 (ecological and health risk assessment)

HOW TO READ THIS DOCUMENT

This synthesis consolidates the three Gold for Good baseline studies into a single evidence base. It is written to be sufficient on its own: a reader who never opens the three technical reports should finish it knowing what was measured, what was found, and what follows. Findings are presented as findings – quantified, sourced and unelaborated. The technical reports remain the authoritative sources for full methodology, data tables and named authorship.



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1. The headline findings

Artisanal and small-scale gold mining — galamsey — has expanded within a decade from Ghana's southern gold belt into the Savannah Region, a historically non-mining frontier on the Black Volta at the tri-border junction with Côte d'Ivoire and Burkina Faso. Nationally the sector supports over one million livelihoods and about 40% gold output, with an estimated 70% of operations unlicensed. In the three study districts it sustains an estimated 15,000 people. No systematic baseline of any kind existed before these studies.

953
survey respondents across 30 communities

74%
unaware of any mining regulation

2.92%
hold a mining licence

100%
of soil samples exceed the cadmium guideline

94%
of soil samples exceed the mercury guideline

38.88%
of miners report using mercury in processing

5.84%
of miners report using cyanide in processing

68.64%
of mapped area at critical environmental risk

2. Key findings of the three studies

2.1 Governance, security and conflict risk[1]

- **Governance is critically weak despite robust laws**. More than 74 relevant laws, policies and institutional mandates were reviewed, yet stakeholders ranked political interference — the "big man from Accra syndrome" – as the single greatest constraint, compounded by under-resourced monitoring, fragmented inter-agency coordination and enforcement so weak that violations carry visibly low consequences.

1 See Technical report 1/3 - Diagnostic Assessment of Governance, Security, and Conflict Risks in ASM Zones in the West Gonja, Bole and Sawla-Tuna-Kalba Districts. Research conducted by Prof. Ebenezer Owusu-Sekyere with Dr Kwabena Owusu Asubonteng-

- **Community governance has filled the vacuum, but excludes those it governs**. Traditional leaders, mining committees and ethnic chiefs allocate land, resolve disputes and manage migrant conduct with real legitimacy – yet women, youth and migrants, who make up the primary workforce, are systematically excluded from land allocation, dispute resolution and security structures.
- **Sawla-Tuna-Kalba district is the more severe case:** a near-total governance vacuum, with no district oversight, no informal community structures, no environmental monitoring, and mining conducted secretly at night by outsiders.
- **The mining economy crosses the border.** Migrant miners from Burkina Faso, Côte d'Ivoire, Mali and Nigeria outnumber local miners at several sites. Conflict drivers include land disputes, clashes between ASM operators and large-scale concessionaires, and confrontations with forest guards; cross-border risks include boundary manipulation, smuggling and migration networks that carry a risk of extremist infiltration. Communities have responded with informal, sometimes armed, security groups operating without formal training or oversight.

Conclusion

> ASM here is no longer only a livelihood or environmental issue but a strategic security challenge. Top-down regulation alone will not resolve it – community legitimacy must be combined with state authority in a co-created model.

2.2 Socio-economic profile[2]

- **Mining pays, and it pulls people in.** Across 953 household interviews in 30 communities, mining households earn nearly six times the annual income of non-mining households (GHS 83,256 versus GHS 14,357), and mining communities are markedly more ethnically diverse – a magnet for inmigration.
- **Formalisation is close to negligible.** Only 2.92% of respondents hold a mining licence and only 15.96% hold registered land. Seventy-four per cent were unaware of any regulation governing mining in their area – non-compliance is substantially a knowledge and access problem, not only a willingness problem.

2 See Technical report 2/3 – Socio-economic profiling and mapping of ASM sites in West Gonja, Bole, and Sawla-Tuna-Kalba districts (Savannah Region). Research conducted by Prof. Paul Kwame Nkegbe.

- **The value chain is sharply gendered.** Women are concentrated in the lowest-earning nodes (processing, ore transport) while men dominate pit ownership, trading and sponsorship. Average weekly earnings are GHS 2,318.65 for men against GHS 967.81 for women, and women are wholly absent from mining-committee decision-making despite bearing the greatest exposure to mercury.
- **Land use is changing fast.** Between 2017 and 2025, forest cover declined by 441.2 km² while settlement area more than doubled. Six communities – including Dollar Power and Tutumba – are under "extreme mining pressure," with mining footprints three to eight times the size of the built-up area.
- **The economy runs on cash.** 98.33 per cent of gold payments are in cash, exposing the sector to money-laundering risk and meaning the state's own gold-aggregation drive may unintentionally reward unlicensed production.

Conclusion:

> ASM is a durable, substantial source of livelihood that is not going away. Stopping it is not a feasible strategy – regularising and regulating it is – yet state support for miners who want to exit is nearly absent (fewer than 5 per cent of former miners received any training).

2.3 Ecological and health risk / No-go areas[3]

- **Soil, not water, is the dominant exposure pathway.** Cadmium exceeded international guideline values in 100 % of soil samples (mean 33.45 mg/kg against a 0.8 mg/kg threshold) and mercury exceeded guidelines in about 94 % of samples. Water quality is broadly within WHO guidelines except at localised hotspots.
- **Children carry a disproportionate share of the risk.** Probabilistic modelling found about 46 % of children's exposure scenarios exceed acceptable non-carcinogenic risk thresholds, versus 20 % for adults, with cadmium responsible for over three-quarters of the hazard. Women and children are the most vulnerable groups — women through ore processing, children through soil contact and residential proximity to processing.
- **Forest encroachment, not water proximity, drives risk.** Under a combined forest-and-water risk composite, 68.64 % of the 94 mapped ASM sites (about 1,002 hectares) fall in the critical-risk category. Dollar Power and Tinga account for 59 of those critical sites and are identified as priority intervention areas.

3 See Technical report 3/3 – Ecological and health risk assessment of ASM sites and identification of "No-Go" areas (Savannah Region). Research conducted by Dr Dzigbodi Adzo Doke.

- **The window for restoration is still open.** Because ASM here remains localised surface activity rather than large-scale clearance, most mature trees survive, and ecological restoration – assisted regeneration, pit backfilling, enrichment planting – remains viable now. That window will not stay open indefinitely.

Conclusion

> The degradation is real but specific rather than uniform — concentrated in cadmium and mercury in soil and domestic dust, in noise at processing points, and in forest encroachment at two communities, rather than in wholesale ecological collapse. That specificity is what makes intervention tractable, provided restoration begins before the window closes.

2.4 Where the three studies converge

Read individually, each study stands on its own. Read together, three convergences emerge that no single volume could establish alone.

- **Land and protected areas:** the socio-economic profiling finds mining encroaching on the Yerada Forest Reserve and the fringes of Bui National Park; the ecological assessment independently identifies forest encroachment as the dominant driver of environmental risk; and the governance assessment shows these are precisely the areas where regulatory authority is least settled. The places under greatest ecological pressure are the places no one is clearly in charge of.
- **Contamination and who bears it:** the ecological assessment's finding that children's soil-exposure risk far exceeds adults' only takes on its full meaning next to the socio-economic profile's account of settlement patterns and mining-income dependence, which explains which children live on that soil, and why their families are unlikely to leave.
- **Mobility and the border:** the governance assessment's finding that migrant miners outnumber local miners at several sites, read alongside the socio-economic profile's mapping of labour and gold-trading networks, describes a mining economy that does not stop at Ghana's border — a fact no single-district or single-discipline study could have shown.

As the three studies' own shared foreword puts it: governance weaknesses enable the informality that drives environmental harm; environmental degradation and health risk erode the very livelihoods the socio-economic profile documents; and competition over land, water and gold feeds the conflict dynamics that threaten community stability and regional security.

3. Key recommendation:
one integrated, inclusion-conditioned response

Insecure governance, weak formalisation and environmental degradation are not three problems. They are symptoms of one unregulated mining economy — the same drivers (informality, absent regulation, political interference and the lack of viable alternatives), the same affected groups (women, youth, migrants, and the children who live where they work), and the same locations (Dollar Power and Tinga recur across all three studies as under the greatest pressure). Enforcement alone will fail.

A patrol post sited without reference to migration corridors will police the wrong road. A rehabilitation programme designed without reference to household income will restore land that people come back to remine, because they have nowhere else to go. A licensing reform that ignores customary tenure will be complied with only where the state is watching, because the authority that actually allocates land will not have consented to it. Each of the three studies, read on its own, arrives at some version of this same conclusion: the socio-economic profile finds non-compliance to be substantially a knowledge and access problem rather than defiance; the governance assessment finds that community structures already carry a legitimacy that state regulation currently ignores; and the ecological assessment finds that restoration is only viable if the people living on that land are not forced straight back onto it.

Durable change therefore requires pairing regulation with community legitimacy, livelihood security and environmental restoration treated as one integrated, inclusion-conditioned response, not as four separate workstreams to be sequenced or traded off against one another. Concretely, this means:

- **Regulation that is co-created, not imposed:** building on the meta-governance framework the governance assessment proposes, which formally recognises traditional authorities, mining committees and community structures as partners rather than obstacles, so that licensing and enforcement carry the legitimacy needed to be observed when no one is watching.
- **Community legitimacy made inclusive, not merely preserved:** the same community structures that regulation must work with are the ones that currently exclude women, youth and migrants — the primary workforce. Extending governance participation, for example through the women's advisory committees and minimum representation thresholds the socio-economic assessment recommends, is not a side commitment to gender equity; it is a precondition for any regulatory reform to hold, since these are the groups reform must ultimately bind.

- **Livelihood security as the condition for compliance and restoration alike:** formalisation will only be adopted, and rehabilitated land will only be left alone, if it improves on what miners currently earn or offers a credible alternative. That means credit, cooperative licensing that keeps returns with local miners rather than absentee sponsors, and support for the roughly half of miners who have already considered leaving the sector but lack the training or capital to do so.
- **Environmental restoration while the window is still open:** prioritising the same handful of communities — Dollar Power and Tinga foremost — that recur across all three studies as under the greatest pressure, combining pit backfilling, assisted regeneration and no-go zone enforcement with the livelihood and governance measures above, so that restored land stays restored.

Any one of these pillars pursued alone will fail for a reason the other two studies already document: enforcement without legitimacy is evaded, legitimacy without inclusion entrenches the exclusion of the people most exposed to harm, and restoration without livelihood security is simply remined. The three studies were designed as three lenses on one corridor precisely because the corridor's problem is singular. The response has to be too.

These are baseline studies, and their purpose is operational: their findings are already feeding directly into the project's activity chain, from joint border-patrol siting to land-rehabilitation prioritisation to inter-agency training. This synthesis is offered so that, as those activities are designed and sequenced, they are read and resourced as parts of one response rather than as three parallel tracks.

Three symptoms of one system — addressed as one integrated response

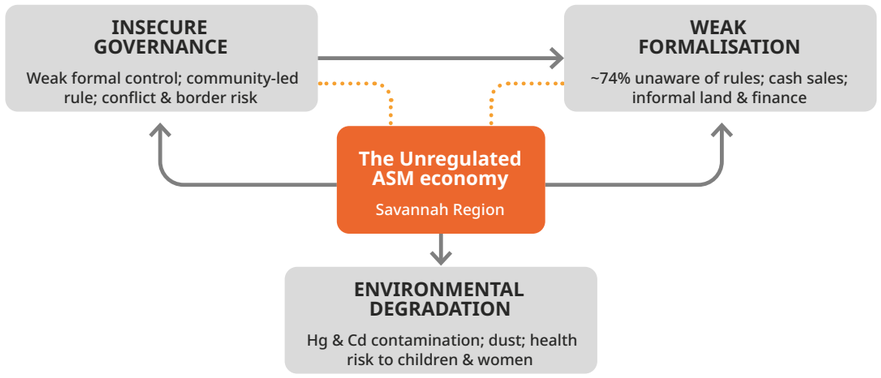


Figure 1. *The three studies as interlocking symptoms of one unregulated ASM economy, mapped to the three Gold for Good outputs.*

4. Where the evidence converges

Site / corridor	District	Governance & conflict	Mining pressure & licensing	Contamination & no-go risk	Rehabilitation potential
Dollar Power	Bole (border buffer)	HIGH	HIGH	HIGH	STRONG
Tinga	Bole	HIGH	HIGH	HIGH	MODERATE
Wakawaka	Bole	HIGH	HIGH	MODERATE	STRONG
Tutumba	Bole (beyond boundary)	HIGH	HIGH	MODERATE	MODERATE
Kui / Gbenfu	Bole	MODERATE	HIGH	MODERATE	NOT ASSESSED
Dakuripe Kamara	Bole	MODERATE	LOWER	NOT ASSESSED	NOT ASSESSED
Banda Nkwanta	Bole	HIGH	MODERATE	NOT ASSESSED	NOT ASSESSED
Black Volta corridor	Sawla-Tuna-Kalba	VACUUM	MODERATE	NOT ASSESSED	NOT ASSESSED

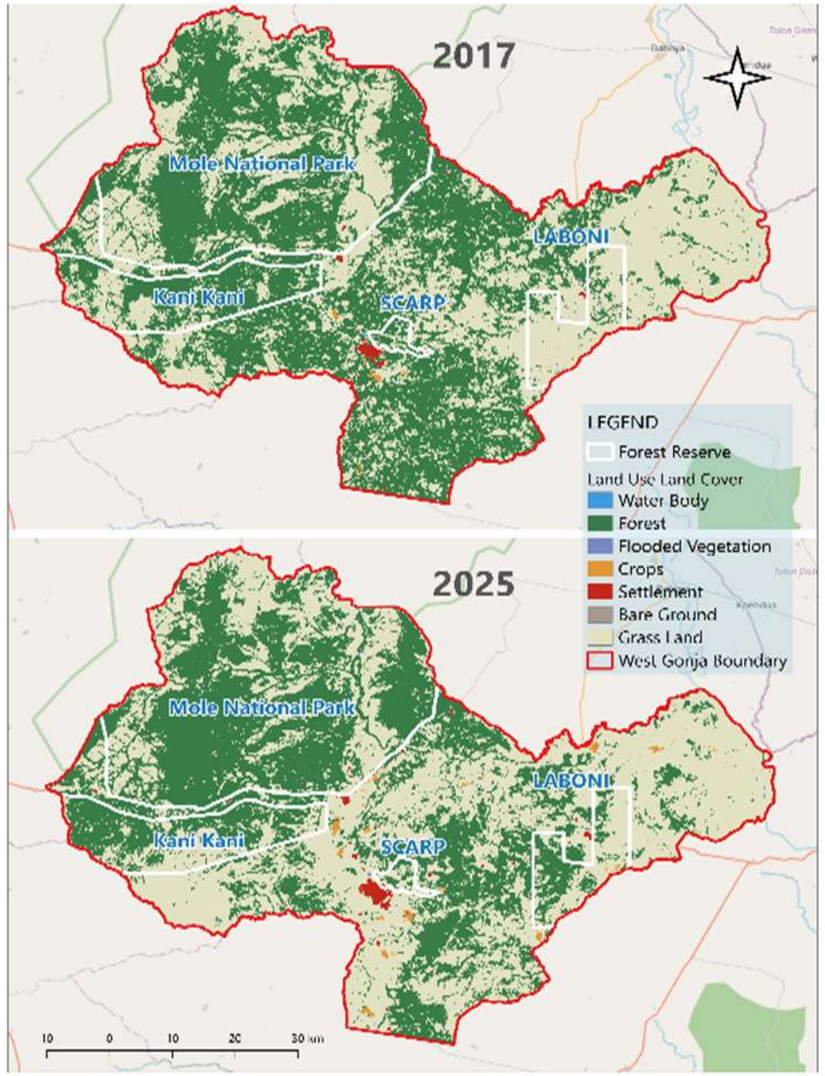
The same communities recur as priority sites under all three lenses, reached by different methods. The matrix below consolidates that convergence; the maps that follow are the geo-referenced originals from each study.

WHAT THE MATRIX SHOWS

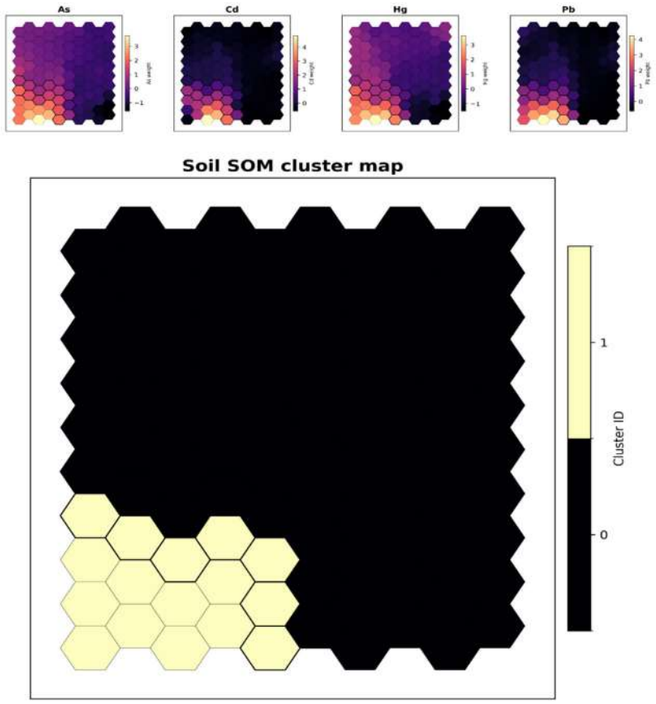
The Bole cluster – Dollar Power and Tinga consistently rank highest for risk and mining pressure across the socio-economic and ecological assessments alike, making them the clear priority for engagement; Wakawaka, by contrast, shows a markedly lower risk profile despite comparable mining activity. Dollar Power and Tinga account for 59 of the sites classified as critical risk in the ecological assessment, with all mapped sites falling into this category. They are also independently identified in the spatial mapping as areas under extreme mining pressure with footprints three to eight times built area. Taken together, these findings indicate that the cluster represents a strong priority for integrated rehabilitation, combining well-documented environmental impacts, existing institutional entry points for intervention, and remnant vegetation that provides a foundation for ecological restoration.

The Sawla-Tuna-Kalba corridor is the inverse case, characterized by limited governance presence, the highest security exposure, and the absence of a geo-referenced mining footprint, alongside comparatively lower institutional readiness. *These findings suggest that strengthening governance and undertaking further verification and mapping should precede large-scale and sustainable rehabilitation efforts.*

The mapped evidence



Map 1. *Geo-referenced ASM sites in Bole – 38 mining polygons across 19 communities, from satellite imagery validated by ground-truthing.*
Source: socio-economic profiling and mapping.



Map 2. *Composite environmental risk classification of 94 ASM sites against combined forest and water buffers – 68.64 per cent of mapped area critical.*
Source: ecological and health risk assessment.

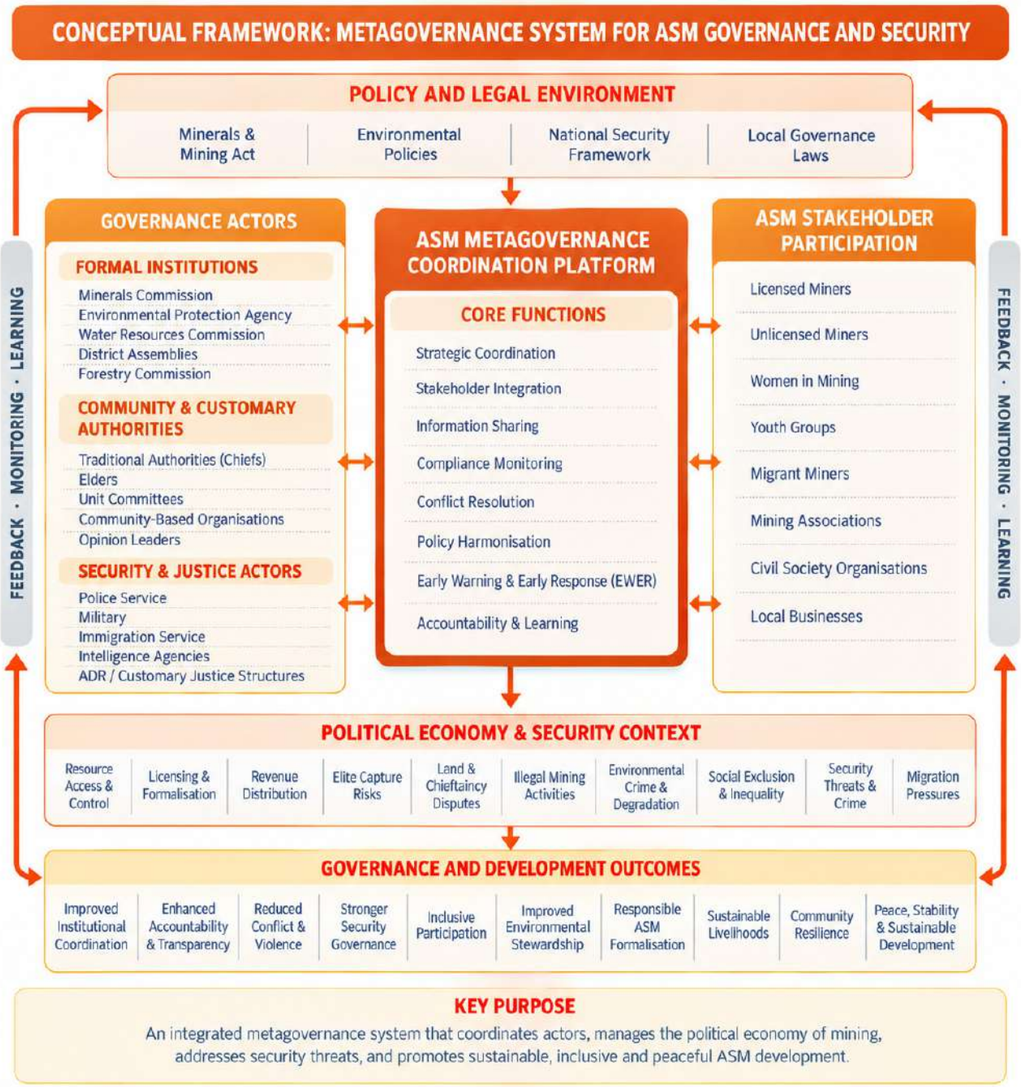
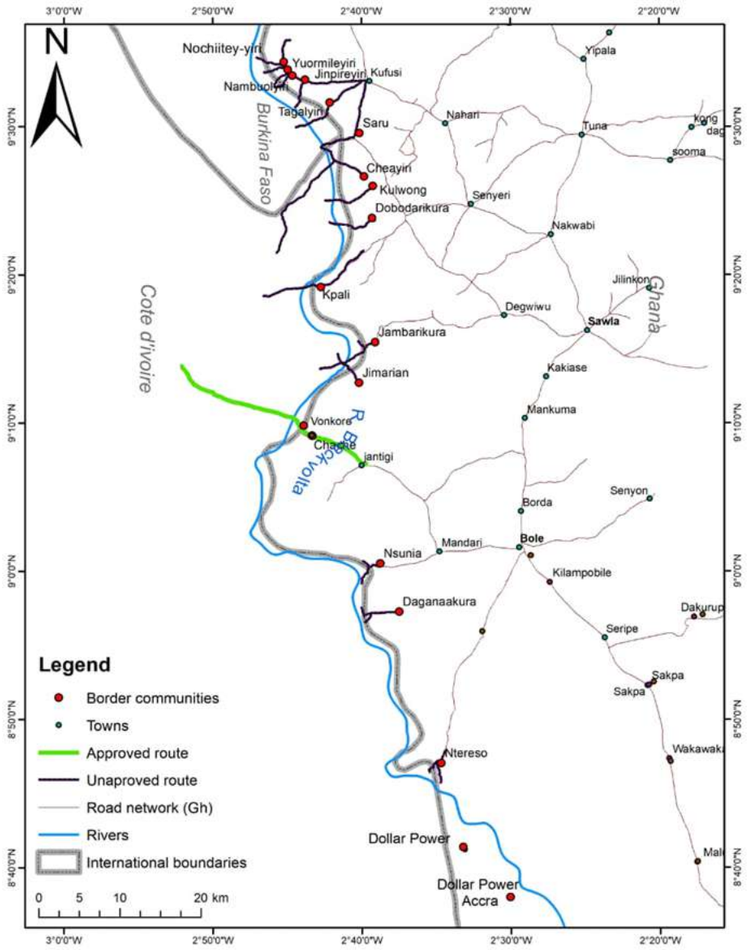
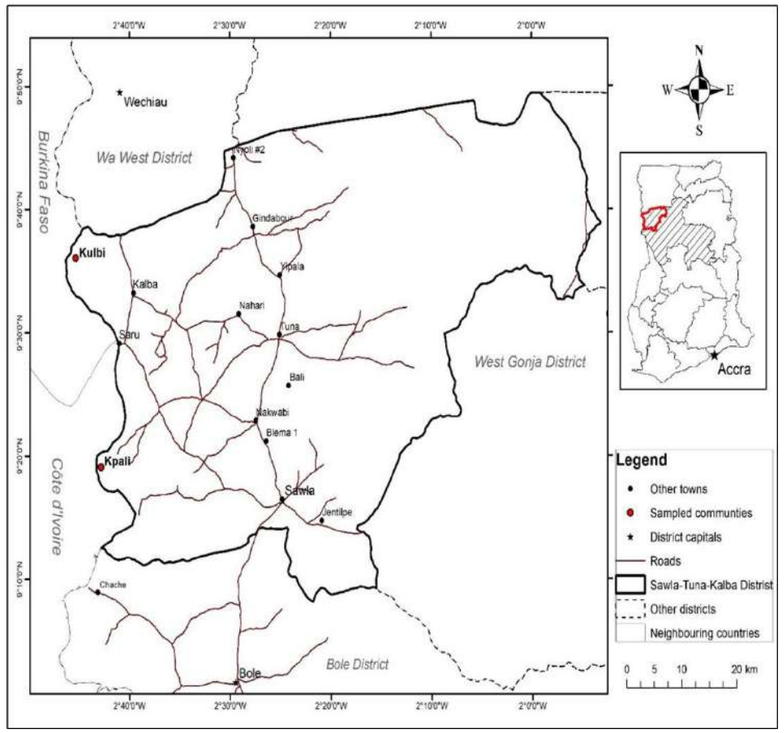


Figure 2. Conceptual framework for ASM meta governance.

The framework situates a coordination platform between formal, customary and security actors on one side and ASM stakeholders on the other, operating within a policy and legal environment and conditioned by the political economy of mining. Feedback, monitoring and learning loops return outcome evidence to the policy level.



Map 3. *Approved and unapproved border crossing points along the Ghana–Côte d'Ivoire frontier.*
Source: governance, security and conflict diagnostic.



Map 4. *Reported mining communities in the Sawla-Tuna-Kalba District.*
Source: governance, security and conflict diagnostic.

EVIDENCE QUALITY AND LIMITS

Three constraints apply across the series. The studies were conducted within a single field season, capturing a seasonal snapshot of activity known to fluctuate with rainfall – material given that alluvial mining intensifies in the dry season. Sampling was purposive rather than probabilistic, reflecting the absence of any population register for a mobile informal workforce. Access was shaped by security conditions and operators' willingness to be observed, introducing a known bias in documentation of unlicensed operations and child labour.

Study-specific limits: workforce demographics – headcounts, age, nationality, education – are largely unknown, and child labour is visible but undocumented. Dust results rest on a single sample and fish on three, so these are indicative flags rather than estimates. Survey data carry the usual recall and disclosure caveats of an informal, partly illicit sector. Point estimates should be cited as provisional.

5. Governance, security and conflict

> Diagnostic Assessment of Governance, Security and Conflict Risks in ASM Zones – Prof. Ebenezer Owusu-Sekyere, with Dr Kwabena Owusu Asubonteng. Anchors coordination and operational capacity of security and regulatory actors.

The frontier

- **22 ASM communities in Bole, 3 in Sawla-Tuna-Kalba**, all along the Black Volta; 18 formally undergoing formalisation but most still unlicensed. Field engagement confirmed no active ASM in West Gonja.
- The sector is shifting **from poverty-driven subsistence toward capital-intensive, mechanised operation.**
- Four typologies: shallow-pit "ghetto" mining (depths of seven electricity poles, four to six months to reach gold); women-led surface "toface" excavation; mechanised crushing and Changfa-engine alluvial mining degrading the river; and tailings reprocessing ("overs"), dominated by women and foreign nationals.
- **Migrant miners from Burkina Faso, Côte d'Ivoire, Mali and Nigeria outnumber locals** at several sites.
- Youth are the primary labour force but excluded from governance. Child labour is visibly present but undocumented. Site populations, age, origin, education and hazard exposure are unrecorded everywhere.
- Alluvial mining intensifies in the dry season, coinciding with peak water scarcity — an **explicit climate–security nexus.**



Along the Black Volta, one river tells four faces of gold mining: from hand-dug pits sunk seven electricity poles deep, to surface excavation led by women, to mechanised crushing mining: from hand-dug pits sunk seven electricity poles.







Changfa-engine dredging eating away at the riverbed, to the reprocessing of tailings. Four stages of one trajectory: a sector shifting, from subsistence to industry.

A weak formal order, a strong informal one

Ghana has a robust statutory framework and well-defined institutional architecture for ASM governance. The baseline findings, however, indicate that, in practice, formal governance remains constrained. Stakeholders ranked **political interference – the "big man from Accra syndrome" – as the single greatest constraint**, compounded by limited operational resources (including the absence of speedboats for river monitoring), fragmented mandates enabling

forum-shopping, interference by traditional and opinion leaders on enforcement processes, limited community trust, and weak enforcement capacity.

In Bole, community governance arrangements have evolved to fill many of these implementation gaps and are widely regarded as legitimate and effective. Traditional leaders play a central role in regulating land access and rites; while community committees allocate mining pits, enforce local rules and collect levies. Ethnic-group chiefs manage relations with migrant miners and sponsors, machine owners, gang leaders, youth patrols, women's groups and community welfare schemes contribute to the management of generators, pumps and health funds. **These are not obstacles to governance – they are the governance**. At the same time, participation in key decision-making processes remains uneven. Although women, youth and migrants miners make up the primary labour force, they have limited representation in land allocation, dispute resolution, benefit-sharing and security structures.

THE SAWLA-TUNA-KALBA GOVERNANCE GAP

Sawla-Tuna-Kalba presents a very different governance context from Bole. The baseline found limited state oversight and no comparable community governance arrangements to coordinate ASM activities. Mining is reported to take place largely at night, secretly, along the Black Volta. The assessment found no established mechanisms for district oversight, enforcement, health-and-safety or environmental monitoring, royalty collection, dispute resolution or systematic data collection on ASM activities.

The workforce includes a substantial proportion of miners from outside the immediate area, reflecting the highly mobile nature of ASM. In the absence of effective governance and mechanisms for managing access to resources and resolving disputes, this mobility may increase the potential for tensions between different groups of resource users. Oversight of the corridor currently relies primarily on the Blue Water Guards, whose operational capacity is constrained by limited equipment, including the lack of boats suitable for effective river patrols.

The Blue Water Guards are mandated to provide round-the-clock surveillance of water bodies, monitor illegal mining activity, and report threats to the Ghana Navy Command Centres and the Minerals Commission for rapid response, but logistical constraints — including the absence of speedboats and drones — limit enforcement; one informant noted that operators, being strong swimmers with motorised boats, can evade Guards who lack even a hand-paddled canoe. Where adequately resourced, however, the unit has demonstrated results: an intelligence-led operation on 10 January 2026 near Kpali dismantled four Changfan machines and other mining equipment.

Conflict typologies and security threats

The baseline identified six recurrent conflict typologies that together illustrate the range of security and governance challenges associated with ASM across the study area. These conflicts occur at different levels—from disputes within mining operations to tensions between communities, resource users and state institutions, and are driven by overlapping governance, land tenure, economic and security factors. While their prevalence varies across locations, they provide a useful framework for targeting conflict prevention, governance and peacebuilding interventions.

Typology	Drivers and documented hotspots
Inter-community	Disputes over gold-rich land — e.g Wakawaka–Sakpa, Banda Nkwanta–Nouyiri. Stakeholders warned these can escalate into national-security threats.
ASM–concession	Overlapping statutory rights of licensed firms and customary land use — e.g Tutumba, Dollar Power. Exacerbated by historical rezoning, land acquisition, expropriation and competing claims over access to mineral resources.
Intra-gang	Disputes over the division of proceeds, weighing practices and operational responsibilities within and between gangs.
Miner–forest guard	Confrontation following night-time encroachment into reserves.
Cross-border	Territorial contestation in the Dollar Power buffer; reported manipulation of boundary markers to access gold-bearing land; porous crossing along the Black Volta river enabling smuggling and illicit mineral trade; migration networks carrying extremist-infiltration risk; communication deficits delaying security reporting.
Community criminality	Small-arms proliferation, armed robbery, narcotics trafficking, gambling and syndicated youth gangs. Unregistered sites near forest reserves have also become nodes for smuggling of gold, firearms and controlled substances, as well as other forms of illicit trafficking.

Security and governance implications

- **Early-warning and monitoring mechanisms remain insufficiently institutionalised.** While there have efforts to strengthen local monitoring and early-warning capacities, these mechanisms are not yet fully embedded within a systematic, institutionally owned framework. Monitoring continues to remain largely informal, dependent on individual actors and unsupported by systematic data, limiting the ability of authorities to map hotspots, monitor trends and allocating resources effectively.

- In several communities, local security groups have emerged to supplement limited formal security provision. These groups conduct patrols and checkpoints and were reported to carry pump-action and single barrelled firearms. They are also widely understood to rely on spiritual fortification as a source of protection and legitimacy. Most of them operate without formal training, oversight or accountability mechanisms, increasing the risk of escalation.

- Dispute resolution blends customary and formal systems and is widely relied upon by communities. Yet, assessment documented instances of **coercive sanctions – whipping and banishment recorded at Tinga and Dollar Power** – raising the need to strengthen safeguards and human-rights concerns.

- **Horizontal cohesion within communities is generally strong, while vertical cohesion between communities and state institutions is comparatively weak.** This suggests that interventions are likely to be more effective where they build on trusted community structures while strengthening collaboration with formal institutions.

- Transnational criminal and extremist-infiltration risk. Numerous unapproved crossing points along the Black Volta corridor were identified as a potential avenue for transnational criminal networks. Security informants linked the concentration of transient, weakly monitored migrant populations to a risk of extremist infiltration — citing incidents involving armed individuals that generated local fears of terrorist infiltration, though subsequent investigation did not confirm terrorist involvement — within what informants described as a wider transnational security economy of illicit financial flows, money-laundering exposure through an almost entirely cash-based gold trade, and foreign financiers operating outside formal accountability frameworks. Firearms circulation, including pistols registered for self-protection and the pump-action weapons carried by informal community security groups, was linked by district-security informants to the emergence of organised criminal structures; Dollar Power, adjoining the Bui Dam, was separately flagged by the Bui Power Authority as a potential hub for illicit arms trafficking.

- Trafficking in human beings, including prostitution, was flagged as a risk but not independently investigated. Porous borders were identified as a structural enabler of human trafficking alongside smuggling and illicit mineral trade, and the socio-economic profile separately recommends integrating GBV prevention, recognition and referral pathways into community security — but the baseline collected no targeted indicators on trafficking in persons, sexual exploitation or prostitution specifically. A dedicated trafficking-in-persons assessment is recommended.

The governance findings are reinforced by a high degree of convergence across the three baseline studies. Although each assessment examined a different dimension of ASM, the table below shows that governance-related challenges emerged consistently across the evidence base. This convergence strengthens confidence that these are systemic issues requiring coordinated rather than sector-specific responses.

Cross-cutting theme	Governance, Security & Conflict	Socio-Economic Profile	Ecological & Health Risk
Weak formal governance	Central finding	Present	Not a focus
Exclusion of women, youth & migrants	Central finding	Central finding	Present
Cross-border / migrant dynamics	Central finding	Present	Not a focus
Cash & informal finance	Present	Central finding	Not a focus
Land tenure informality	Present	Central finding	Present
Priority hotspot sites (Dollar Power, Tinga)	Present	Central finding	Central finding
Health & environmental harm	Present	Present	Central finding
Community-led governance	Central finding	Present	Not a focus

Figure 2. *Governance at three speeds — a functioning informal order, a hollow formal one, and an outright vacuum in Sawla-Tuna-Kalba.s*



Ghana's Blue Water Guard moves in to immobilize a mechanised floating mining barge fitted with a Chang fang on the Black Volta River at Babato near Bamboi.

RECOMMENDATIONS

A **metagovernance framework** should be established – not as a new institution, but as a coordination mechanism clarifying roles, establishing platforms, enabling information sharing, monitoring compliance and resolving conflict. The framework should bring together state agencies, traditional authorities, community structures, mining associations, women, youth and migrant miners, and Early Warning and Early Response systems. See graph on page 15.

Implementation could be phased:

0-12 months: revitalise district security and peace platforms; map ASM communities; establish outposts in high-risk border corridors; formalise community security; build structured early warning.

1-3 years: simplify licensing processes; legal recognition of community governance; stronger District Assembly and traditional authority roles; improved border and communication infrastructure.

4 years+: national ASM security-and-governance framework; integrated data system; boundary demarcation; permanent inter-agency coordination.

Support to community security groups should be **conditioned on clear accountability arrangements, appropriate training, inclusion of women, youth and migrants and on human-rights safeguards**, with Sawla-Tuna-Kalba and the border corridors prioritised.

KEY TAKEAWAY

Top-down regulation alone will not deliver. A co-created model combining state authority with the legitimacy and adaptive capacity of community governance offers the greatest potential — and the convergence of transnational crime, border porosity, arms proliferation and extremist-infiltration risk has elevated ASM here from a livelihood question to a strategic national-security challenge.

6. Socio-economic profile, value chain and spatial footprint

Socio-Economic Profiling and Mapping of ASM Sites – Prof. Paul Kwame Nkegbe. Anchors GoldBod compliance and responsible sourcing.

Who mines, and why exit is hard

- ASM is dominated by men and by the young (18–40 band), with low formal education. Households average five active members, dependency ratio 1.56. Mining communities are markedly more ethnically diverse – ASM is a magnet for in-migration.
- **Average annual household income: GHS 83,256 in mining communities against GHS 14,357 in non-mining** – nearly six times higher, with better access to piped water, toilets, electricity and financial services (predominantly mobile money).
- School dropout is **more pronounced in non-mining than mining communities**, averaging three children per household, driven by inability to pay fees.
- Non-mining households farm larger areas (4.00 ha against 2.86 ha) and produce more, but mining communities achieve **higher yields per hectare (588.24 against 503.92 kg/ha)** and far greater livestock wealth (12.05 against 4.61 tropical livestock units). Mining does not replace agriculture – **it recapitalises households that combine both**, which is part of why exit is difficult.

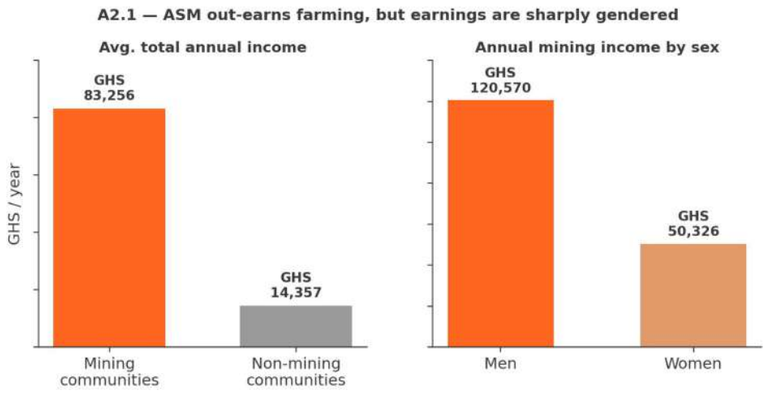


Figure 3. Mining decisively out-earns farming, but mining income is sharply gendered.



Both mining and non-mining communities report children's engagement in mining, albeit at a lower level.



Young people, including children, form the backbone of ASM labour, yet none are counted. No records of age, origin, education or hazard exposure exist on site.

A sharply gendered value chain

- Mean experience 6.93 years (men 7.91, women 5.47). Income potential is the principal pull factor; most enter through self-initiative; financing is self-, family- and employer-based; pit digging is overwhelmingly manual.
- **Women concentrate in one or two activities; men operate across multiple roles.** Men work 10.04 hours daily against 9.42 for women – a marginal difference against a very large earnings gap, indicating structural rather than productivity causes.
- **Annual mining income: GHS 120,570 for men against GHS 50,326 for women.** Weekly earnings descend from pit owners (GHS 4,417) and traders (GHS 3,838) to processors (~GHS 1,127) and ore transporters (GHS 607) – placing women disproportionately in the lowest-earning nodes.
- **Mercury use is widespread (38.88 %); cyanide present at 5.84 %.** Injuries concentrate among underground miners, processors, ore transporters and pit owners.
- **Women are absent from mining committee decision-making at every site.** Barriers to engagement are financial, safety-related, physiological and cultural. Men are considerably less likely than women to recognise sexual harassment as a problem.

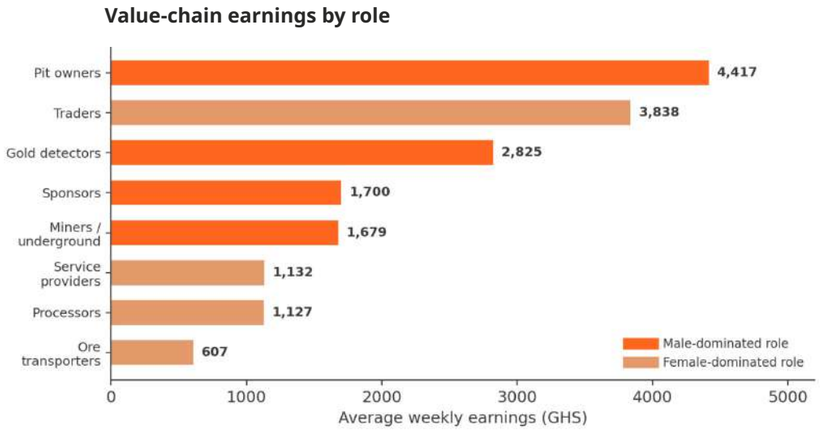


Figure 4. *Weekly earnings by value-chain role; male-dominated roles cluster at the top.*

Land, licensing and the compliance gap

- Tenure is hierarchical, allodial interest vested in the **Yagbonwura**. Registration is poorly developed — **only 15.9 6% hold registered land**. Under the Minerals and Mining Act 2006 (Act 703) chiefs hold land but not the minerals beneath it, a position sitting uneasily with practice.
- Communities have co-produced a flexible access system: proceeds-sharing, free allocation, short-term cash leases or purchase. Proceeds – locally "**loads**" – are shared between sponsor, workers and mining committees.
- **Only 2.92 % hold a mining licence** – Dakuripe Kamara (cooperative) and Tinga Wenchiwenchi (community mining) the exceptions. Barriers in order: **cost, lack of information, bureaucratic hurdles, corruption**. Greatest difficulty falls on communities inside reserves or licensed concessions.
- **74 % were unaware of any regulation governing mining in their area** – non-compliance is substantially a knowledge problem, not solely a willingness problem, and cannot be addressed by enforcement alone.
- Two settlement types: **formally integrated** into district governance (Tinga, Dakuripe, Wakawaka) versus **organically grown informal** (Dollar Power, Tutumba, Cloth) still negotiating recognition. Institutional readiness differs sharply — directly relevant to rehabilitation site selection.

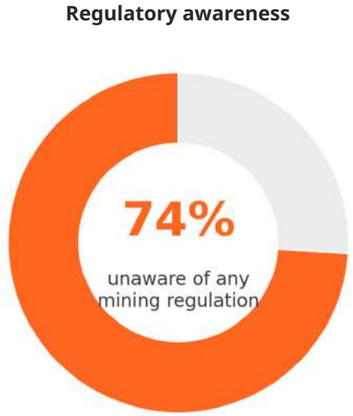
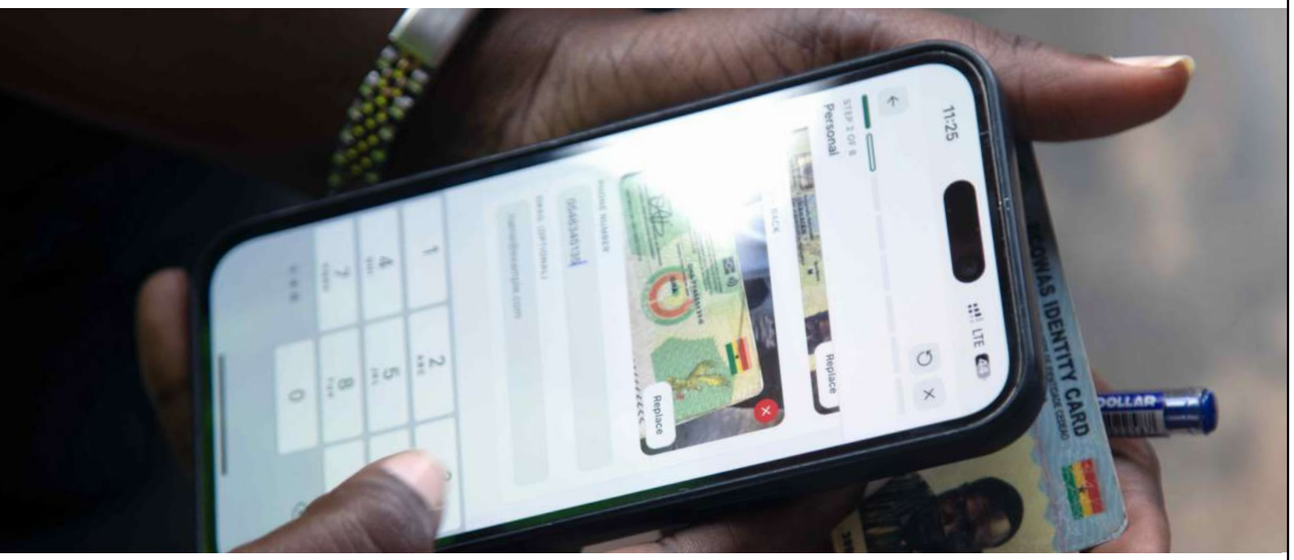


Figure 5. *Regulatory awareness among operators.*

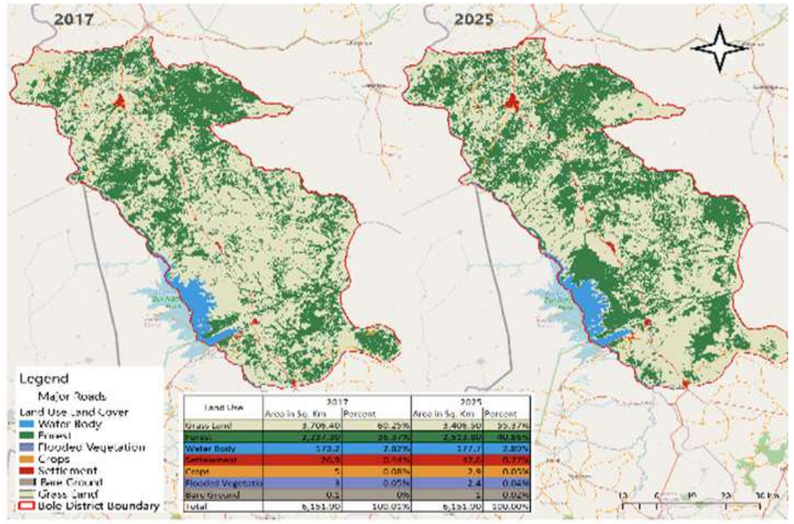




Despite efforts to register, formalisation remains difficult. A woman officer uses a smartphone and a miner ID card to complete the registration process, illustrating attempts by ASM operators to enter the formal system despite persisting practical barriers to registration and licensing.

Spatial footprint

- Grassland and forest were **98.24 % of the landscape in 2017.** By 2025 **forest cover had fallen 441.20 km² (-2.92 %)**, grassland expanded 370.60 km², and **settlement more than doubled from 56.80 to 114.90 km²**. While mining is likely to be one contributing factor of these changes in areas affected by ASM, the available land-cover data do not allow the observed changes to be attributed to mining alone; other factors, including population growth, settlement expansion, agriculture and associated land-use changes, are also likely to have contributed.
- **38 mining polygons across 19 communities, all in Bole.** Four (Dollar Power, Dollar Power Accra, Dollar Power Dablakoro, Tutumba) lie marginally beyond the district boundary. No active site was geo-referenced in Sawla-Tuna-Kalba – a site at Saru had been closed by community resistance – or in West Gonja, with Mole National Park undisturbed.
- **Growth occurs through multiplication of new sites, not expansion of existing ones,** magnifying footprint per unit of gold and making containment as important as remediation.
- **Six communities –** Tutumba, Kui, Dollar Power, Dollar Power Accra, Dollar Power Dablakoro, Gbenfu – show particularly high levels of mining-related land disturbance, with mapped mining footprints estimated at three to eight times the size of their built-up areas. Surface mining at Tutumba and Wakawaka has left open trenches and spoil heaps abandoned as operations move on; underground sites such as Tinga show markedly less surface disturbance.
- Several sites lie inside or adjacent to the **Yerada Forest Reserve** and along the fringes of **Bui National Park**, raising encroachment and succession risk.



Map 5. *Land use and land cover change, 2017–2025. Source: socio-economic profiling and mapping.*

- Forest gained overall, most visibly in the south. Between 2017 and 2025, forest cover in Bole rose by 12.36% (36.37% to 40.86% of the district), with the clearest gain in the southern half of the district, near the Black Volta — visible as a denser, more continuous green band in the 2025 panel than in 2017.
- The gain and the mining footprint are not the same places. Bole is also the district with by far the heaviest and most actively expanding mining footprint of the three studied (see above); the district-wide forest increase therefore reflects net change across the whole district, not an absence of mining pressure — clearing at mining and settlement nodes and regrowth elsewhere are both occurring within the same boundary. . As with the land-cover figures above, this reflects a change in Sentinel-2-classified canopy cover between two single-date snapshots (2017, 2025) rather than field-verified replanting or natural regeneration; a ground check of the southern patches, ideally alongside the fieldwork behind the mapped mining sites, would help confirm it.

Markets, migration and life after mining

- Gold is sold mainly to local buyers, consolidated by licensed aggregators, reaching the Ghana Gold Board. **GoldBod's aggregation drive may unintentionally reward unlicensed production** — two arms of the state pursuing contradictory objectives in the same sector.
- **98.33 % of gold payments are in cash**, exposing the chain to money laundering. For buyers bound by OECD due-diligence expectations, formal traceability at the aggregation point does not guarantee upstream legitimacy.
- Cross-border migration for mining is limited (**under 2 %** in the past year); internal mobility is more significant (**7.87 %** past year, **~38 %** ever). Higher yields are the primary driver. Payment is predominantly daily or by ore share; **family pit workers often receive no direct payment**.
- **45 % have considered leaving**. Former miners exit into trading, agriculture, artisanal trades and dressmaking, facing inadequate capital, skills, market access and land.
- **Only 4.76 % received any training after quitting**; financial support was rarer. **54.76 % name credit as the most useful reintegration support**. Post-exit income is gendered – most women report lower income, most men parity or improvement.
- Former miners nonetheless report good health and quality of life equal to or better than while mining, and **only 6.35 % intend to return** – evidence that supported exit pathways would find takers.

RECOMMENDATIONS

Governance: develop a district spatial framework to map sites, manage the proliferation of new sites, and profile sites outside Minerals Commission block-out areas; establish women-only ASM advisory committees with a **30 per cent minimum women's presence** applied by the District Mining Committee. Strengthen women's participation through governance and financial literacy training; integrate gender-responsive approaches into community security, including GBV prevention, recognition and referral pathways; strengthen the DMC as the primary coordination platform on which the Minerals Commission and GoldBod collaborate.

Formalisation: promote cooperative or group mining licences that reduce the risk of licence transfers or sub-leasing to large-scale firms; complement licensing with access to appropriate equipment personal protective equipment (PPE) and technical support, recognising that **current recovery techniques capture less than 40% of available gold**; expand banking access and flexible financial products to reduce cash dependence; community-level awareness building, along community-level awareness of licensing requirements and regulatory obligations.

Security and conflict management: explore options for formalising ASM activities in suitable areas of the declassified Dollar Power lands through inclusive dialogue with affected stakeholders; strengthen the involvement of traditional authority in licence issuance and renewal; use the DMC-brokered engagement on boundary contestations for ratification by the Gonja Traditional Council and Savannah Regional House of Chiefs; enhance coordination among the military, police and immigration agencies.

Local development: strengthen linkages between mineworkers and local sponsors to increase the retention of economic benefits within local *communities; prioritse regularisation and support for responsible ASM over enforcement-only approaches; and expand access to credit, skills development and livelihood opportunities for miners seeking to transition into alternative employment.*

KEY TAKEAWAY

Mining here is too ingrained to stop; the path is to regularise and thereby regulate it. The cash-based, self-financed, aggregation-fed structure is simultaneously why the economy resists formalisation and why it poses a laundering and security risk – so compliance must be made attainable and attractive, not merely mandatory.



ASM provides important livelihood and employment opportunities for a vast majority of the population in the Savannah region and beyond.
Here's a bird view of shallow-pit "ghetto" mining in Dollar Power.

7. Ecology, contamination and health

> Ecological and Health Risk Assessment of ASM Sites and Identification of "No-Go" Areas – Dr Dzigbodi Adzo Doke. Anchors land rehabilitation and "no-go" area designation.

Ecology – degraded but recoverable

ASM has altered vegetation structure without causing complete woodland loss. Because mining operations are concentrated in localised surface pits rather than extensive land clearing, **94 stems representing 13 species were recorded** across the three inventoried one-hectare plots. Species **evenness was high across all sites, indicating that no species had been competitively eliminated** within the sampled areas.

Site	Ecological signature	Restoration implications
Wakawaka	Highest richness and diversity (H′ = 2.30); tallest, most even-aged stand consistent with regenerating fallow farmland; valuable timber *Pseudocedrela kotschyi* and *Pterocarpus erinaceus*.	High natural regeneration potential: strong potential for assisted natural regeneration, requiring relatively limited intervention
Dollar Power	Largest average tree diameter, greatest structural variability; mature canopy of *Burkea africana, Parkia biglobosa, Ficus* spp.	Priority for conservation: protect— mother-tree.
Tinga	Lowest diversity (H′ = 2.06), dominated by *Vitellaria paradoxa* (shea) and *Terminalia* spp. — nearly half of all individuals — yet holds the tallest and largest-diameter trees in the dataset.	Targeted ecological restoration: use enrichment planting to rebuild diversity and accelerate woodland recovery where natural regeneration alone is insufficient.

- Ground-arthropod sampling captured 61 individuals across 10 taxa, **74 %** ants – a signature of compacted, vegetation-reduced savanna soils – with diversity declining near active mining.
- **Restoration through assisted natural regeneration, enrichment planting, pit backfilling and mother-tree protection is viable now**. This is a materially cheaper starting point than the stripped landscapes typical of southern *galamsey*.



Once the gold is gone, abandoned pits and degraded land remain, increasing erosion, reducing biodiversity, and slowing the natural recovery of forests and agricultural land.

Contamination

Medium	Finding
Soil (49 samples)	**Cadmium exceeded guideline in 100 % of samples –** mean 33.45 mg/kg – approximately 42 times the 0.8 mg/kg threshold, and a maximum concentration of 288.12 mg/kg. **Mercury exceeded the guideline in ~94 %** of samples – with a concentration of 1.38 mg/kg, approximately 4.6 times the 0.3 mg/kg threshold. **Lead** breached threshold at localised hotspots, reaching 561.19 mg/kg. **Arsenic** generally below applicable guideline.
Water (60 samples, Wechiau–Bamboi)	Means for most metals fell **within WHO drinking-water guidelines values**, although localised exceedances were recorded— notably cadmium, and maxima for lead and arsenic above WHO limits at specific points. High variability indicates point-source enrichment, not uniform pollution. Gold cyanidation is a hydro-metallurgical technique allowing for the extraction of gold from low-grade ores. This method is not widely practiced in ASGM in Ghana but associated with neighbouring countries of Burkina Faso and Mali and therefore the method is nicknamed 'Burkina' in Ghana.

Medium	Finding
Water (60 samples, Wechiau–Bamboi)	Although cyanide reacts readily in the environment and may quickly degrade when exposed to sunlight or form complexes of varying stabilities, its toxicity to many living organisms, at even low concentrations, is the primary reason for which it is guided globally by the International Cyanide Management Code (ICMC). According to the Ghana EPA, the use of cyanide for gold processing by artisanal small-scale gold miners is not illegal. However, any ASGM operator seeking to use this method, must meet stringent requirements prior to obtaining an environmental permit as is the case in the large-scale mining sector where leaching with cyanide is allowed. Presently, this is an illegal activity for ASGM since no ASGM operator has obtained the requisite approvals to do so (GoG, 2020). Results from the survey conducted in the study area revealed that 5.84% (26 out of 445) of respondents agreed to using cyanide in their mining operations. This use has the potential to affect the miners as well as the surrounding communities. The USEPA IRIS database evaluates the risk from Cyanide exposures mainly through oral and inhalation routes and exposures even at low doses may cause headaches, neurological disturbances and thyroid dysfunction among many other health effects. Water points where guideline values are exceeded may present a potential health concern and warrant site-specific assessment, continued monitoring and, where necessary, measures to reduce exposure or identify alternative safe drinking-water sources.
Indoor dust (amalgam-burning room)	Lead 395.5 mg/kg, arsenic 83.47 mg/kg, mercury 29.37 mg/kg — indicating **inhalation of contaminated dust in domestic and processing spaces as a significant exposure pathway**. Contaminated particles may also disperse into the immediate surroundings of processing sites, potentially extending exposure beyond the burning room. Single sample; indicative.
Fish and plants	Fish (3 samples, Clarias gariepinus) did not exceed the Codex lead value, though all four metals were detectable. Plant samples approached Codex limits for arsenic and lead.



Where ore is processed, pollution can flow beyond the site. Wastewater from processing is discharged into surrounding areas, with mercury, cadmium and other toxic substances used in gold recovery posing an additional risk of contamination to water, soil and people.

PCA, Self-Organizing Maps and Positive Matrix Factorization each independently resolved two contamination signatures – one cadmium–lead dominated, the other arsenic-mercury – indicating distinct but mining-related sources. For remediation design this matters directly: **mercury control and cadmium/lead control are, to a degree, separate problems requiring separate measures.**

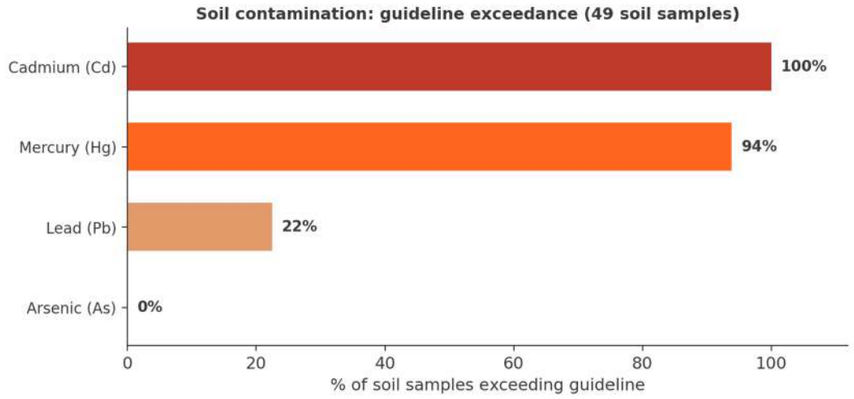


Figure 6. *Soil-guideline exceedance by metal.*



Unrehabilitated mining sites pose lasting hazards to nearby communities. Open pits collect stagnant water, increase the risk of accidents, and create breeding grounds for disease vectors such as mosquitoes.

Human health

- **In the West Gonja, Bole and Sawla-Tuna-Kalba Districts, soil, not water, is the principal exposure medium**. Approximately **46 % of child and 20 % of adult exposure scenarios exceed the acceptable non-carcinogenic threshold**, with **cadmium contributing over three-quarters of total estimated hazard**. Water risk is generally low. This pattern may reflect local mining practices, with much mining occurring inland and chemical processing concentrated closer to settlements, potentially increasing soil-related exposure. However, the findings relate to the pathways assessed and do not exclude other risks, including through the aquatic food chain.
- Children are consistently at higher risk through lower body weight and greater exposure per unit body mass. Sensitivity analysis identifies **dermal contact and incidental soil ingestion** as the driving pathways.
- **Primary grinders exceed the 85 dB WHO/Ghana occupational limit**, operated around eleven hours daily by young men, **none observed wearing hearing protection**, close to residential quarters – extending exposure to women and children who are not miners. Hearing loss, tinnitus, fatigue and sleep deprivation are probable outcomes.
- **Headache is the most reported symptom**, followed by chronic cough and breathing difficulty, with musculoskeletal pain and fatigue – consistent with sustained dust, noise and physical loading. The Dollar Power clinic reports upper respiratory disease predominating in the dry season, malaria in the rains.
- **Women and children are the most vulnerable** – women through concentration in ore processing and daily handling of contaminated material, children through soil contact and residential proximity to processing.

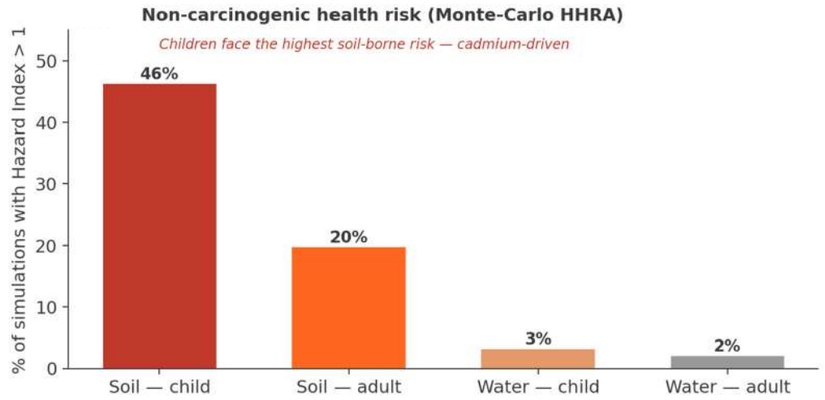


Figure 7. *Share of Monte-Carlo simulations exceeding the safe hazard threshold (HI > 1), by receptor and medium.*

Hazard	Likelihood	Severity	Risk level
Mercury exposure	High	High	**Extreme**
Cadmium exposure	High	High	**Extreme**
Dust inhalation	High	High	**Extreme**
Pit collapse	Medium	High	**High**
Noise exposure	High	Medium	**High**
Falls and trips	High	Medium	Moderate
Water contamination	Medium	Medium	Moderate
Malaria	Medium	Medium	Moderate

"No-go" delineation – forest, not river

- **94 sites over 1,001.79 ha** classified against Ghana's 300 m riparian and 500 m protected-area buffers. 68.64% of mapped area falls in the critical risk category – most ASM activity is inside or immediately adjacent to environmentally sensitive land.
- **Forest encroachment rather than water encroachment is the primary driver of ecological risk.** Based on water-related risk alone, only **0.23%** of mapped area falls within the critical-risk category, with most sites located outside the riparian buffer. While national discussions on ASM often emphasise river pollution, the evidence from this study indicates that, in the Black Volta corridor, encroachment into protect forest represents the more significant ecological constraint and should be prioritised in restoration planning.



Stone crushing generates large quantities of dust and exposes workers, often with little protective equipment, to persistent respiratory hazards and unsafe working conditions.



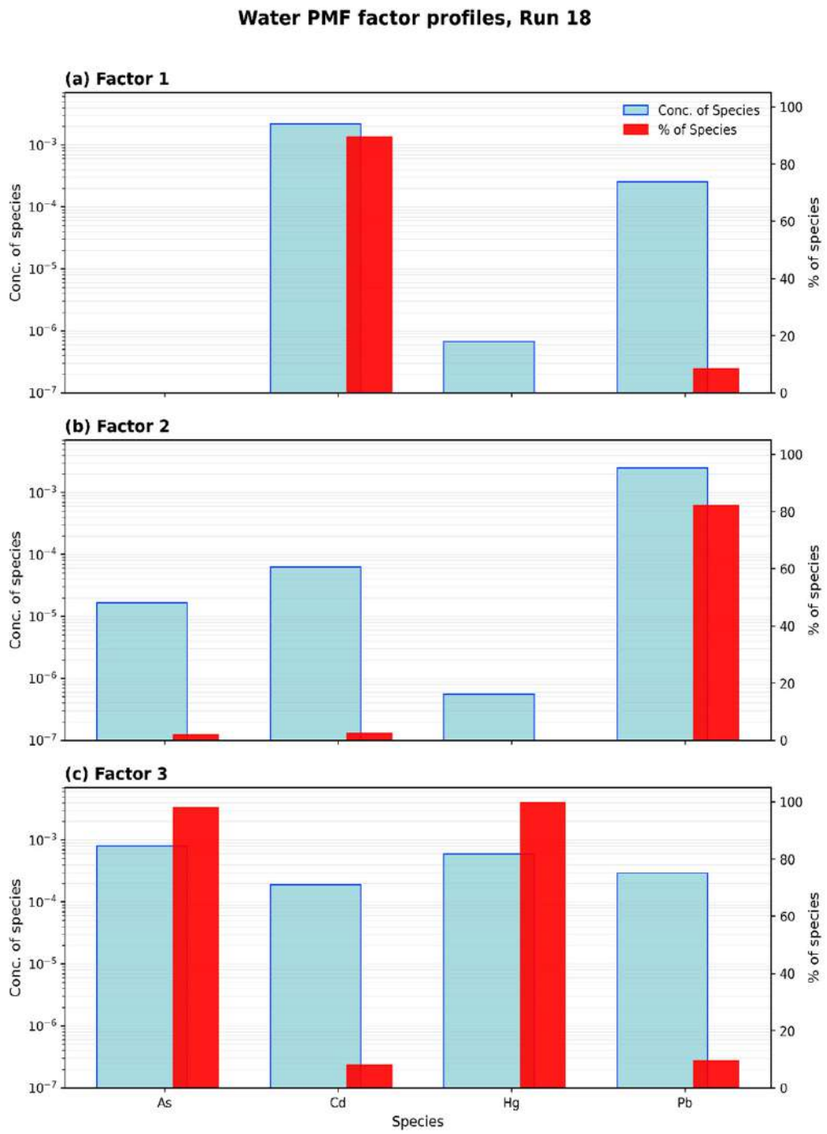
For these children, the mine is both a workplace and a place to play. Along with adults, among the rocks, they take part in the daily activities of the site, growing up in close contact with the dust, soil and materials of the mine.



The growing use of Changfan engines has intensified gold extraction, allowing mining to expand more rapidly while dramatically increasing river pollution and environmental destruction. Here is the Bamboi abandoned ASM site on Black Volta.

- **Dollar Power and Tinga account for 59 critical-composite sites, with every one of their mapped sites so classified**. Tinga has the largest average site size and is the only community with sites inside the water-critical zone. Wakawaka is lower risk but not risk-free.
- The designation of “no-go” areas was validated through participatory consultations with traditional leaders and Tindanas, and should inform local land-use planning. These areas encompass riparian buffers, food-producing farmland, schools, health facilities and residential settlements. The design principle is pragmatic: place children’s play areas away from mining but near homes for supervision.

Map 6. *Site classification against the 500 m protected forest buffer — the dominant driver of critical risk. Source: ecological and health risk assessment.*



RECOMMENDATIONS

Ecological: protect mature mother trees as priority seedbanks, embedding their conservation into miner education and CSO awareness work; promote assisted natural regeneration through silvicultural thinning and weeding, complemented by enrichment planting with indigenous fruit and other native tree species to restore ecological biodiversity; require **mandatory pit backfilling as immediate and standard post-mining practice** – reducing erosion, creating suitable conditions for natural regeneration, and eliminating physical hazard to children and livestock; establish community-managed nurseries from surviving mother trees and maintain permanent monitoring plots to track restoration outcomes over at least five years.

Human health: establish hearing-conservation programmes combining noise monitoring, audiometric screening, hearing protection, workers education and job rotation, delivered jointly by the EPA, Minerals Commission and district environmental health officers; strengthen integrated child health programmes through with biomonitoring; prioritise **dust suppression and mercury-free extraction as the two highest-severity hazards – concretely, promoting mercury-capturing retort technology (such as the see-through, fast-heating "lantern retort" now on trial in Ghanaian ASM) to replace open-air amalgam burning, and piloting direct smelting of gravity concentrates as a mercury-free alternative to amalgamation, with any shift toward cyanide leaching paired with the EPA permitting, operator training and tailings-detoxification it requires, so one hazard is not simply traded for another**; reduce exposure of vulnerable populations by ensuring physical separation between mining and ore-processing activities and residential areas, schools and other sensitive locations; support routine heavy-metal monitoring of the Black Volta by the Water Resources Commission with results made publicly accessible through District Assemblies.

"No-go" zones: prioritise enforcement and rehabilitation efforts in Dollar Power and Tinga; undertake immediate verification of Tinga's two water-overlapping sites and determine appropriate remediation or closure measures where required; institutionalise routine GIS monitoring of the 500 m forest and 300 m riparian buffers using periodic satellite or drone imagery; develop community-specific reclamation plans and strengthen engagement with ASM operator to improve compliance with riparian buffer policy and other environmentally sensitive land-use restrictions.

KEY TAKEAWAY

The landscape is recoverable, but the contamination is severe and human-facing. The risks are severe in specific, addressable ways — cadmium and mercury in soil, dust and noise at processing points, children's exposure through soil contact, forest encroachment at Dollar Power and Tinga. That specificity is what makes intervention tractable, and it means rehabilitation must lead with contamination control, sequenced ahead of replanting.

8. Cross-cutting findings

The most reliable findings in this series are those emerging in more than one study, arrived at by different means. Three such convergences carry direct design consequences.

One causal chain

Weak formal governance explains the 74% regulatory unawareness and 2.92% licensing rate; these permit uncontrolled processing – 38.88% mercury use, techniques recovering under 40% of available gold – which is measured downstream as the cadmium, mercury and dust burden falling on children and women. **Break any link and the chain weakens; address only one and the others regenerate it.**

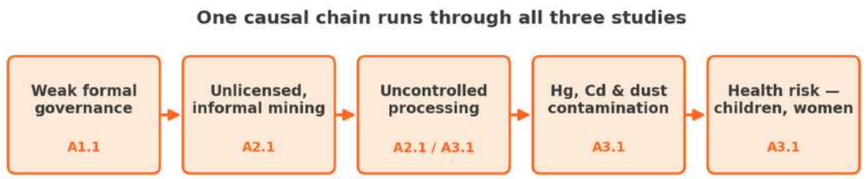


Figure 8. *One causal chain linking governance, formalisation and environmental-health outcomes.*

The same excluded groups

Women andyouth are simultaneously **the politically marginalised** (shut out of land allocation, dispute resolution, benefit-sharing and security, with women absent from committee decision-making at every site), **the economically disadvantaged** (concentrated in the lowest-earning nodes; women averaging GHS 50,326 against GHS 120,570 for men), and **the most exposed** (women processors handling mercury daily; children bearing the highest soil-cadmium hazard, 46 per cent of scenarios above threshold). Any intervention improving their position advances all three project outputs at once; any that ignores them reproduces harm along every axis.

The same geographies, reached three ways

- **Land and protected areas.** The spatial mapping places sites inside and adjacent to the Yerada Forest Reserve and on the Bui National Park fringes. By an entirely different method, the ecological assessment finds forest encroachment – not water proximity – the dominant driver of composite risk. Read with the governance diagnostic's account of contested mandates:

the areas under greatest ecological pressure are those where regulatory authority is least settled. This is not a passive vacuum: the governance diagnostic documents recurring confrontations between miners and forest guards at these same encroachment points — reported in Banda Nkwanta, Wakawaka and Dollar Power — a security dimension the ecological assessment's composite risk score, built from physical proximity to forest and water buffers, does not itself capture. Read together, the sites the ecological assessment ranks most critical are also the sites where enforcement is most actively and repeatedly contested on the ground.

- **Mobility and the border**. Migrant miners outnumber locals at several sites; the labour and gold-trading networks map onto the same corridors. Together they describe an economy that does not stop at the national boundary – of direct consequence for how border security is conceived and where patrol posts are sited.
- **Delivery channel**. The community-led order is the mechanism through which land access and participatory "no-go" designation must operate. The three interventions share not only a geography but an institutional channel.

Tensions the Gold for Good pilot must design around

- **The GoldBod paradox.** Gold aggregation may include production from illegal gold. With 98.33% of gold transaction settled in cash and 2.92 per cent of miners holding a licence, traceability systems should extend upstream of the aggregation point rather than relying on aggregation alone as evidence of responsible sourcing.
- **Legitimacy versus inclusion.** The community arrangements recognised for their effectiveness are also those in which women, youth and migrants have limited participation, and where some customary sanctions raise human rights concerns. Strengthening these systems should therefore be accompanied by inclusion and rights safeguards.
- **Recoverable but contaminated.** Ecology is optimistic, chemistry alarming. Restoring vegetation without addressing mercury, cynanide and cadmium contamination would be cosmetic and could return people to contaminated land.
- **Forest encroachment emerges as a key ecological concern.** Unlike mining contexts where impacts on rivers and surface water dominate, many mining sites in this corridor are located inland and away from major water bodies. The findings therefore point to encroachment into protected forests as a particularly important driver of environmental degradation, while not excluding localised risks to water sources. Thus, interventions designed around primarily river pollution risk missing the main driver of environmental degradation.

- **Regularisation versus proliferation**. ASM is growing through the multiplication of new sites. Licensing existing sites without spatial containment risks legitimising a footprint that continues to expand.
- **The missing data foundation**. All three studies points to weak baseline data, monitoring and early warning systems. Without a permanent monitoring and EWER backbone, progress will be difficult to measure and sustain.



Seen from above, Dollar Power tells its own warning: a settlement pushing outward into unbroken forest. Here, the frontier isn't advancing along a riverbank, it's eating into protected woodland, one new site at a time.

9. Implications for the Gold for Good pilot project and for policy



Figure 9. *From evidence to action – headline priorities crosswalked to the three Gold for Good outputs.*

Output	What the evidence implies
Security and regulatory coordination	Address the incentive and accountability structures that sustain illegal and harmful mining practices, alongside strengthened coordination between state, traditional and community actors.. Establish a functioning community-based EWER mechanism and work with existing community security structures, subject to human-rights safeguards and the meaningful inclusion of women, youth and migrants. Site joint border patrol posts by reference to documented migration corridors and boundary-pillar contestation rather than administrative convenience. Prioritise the Sawla-Tuna-Kalba vacuum and the Black Volta border corridors.
GoldBod compliance and responsible sourcing	Make compliance attainable through cooperative licensing (not sub-lets to large-scale firms), district spatial development frameworks and profiling of sites outside Minerals Commission block-out zones. Close the 74 per cent awareness gap through community engagement, not enforcement alone. Use the District Mining Committee to harmonise Minerals Commission and GoldBod incentives. Design traceability reaching upstream of aggregation. Extend banking to reduce 98 per cent cash dependence. Pair compliance with credit, skills and job-placement support.
Land rehabilitation	Prioritise rehabilitation and "no-go" enforcement where contamination and exposure are highest but remnant vegetation still allows recovery — Dollar Power and Tinga first. Lead with dust suppression and mercury-free processing, the two extreme-severity hazards. Use assisted natural regeneration, mother-tree protection, enrichment planting and mandatory pit backfilling. Monitor the 500 m forest and 300 m riparian buffers by periodic imagery. Protect children and women processors first.

Site selection for rehabilitation

The prioritisation logic is threefold: target sites that are **(i) high-contamination and high-exposure, (ii) socially and institutionally ready, and (iii) still ecologically recoverable**. The Bole cluster — Tinga, Wakawaka and Dollar Power — satisfies all three and is the strongest candidate group.

Within it the criteria pull in different directions, and this should be explicit. **Dollar Power** ranks highest on contamination and conservation value but is an organically grown informal settlement with lower institutional readiness and an unresolved concession dispute. **Tinga and Wakawaka** are formally integrated into district governance, giving the strongest delivery channel; Wakawaka additionally shows the strongest regeneration signal but a lower risk profile. A defensible sequence begins where institutional readiness and ecological recoverability coincide, while using the negotiated-licensing and traditional-authority routes to build the institutional channel at Dollar Power in parallel. Sawla-Tuna-Kalba carries high governance and security harm but lacks both verified footprint and institutional readiness and requires groundwork first.

Wider policy relevance

- **National ASM policy.** Governance approaches designed for the southern gold belt are not fully suited to a borderland context characterised by limited baseline data, cross border security dynamics and forest encroachment as the primary environmental constraint. National strategies should therefore incorporate context-specific governance approaches, supported by a national ASM security-and-governance framework and integrated data system.
- **International responsible sourcing.** The GoldBod paradox highlights the risk that traceability schemes may inadvertently certify gold from unlicensed operations unless they reach the unlicensed upstream of the aggregation point. This has direct relevance to OECD due-diligence guidance and to any buyer seeking to source responsibly produced Ghanaian gold.
- **The mercury agenda.** Measured soil and dust contamination, a 38.88 per cent mercury use prevalence, and processing that sheds most of the gold as contaminated waste make the study area a strong candidate site for Minamata-aligned mercury-free processing pilots, with measurable progress against an established baseline.
- **Preventive ASM governance.** Much ASM policy focuses on mitigating established impacts. In contrast, this study area combines an expanding ASM frontier, surviving mother trees, functioning (if exclusionary) community governance arrangements and a robust baseline established before environmental degradation becomes irreversible. This provides an opportunity to test whether preventive, rather than primarily remedial, ASM governance can improve environmental, governance and development outcomes.

THE SINGLE MESSAGE

Enforcement alone will not be sufficient. Durable change requires pairing regulation with community legitimacy, livelihood security and environmental restoration as a single, integrated and inclusion-conditioned response – exactly the logic underpinning the Gold for Good theory of change. The task now is to treat this frontier as the preventive test case it is, while the window for prevention is still open.

Source documents

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ABOUT COGINTA

Coginta is a non-governmental organisation incorporated under Swiss law and recognised as being of public benefit, which works to promote economic and social development by addressing the structural causes of instability, poverty and exclusion. Its work lies at the intersection of local governance and security, conflict prevention, natural resource management and socio-economic development, recognising that these aspects are closely interlinked and essential to social stability and cohesion. Coginta has its headquarters in Geneva and country offices in Burkina Faso, the Central African Republic, Chad, Côte d'Ivoire, the Democratic Republic of Congo, Ghana, Guinea, Mozambique, Niger and Senegal.

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