

Beyond Extraction: Governing Sustainable Mining, Resource Justice, and Community Resilience in Turkana County, Kenya A Desk-Based Policy and Governance Synthesis

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Abstract

Turkana County, in Kenya's arid north, sits atop two extractive frontiers that are advancing far ahead of the institutions meant to govern them: artisanal gold mining at Lomeguro/Naduat, Locheremoit, Kalomwae, and Moruogor, and the commercial oil development now proceeding in the South Lokichar Basin of Turkana East and South. This paper synthesises publicly available government, media, county, and academic sources to examine the governance gap that has accompanied this dual extractive economy and the socio-economic, environmental, and security consequences that follow from it. Drawing on resource curse theory, common-pool resource governance, devolution and subsidiarity theory, and environmental justice frameworks, the paper documents recurring patterns across the mining sites: fatal shaft collapses linked to the absence of appropriate equipment and safety standards, unregulated mineral pricing and trading, weak county revenue and royalty capture, contested land governance around conservancies, and infrastructural, educational, and social strains on host communities. It situates Turkana's experience within comparative artisanal and small-scale mining (ASM) formalisation literature from Ghana and Tanzania, and within Kenya's own Mining Act, 2016 and its devolved royalty-sharing architecture. The paper's principal contribution is the Integrated Sustainable Mining Governance Framework (ISMGF), a ten-pillar model linking governance, environmental sustainability, community well-being, economic inclusion, security, technology, local content, transparency, climate resilience, and intergenerational equity. The paper concludes with a set of practical, sequenced policy recommendations for the Turkana County Government, the national government, and development partners, including a proposed Turkana Artisanal Mining Authority, designated mineral trading centres, a county mineral cadastre, and an environmental restoration fund financed through production levies.

Keywords: Sustainable Mining, Artisanal and Small-Scale Mining (ASM), Resource Governance, Turkana County, Extractive Industries, Community Resilience, Kenya Devolution, Oil and Gas Governance, Resource Curse, Integrated Sustainable Mining, Governance Framework (ISMGF)

1. Introduction

Turkana County occupies roughly 77,000 square kilometres of Kenya's arid and semi-arid north, a region long associated with pastoralism, chronic drought, and some of the highest poverty rates in the country. Over the past three decades, and with growing intensity since the early 2010s, that image has been complicated by the discovery and expansion of two extractive economies: artisanal gold mining at sites including Lomeguro/Naduat in

Turkana North, Locheremoit and Nagetei in Turkana South, and Moruogor in Loima, and the development of commercial oil reserves in the South Lokichar Basin spanning Turkana East and Turkana South [1,2].

The gold fields around Lomeguro were first opened after local discovery of surface deposits in 1991, and have since grown into a livelihood system drawing miners, and increasingly

women miners, from across the county and beyond [2]. County officials estimate that mining activity at sites such as Lolupe and Locheremoit directly engages thousands of artisanal workers [3]. At the same time, the oil discovered in the South Lokichar Basin in 2012 has, after more than a decade of stalled commercialisation under Tullow Oil, moved toward first production under a new operator, Gulf Energy, with a Field Development Plan approved by Kenya's Cabinet Secretary for Energy and Petroleum and submitted to Parliament for ratification in late 2025 [4,5].

These two extractive tracks are advancing at very different speeds and along very different regulatory pathways, yet they share a common feature that motivates this paper: extraction is running ahead of the governance, spatial planning, revenue, and social protection architecture required to manage it sustainably. On the artisanal side, this has manifested as repeated fatal shaft collapses, most recently a November 2024 collapse at Naduat that killed three miners and a further collapse in mid-2025 that led the county to close the flagship Lomeguro site altogether pending a safety and environmental review [6-8]. On the oil side, the scale of anticipated investment is now considerable: Gulf Energy has indicated capital commitments of approximately USD 6 billion, with government revenue projections of roughly USD 2.9 billion (about KES 374 billion) from crude exports, and construction-phase employment estimated at over 3,000 direct jobs [8-10].

The significance of this moment is threefold. First, Turkana is an instructive test case for how Kenya's 2010 Constitution and its devolved system of government translate high-level guarantees, such as Article 69's commitment to sustainable exploitation, utilisation, and conservation of the environment and natural resources, into practice at the county level [11]. Second, the Mining Act, 2016 introduced one of the more progressive royalty-sharing formulas in the region, allocating 20% of mineral royalties to county governments and 10% directly to communities hosting mining operations, alongside legal recognition of artisanal miners and a national mining cadastre [12,13]. Whether that architecture can be operationalised in a county as remote, poor, and institutionally thin as Turkana is an open and consequential question. Third, the county's experience offers comparative lessons for, and can draw lessons from, artisanal mining formalisation efforts elsewhere on the continent, notably in Ghana and Tanzania, where governments have experimented with licensing reform, mining cooperatives, and dedicated mineral trading and processing centres [14,15].

This paper's central contribution is the Integrated Sustainable Mining Governance Framework (ISMGF), a conceptual model that links ten interdependent pillars, governance and institutions, environmental sustainability, community wellbeing, economic inclusion, security and enforcement, technology and safety, local content and benefit-sharing, transparency and accountability, climate resilience, and intergenerational equity, into a single framework for evaluating and designing mining governance

interventions in frontier, low-capacity settings such as Turkana. The remainder of the paper proceeds as follows: Section 2 reviews Turkana's geological and mineral potential; Section 3 situates the study within the wider literature; Section 4 sets out the theoretical framework; Section 5 describes the study area; Section 6 outlines the desk-based methodology and its limitations; Section 7 presents thematic findings; Section 8 develops the ISMGF; Section 9 sets out policy recommendations; and Section 10 concludes.

2. Geological and Mineral Potential of Turkana

Turkana's subsurface endowment is bifurcated between hard-rock and alluvial gold in the county's northern and southern hills and hydrocarbon reserves in the Tertiary rift basin that runs through Turkana East and South. On the mineral side, the principal artisanal gold sites identified in this study are Lomeguro/Naduat in Turkana North, Locheremoit and the adjacent Nagetei and Lolupe sites in Turkana South, and Moruogor in Loima sub-county; Kalomwae and Moruita (Moruogor) are also referenced in county and community accounts as long-standing, higher-risk mining locales [3,16]. Beyond gold, county officials and press reporting also reference the presence of precious and semiprecious stones, including sapphire, rhodolite garnet, and jade, across the wider mineral belt [16].

On the hydrocarbon side, oil was first discovered in the South Lokichar Basin in 2012, principally at the Ngamia-1 and Amosing wells within license Blocks 10BB, 13T (T6 and T7 in current parlance) [4,17]. Current estimates place total oil in place at approximately 2.85 billion barrels, with 429 to 560 million barrels considered technically and commercially recoverable under present development plans [10,17]. Following Tullow Oil's decade-long struggle to secure financing and its 2025 divestment of its Kenyan upstream portfolio to Gulf Energy for a minimum consideration of USD 120 million, an approved Field Development Plan now targets first commercial production, transported initially by road tanker to Mombasa, before the end of 2026, with Phase 1 output of approximately 20,000 barrels per day rising to 50,000 barrels per day in Phase 2 from 2032 [5,10]. A longer-term export pipeline of roughly 820 to 895 kilometres to the port of Lamu under the LAPSET corridor is also envisaged [5].

A recurring and consequential gap identified throughout this study, and confirmed in county government statements about establishing a gemstone and mineral tracking centre, is the absence of a comprehensive, publicly accessible geological and mineral cadastre for Turkana's artisanal sites [2]. Where the oil sector benefits from internationally audited reserve estimates, seismic surveys, and a national online mining cadastre portal established under the Mining Act, 2016, the county's gold and gemstone deposits remain, in comparative terms, geologically under-mapped at the artisanal scale, a gap that recurs as both a finding and the basis for one of this paper's central recommendations.

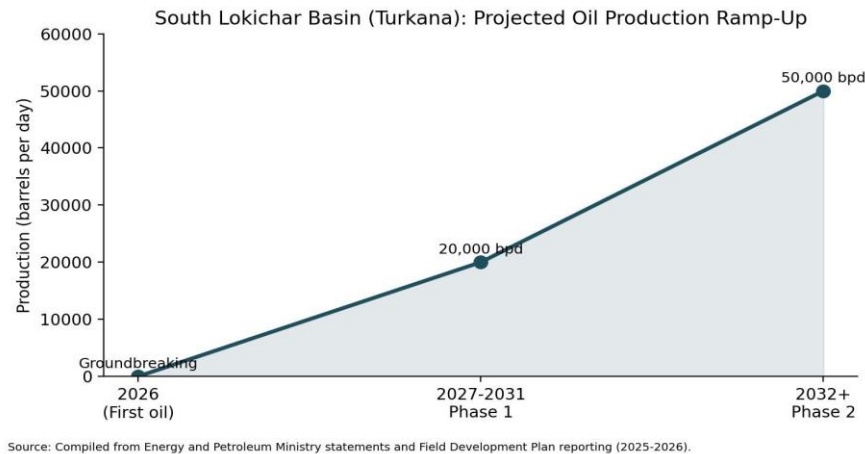


Figure 1: Projected oil production Ramp-Up, South Lokichar basin, Turkana. Source: Compiled from Energy and Petroleum Ministry and Field Development Plan Reporting.

3. Literature Review

3.1. Resource Curse and Governance in African Extractives

A substantial literature, beginning with Auty's formulation of the 'resource curse' and extended by Sachs and Warner's cross-country analysis, has documented how resource-rich developing economies frequently underperform resource-poor peers on growth, governance quality, and institutional development [18,19]. Subsequent work has nuanced this picture, arguing that the curse is conditional on the strength of pre-existing institutions rather than an inevitability of resource endowment itself [20]. International IDEA's (n.d.) comparative study of mineral resource governance across Africa similarly finds that outcomes diverge sharply depending on the quality of licensing regimes, revenue transparency, and community benefit-sharing arrangements rather than on geology alone, a finding directly relevant to Turkana's simultaneous management of a maturing artisanal gold sector and an emerging oil sector.

3.2. Artisanal and Small-Scale Mining (ASM) Governance: Comparative Cases

Ghana and Tanzania offer the most extensively documented African comparators for ASM governance reform. In Ghana, the government's formalisation drive, supported by the World Bank's Artisanal and Small-Scale Mining Formalization Project, has combined simplified licensing, institutional capacitybuilding, and support for 'galamsey' (informal) mining communities transitioning toward legal recognition, while grappling with the environmental and safety costs of mechanised informal mining [14]. Studies using process net-mapping in Ghana's ASM sector have identified highly centralised, bureaucratic licensing procedures as a principal driver of continued informality, since lengthy and costly formal processes create strong disincentives against registration [21,22]. Tanzania has pursued a distinct model centred on Centres of Excellence (COEs) for artisanal gold and gemstone mining, developed with World Bank support and intended to formalise miners as small entrepreneurs through decentralised licensing, designated mining

zones, and shared processing infrastructure [15].

Comparative assessments caution that the 'entrepreneurial' framing embedded in the COE model risks underestimating the collective, cooperative, and often precarious character of ASM livelihoods, and that centre-based formalisation can inadvertently exclude the most marginal miners it is meant to serve [15]. Tanzania's parallel state-led efforts to curb environmental impacts, including promotion of mercury retorts to reduce mercury use in gold processing, illustrate both the technical feasibility and the institutional difficulty of environmental reform within ASM systems [23]. A recurring lesson across both cases, and one with direct relevance for Turkana, is that formalisation succeeds only where devolved or local administrative bodies are given genuine authority, resources, and capacity to license, monitor, and support miners, rather than formalisation being announced at the national level and left unimplemented locally [22,24].

3.3. Kenya's Devolution and Extractive Governance

Kenya's Mining Act, 2016 replaced colonial-era legislation and introduced several reforms directly relevant to this study: legal recognition and a simplified permitting pathway for artisanal miners, exempting them from the technical and financial capacity requirements applied to large-scale operators; a national online mining cadastre intended to bring transparency to licensing; mandatory Community Development Agreements for large-scale mineral right holders; and a statutory royalty-sharing formula allocating 70% to national government, 20% to county governments, and 10% to the community hosting the mining operation [12,24]. The Act further establishes Artisanal Mining Committees and county-level mining offices, embedding a devolved implementation architecture into the legislation itself [25]. The practical implementation of this architecture, however, has been uneven. Legal commentary notes ongoing ambiguity in royalty rate-setting, dispute resolution, and the operationalisation of Community Development Agreements [26]. For oil and gas, a

parallel regime under the Petroleum (Exploration, Development and Production) Act, 2019 and Article 71 of the Constitution governs the ratification of Production Sharing Contracts, as illustrated by the parliamentary review process for the South Lokichar Field Development Plan in late 2025 [4,27].

3.4. Environmental and Social Impacts of Unregulated Mining

A well-established environmental health literature links unregulated ASM to land degradation, water contamination, and elevated occupational health risk, particularly where mercury or unsafe tunnelling methods are used and where surface rehabilitation is neither mandated nor practised [22,23]. The social literature on extractive 'boomtowns' more broadly documents associated risks of school disruption, family strain, and genderbased vulnerability in host communities, though the specific magnitude of these effects is highly context-dependent and requires local verification rather than direct transposition from other settings [15].

3.5. Conservancies and Land Rights in Northern Kenya

A distinct but adjacent literature examines the wider East African, and specifically northern Kenyan, debate over community conservancies. The Northern Rangelands Trust (NRT) model has established dozens of community conservancies across northern and coastal Kenya since the mid-1990s, reorganising communal pastoral land under new governance arrangements in partnership with international conservation funders. Independent and advocacy assessments of this model reach sharply divergent conclusions: some scholarship documents governance benefits and improved ecological outcomes tied to community buy-in and participatory management (MDPI Sustainability), while a 2021 Oakland Institute report and subsequent 2025 assessments by the Fédération Internationale des Droits Humains (FIDH) and Avocats Sans Frontières raised serious allegations regarding land dispossession and human rights abuses linked to conservancy security operations, allegations that NRT and an independent review commissioned by a major conservation funder have disputed [28-31]. Notably, in January 2025 Kenya's Environment and Land Court ruled that two NRT-affiliated conservancies in Isiolo County, Biliqo Bulesa and Cherab, had been established unlawfully [29]. This is a live, contested, and unsettled area of Kenyan resource-governance debate rather than an adjudicated set of facts specific to Turkana, and it is treated in this paper strictly as background literature framing a recommendation for independent land-tenure review, not as an evidentiary finding about any specific organisation's conduct in Turkana's Kalobeyei or Suguta areas.

4. Theoretical Framework

4.1. Resource Curse Theory

Resource curse theory frames the analytical starting point: absent strong institutions, resource windfalls can produce weaker, not stronger, governance and development outcomes [18-20]. Applied to Turkana, the theory generates a testable proposition that motivates this paper's findings: that the absence of licensing, revenue, and enforcement capacity, rather than the presence of gold or oil per se, is the primary driver of the adverse outcomes

documented in Section 7.

4.2. Common-Pool Resource Governance (Ostrom)

Elinor Ostrom's work on the governance of common-pool resources provides a second lens, particularly relevant to artisanal mining sites that are, in effect, unmanaged commons [21]. Ostrom's design principles, clearly defined boundaries, congruence between rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, and conflict-resolution mechanisms, offer a diagnostic checklist against which Turkana's current, largely informal, mining-site governance can be assessed and which underpins this paper's recommendation for mining cooperatives and community-based trading centres.

4.3. Devolution and Subsidiarity Theory

Kenya's 2010 Constitution embeds a subsidiarity logic: functions should be exercised at the level of government closest to the citizens affected, unless a compelling case exists for centralisation [11]. The Mining Act's allocation of licensing offices, Artisanal Mining Committees, and royalty shares to county government reflects this logic [25]. Devolution theory cautions, however, that subsidiarity without adequate fiscal transfer, technical capacity, and accountability mechanisms at the local level can produce a governance vacuum rather than genuine local empowerment, a risk squarely relevant to a county with Kenya's highest poverty headcount and thinnest administrative capacity [32].

4.4. Environmental Justice Framework

Finally, an environmental justice framework, concerned with the fair distribution of environmental benefits and burdens and with meaningful community participation in decisions affecting local ecosystems and livelihoods, underpins this paper's treatment of land, conservancy, and environmental degradation questions [33]. This framework is deliberately agnostic as to which party is at fault in any specific land dispute; its analytical function is to insist that procedural fairness, recognition of pastoralist and mining communities' rights, and distributive equity in revenue-sharing be treated as first-order governance objectives rather than afterthoughts.

5. Study Area

Turkana County is Kenya's second-largest county by land area, bordered by South Sudan, Ethiopia, and Uganda, and characterised by an arid, pastoralist economy historically centred on livestock. It is consistently ranked, across successive Kenya National Bureau of Statistics (KNBS) Continuous Household Surveys, as the county with the highest poverty incidence in Kenya: an overall poverty headcount rate of 82.7% and a hardcore (extreme) poverty rate of 42.6% in the most recent 2022 data, alongside a food poverty rate of 64.3%, all the highest of any Kenyan county [32,34,35]. KNBS's 2019 and 2020 Kenya Poverty Reports similarly place Turkana at, or near, the top of national rankings for child poverty (82% in 2019) and hardcore poverty (43.7% in 2020) [33,36]. A 2025 KNBS child-poverty analysis further finds that around nine in ten Turkana children experience multidimensional deprivation

across three or more indicators, among the most severe rates nationally [37].

This socio-economic backdrop is directly relevant to the extractive governance questions examined in this paper: mining and oil, in a county this poor, are not a marginal economic activity but plausibly one of very few realistic livelihood alternatives to pastoralism, which raises the stakes of governing them well substantially higher than in wealthier, more economically diversified mining regions. The paper's focus zones are: for artisanal gold, Lomeguro/Naduat (Turkana North), Locheremoit, Nageitei, and Lolupe

(Turkana South), and Moruongor (Loima); and, more cautiously per available sourcing, Kalomwae and Moruita/Moruongor as sites frequently referenced in county and community accounts of long-standing but higher-risk mining activity. For oil, the focus is the South Lokichar Basin spanning Turkana East and Turkana South, including the Ngamia and Amosing well fields within licence Blocks T6 and T7 [4,17]. The county's shared international border areas, relevant to the security discussion in Section 7.4, add a cross-boundary dimension to governance challenges not present in interior Kenyan mining counties.

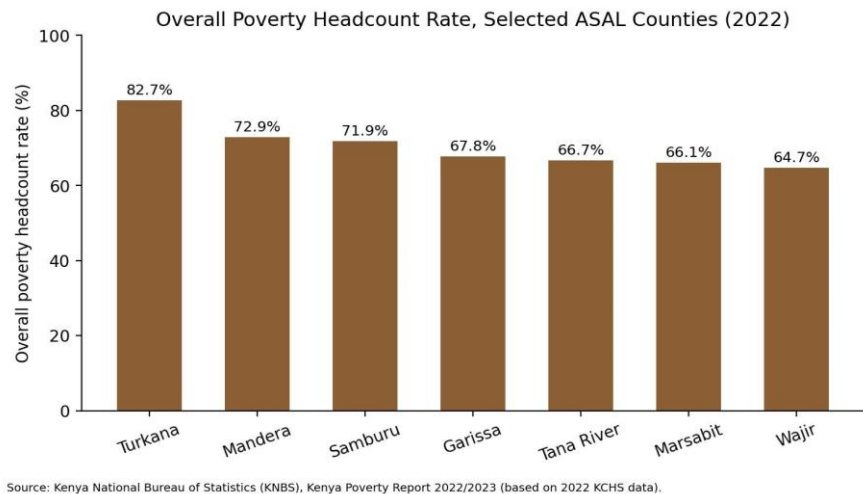


Figure 2: Overall poverty headcount rate for Turkana and comparator ASAL counties, 2022. Source: Kenya National Bureau of Statistics.

6. Research Methodology

This paper is a desk-based synthesis drawing on four categories of secondary sources: (1) Kenya National Bureau of Statistics publications and reports; (2) Turkana County Government press communications and public statements; (3) Kenyan and regional mainstream media coverage of mining incidents, oil sector developments, and governance actions, corroborated across multiple outlets where possible; and (4) peer-reviewed and grey-literature academic sources on resource governance, ASM formalisation, and northern Kenyan land tenure. It does not include original key informant interviews, focus group discussions, or site visits, and this is a material limitation acknowledged throughout.

A mixed-methods design combining the desk review presented here with primary fieldwork, key informant interviews with county mining officials, artisanal miners' associations, and licensed oil-sector operators, focus group discussions with affected communities in Lomeguro, Locheremoit, Kalomwae, and Moruongor, and document review of county revenue and Auditor-General reports, would substantially strengthen the evidentiary basis of several findings below, particularly those concerning security incidents, county revenue leakage, and land-tenure disputes, which are flagged in Section 7 as community-reported or perception-level findings rather than independently verified facts. Any follow-on fieldwork of this kind would require standard ethical safeguards,

informed consent, and protection of sources given the security-sensitive nature of banditry- and insecurity-related content.

7. Findings and Discussion

This section organises findings thematically. Each theme is drawn from convergent public reporting; where a claim rests on community or media testimony rather than an audited record, this is stated explicitly.

7.1. Technology, Equipment, and Occupational Safety Deficits

The single most consequential and best-documented finding of this review is the pattern of fatal shaft collapses at Turkana's artisanal gold sites, attributable to reliance on manual digging methods, deep and poorly shored vertical and horizontal tunnels, and the absence of protective equipment. County government communications confirm a collapse at the Naduat gold mines in Lomeguro village in November 2024 that killed three miners, and a further shaft collapse around mid-2025 that killed one miner and injured two others, prompting county authorities to close the Lomeguro site pending a safety and environmental review conducted jointly with Oil and Gas Group Kenya and the NGO Solidaridad [6-8,38].

Miner testimony collected by national media describes tunnels reaching approximately 30 metres (100 feet) in depth, with low oxygen and high heat, conditions miners describe entering

nonetheless because mining remains their only income source [16]. The county government's response has included targeted equipment support rather than blanket prohibition: in February 2024 the Department of Energy, Petroleum, and Mineral Resources distributed four ball mill machines to artisanal miners at Locheremait, Lolupe, and Moruongor, explicitly to replace slower, more dangerous manual ore-crushing methods [3]. This is a genuine, verifiable governance response, but its scale (four machines against an estimated 10,000 or more artisanal miners at Lolupe alone) illustrates the magnitude gap between current interventions and the scale of the safety deficit [3].

7.2. Market and Pricing Governance

Community and county accounts converge on the absence of a regulated, transparent market for artisanal gold and gemstones in Turkana. The Director of Mining for Turkana County has publicly stated the county's intention to establish a gemstone and mineral trading centre precisely to track extracted quantities, streamline royalty collection, and provide miners a safer transaction environment, explicitly noting that without a defined market, mineral trade remains vulnerable to insecurity and exploitation [2]. This official acknowledgment corroborates, without confirming specific pricing figures, the perception-level finding that pricing in the current informal market is neither transparent nor protective of miners' interests. Comparative ASM literature situates this gap within a well-documented pattern across informal mineral economies, where the absence of accredited assay and trading infrastructure systematically disadvantages primary producers relative to intermediary buyers [22].

7.3. Licensing, Revenue, and Fiscal Governance

The Mining Act, 2016's statutory royalty-sharing formula, 70% national, 20% county, 10% community, together with its provision for county-level Artisanal Mining Committees and mining offices, provides Turkana with a legal entitlement to meaningful mining revenue and local institutional authority [12,25]. The extent to which this framework has been operationalised at the county level, in terms of active royalty collection, a functioning Artisanal Mining Committee, and a published county mineral revenue account, could not be independently verified from public sources reviewed for this paper and represents a priority area for the fieldwork and Auditor-General document review recommended in Section 6. What can be stated with more confidence is that the coexistence of a still-emerging mining cadastre with a largely informal, cash-based artisanal trading system creates, as a matter of institutional design rather than proven specific conduct, elevated risk of revenue leakage and weak levy enforcement, a risk this paper treats analytically as a regulatory vacuum rather than as an assertion of particular corrupt acts by named individuals or institutions.

On the oil side, fiscal governance is comparatively more developed and transparent, reflecting the different regulatory track applicable to large-scale hydrocarbon projects: the Field Development Plan and associated Production Sharing Contracts for Blocks T6 and T7 were subject to Senate public participation in December 2025 under Article 71 of the Constitution and the Petroleum Act, with

government revenue projections and capital investment figures made public in parliamentary and press briefings [9,27].

7.4. Security and Enforcement

Public reporting confirms that at least some Turkana mining zones lack a permanent, dedicated security or enforcement presence, and that this has periodically produced volatile confrontations between communities and state authorities, illustrated by the 2025 protests following the Lomeguro closure, in which residents blocked the Kakuma road for several hours and police reportedly fired shots into the air to disperse crowds [8]. Community accounts referenced in the original project notes describe recurring banditry-related insecurity in the Kalomwae and Moruita areas, including unaccounted deaths; these specific claims could not be independently corroborated through the public sources reviewed here and are presented as community-reported security concerns requiring verification through direct fieldwork, victim or next-of-kin interviews conducted with appropriate ethical safeguards, and, where available, police or human-rights-organisation records, rather than as confirmed casualty statistics. This caution does not diminish the seriousness of the underlying concern; it reflects this paper's standard that unverified casualty figures should not be presented as fact in a scholarly publication.

7.5. Environmental Degradation

Multiple independent sources corroborate environmental degradation at artisanal sites, including the specific 2025 Lomeguro closure decision, which county officials attributed in part to environmental concerns alongside safety incidents [7,38]. The subsequent joint assessment led by the Directorate of Mining explicitly evaluated environmental controls and compliance with environmental safeguarding standards as a condition for reopening [38]. Community-reported concerns about loose soil and unrehabilitated open pits posing danger to livestock and children are consistent with, but not separately verified against, this environmental-review evidence, and align with the wider ASM environmental literature documenting land degradation as a near-universal consequence of unregulated artisanal extraction absent mandated site rehabilitation [23].

7.6. Social and Demographic Impacts

Government and NGO sources converge on artisanal mining's substantial contribution to local livelihoods, alongside associated social strain. Oxfam's 2025 fieldwork profile of women miners in Lomeguro documents a shift in women's roles from manual shaft digging toward oversight, gold-refining, and sales, alongside continuing exposure to the sector's physical hazards [2]. Community-level concerns regarding school dropout, family strain, and rising theft associated with mining boomtown dynamics, as referenced in the project's original field notes, are broadly consistent with the international boomtown literature but require county education office and local police data to establish magnitude specific to Turkana; this paper treats them as a plausible, literature consistent hypothesis warranting targeted primary research rather than an established local statistic [15].

7.7. Infrastructure Deficits

Turkana's overall infrastructure profile, poor road, network, and utility connectivity relative to national averages, is consistent with its status as Kenya's most extreme ASAL county and its correspondingly low household expenditure levels, the lowest average and median adult-equivalent expenditure of any Kenyan county in KNBS's 2019 household survey [32]. This general infrastructure deficit compounds mining-specific challenges: the absence of graded access roads to remote sites such as Lomeguero and Kalomwae raises input and logistics costs, and weak telecommunications coverage constrains the digital pricing and traceability reforms proposed in Section 9.

7.8. County Governance and Institutional Capacity

This review found no independently verifiable public-record evidence regarding specific claims of county staff relocating into mining activity or salary-delay-linked productivity effects; these remain matters raised in community and stakeholder accounts that would require internal county human-resource and payroll data to verify, and are noted here strictly as an area for further institutional audit rather than a documented finding. What is independently verifiable is the general institutional capacity constraint implied by Turkana's position at the bottom of Kenya's county revenue and human-development rankings, which is well-established in KNBS data [32,37] and which provides plausible structural context for, without confirming the specific allegations about, weakened service delivery capacity.

7.9. Conservancies and Land Rights

As set out in Section 3.5, community conservancy establishment in northern Kenya, associated in the original project notes with areas near Kalobeyei and Suguta, sits within a genuinely contested and currently litigated area of Kenyan land governance. Kenya's Environment and Land Court ruling in January 2025, invalidating the establishment of two NRT-affiliated conservancies in neighbouring Isiolo County on procedural grounds, together with the 2025 FIDH/ASF report and the 2021 Oakland Institute

report alleging land-rights and human-rights concerns linked to the conservancy model more broadly, establishes that these are live, adjudicable questions rather than settled facts [28,29]. This paper does not extend those Isiolo-specific findings to any organisation's conduct in Turkana's Kalobeyei or Suguta areas, for which independent verification was not available in the sources reviewed. It instead recommends, in Section 9, an independent, county-led land-tenure review of any conservancy arrangements proposed or established in Turkana's mining-adjacent areas, applying Kenya's Community Land Act, 2016 registration requirements as the baseline legal standard [30].

7.10. Legal and Institutional Gaps for Artisanal Miners

Public sources confirm the existence of at least localised miners' associations, such as the Lolupe Artisanal Miners Association referenced in county government communications, indicating some organic organisational capacity among miners on which formal legal-aid or cooperative structures could be built [3]. However, no evidence of a county-wide legal association or systematic occupational training and sensitisation programme for artisanal miners, beyond the discrete equipment-distribution and safety-review interventions documented in Sections 7.1 and 7.5, was identified in the sources reviewed, consistent with the original project notes' characterisation of this as an under-served area.

8. The Integrated Sustainable Mining Governance Framework (ISMGF)

Synthesising the theoretical framework (Section 4) and the thematic findings

(Section 7), this paper proposes the Integrated Sustainable Mining Governance Framework (ISMGF), illustrated in Figure 3. The ISMGF links ten interdependent pillars around a central governance hub, on the premise that interventions targeting any single pillar in isolation, for example, distributing safety equipment without also addressing market governance, security, or revenue capture, are unlikely to produce durable improvement in a low-capacity frontier setting such as Turkana.

Figure: The Integrated Sustainable Mining Governance Framework (ISMGF)

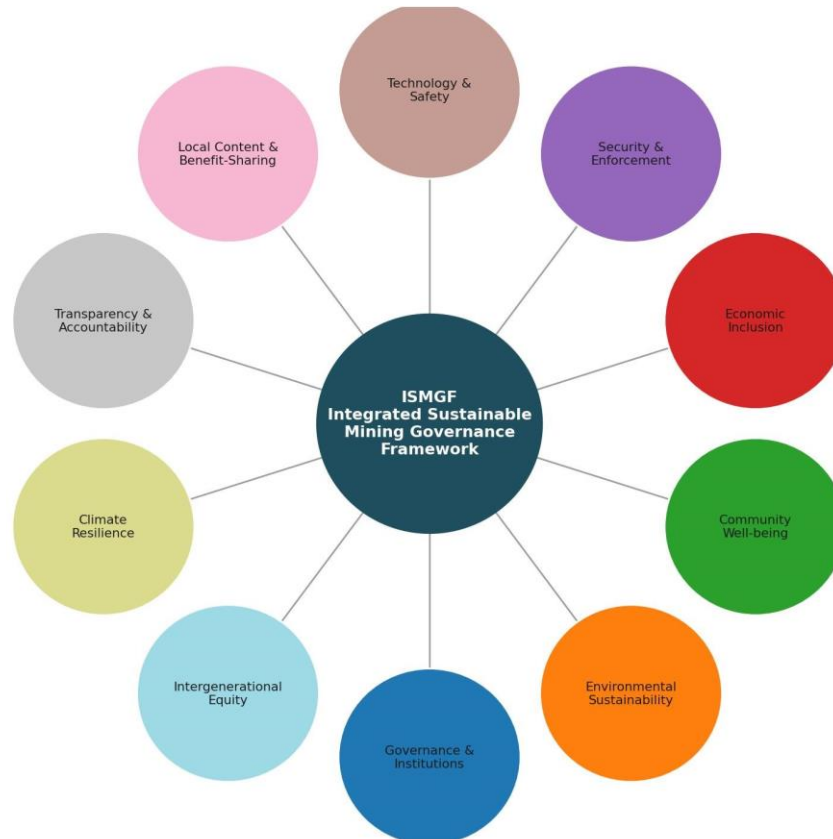


Figure 3: The Integrated Sustainable Mining Governance Framework (ISMGF), Linking Ten Governance Pillars Around A Central Coordinating Hub.

Table 1 maps each ISMGF pillar to its corresponding Section 7 finding and to the specific policy instrument proposed in Section 9, providing the traceability that this paper argues is a necessary feature of any credible sustainable-mining governance framework.

ISMGF Pillar	Corresponding Finding (Section 7)	Policy Instrument (Section 9)
Governance & Institutions	Absence of an operational Artisanal Mining Committee; unclear county mining-office capacity (7.3, 7.8)	Turkana Artisanal Mining Authority (county legislation)
Environmental Sustainability	Site degradation; open, unrehabilitated pits; 2025 Lomeguro environmental review (7.5)	Environmental restoration bonds; rehabilitation mandates
Community Well-being	Boomtown-linked social strain; women miners' occupational exposure (7.6)	Social protection measures; grievance mechanisms
Economic Inclusion	Unregulated pricing; absence of defined trading market (7.2)	Designated mineral trading centres; digital pricing
Security & Enforcement	Absence of permanent security posts; 2025 Lomeguro protest (7.4)	Permanent mining police units; SOG boundary operations
Technology & Safety	Fatal shaft collapses; manual digging methods (7.1)	Mandatory PPE and occupational health standards
Local Content & Benefit-Sharing	Royalty-sharing formula not yet fully operational at county level (7.3)	Royalty-sharing framework operationalisation; local content quotas
Transparency & Accountability	Absence of mineral cadastre; informal cash trading (7.2, 7.3)	County mineral cadastre; digital traceability (QR-based) systems

Climate Resilience	Infrastructure and water-access deficits in an ASAL county (7.7)	Spatial planning integrating water, power, and climate-resilient design
Intergenerational Equity	School-dropout and land-degradation concerns for future generations (7.5, 7.6)	Vocational training centres; environmental restoration fund

Table 1: ISMGF Pillars Mapped to Findings and Policy Instruments

9. Policy Recommendations

The following recommendations are organised by implementation horizon. They are addressed principally to the Turkana County Government, in partnership with the national Ministry of Mining, Blue Economy and Maritime Affairs, the Ministry of Energy and Petroleum, and development partners already active in the sector, including Oil and Gas Group Kenya and Solidarida [38].

9.1. Immediate (0-12 months)

- Mandate personal protective equipment (PPE) and baseline occupational health standards at all active artisanal mining sites, building on the county's existing ball-mill equipment distribution programme [3].
- Complete and publish the outcomes of the Lomeguero safety and environmental review, and use it as the template for phased assessment of Nagelei, Locheremot, Kalomwae, and Moruongor [7].
- Establish a permanent mining police or Special Operations Group (SOG) presence in high-risk border and mining zones, prioritising areas with documented insecurity concerns.
- Strengthen and formally register community grievance mechanisms and basic legal-aid access for artisanal miners, building on existing site-level associations such as the Lolupe Artisanal Miners Association.

9.2. Medium-term (1-3 years)

- Establish a Turkana Artisanal Mining Authority through county legislation, consolidating licensing, safety oversight, and miner-support functions currently dispersed across departments.
- Develop designated mineral trading centres with transparent, digitally recorded pricing and electronic transactions, building directly on the county's stated intention to open a gemstone and mineral tracking centre [2].
- Commission a county mineral cadastre and GIS-based mapping exercise covering all known artisanal sites, integrated with the national Mining Act, 2016 cadastre portal.
- Establish accredited mineral assay facilities in Lodwar and at strategic mining zones to support fair pricing and quality verification.
- Operationalise the Mining Act's royalty-sharing framework at the county level, including a published, audited county mineral-revenue account.
- Commission an independent, Community Land Act-compliant review of conservancy or land-use arrangements proposed near mining zones, applying the transparency and consent standards clarified by recent Environment and Land Court rulings [29].
- Introduce mining cooperatives, drawing on Ostrom's common-pool resource design principles, to strengthen

artisanal miners' collective bargaining position in trading and equipment access.

9.3. Longer-Term (3-7 Years)

- Integrate mining zones into county spatial plans, including planned settlements, roads, water systems, power, telecommunications, schools, and health facilities, and consider modern mineral markets and logistics hubs in strategic border growth centres.
- Establish vocational training centres focused on mining technology, geology, environmental management, machinery maintenance, and entrepreneurship, informed by Tanzania's Centre of Excellence model while addressing its documented risk of excluding the most marginal miners [15].
- Deploy a digital mineral traceability system (QR-code or blockchain-inspired audit trail) linking trading-centre transactions to the county cadastre.
- Establish a county Environmental Restoration Fund financed through mineral and oil production levies, dedicated to mandatory site rehabilitation.
- Expand social protection measures targeting school retention and family stability in mining-affected communities, paired with the primary research recommended in Section 6 to establish local baseline data before designing specific interventions.
- Ensure the oil sector's local content obligations under the Petroleum Act, 2019 and its Field Development Plan translate into demonstrable local supplier development and employment outcomes in Turkana East and South, consistent with the county-registration process for oil-affected villages already under way [9].

10. Conclusion

Turkana County's dual extractive economy, an established artisanal gold sector and an emerging commercial oil sector, presents both Kenya's devolution project and its extractive-sector governance architecture with an unusually consequential test. The evidence reviewed in this paper indicates that the county's artisanal mining sites suffer from a governance vacuum characterised by inadequate safety technology, unregulated pricing, thin revenue and licensing enforcement, absent security infrastructure, and unmapped mineral resources, a vacuum with a documented human cost in repeated fatal shaft collapses. At the same time, the oil sector's more formalised, internationally scrutinised regulatory track, while considerably more developed on paper, faces its own tests of whether projected revenues of hundreds of billions of shillings will translate into equitable, transparent local benefit for a county that remains, by KNBS's own measures, the poorest in Kenya.

The Integrated Sustainable Mining Governance Framework proposed here argues that neither sector can be governed sustainably through single-pillar interventions. Equipment distribution without market reform, security deployment without community trust-building, or royalty formulas without operational enforcement capacity will each fall short in isolation. What Turkana's moment requires, and what this paper's recommendations are sequenced to build toward, is an integrated, county-led governance architecture, anchored in a dedicated Artisanal Mining Authority, a functioning cadastre and trading system, and genuine devolved fiscal capacity, capable of channelling both of Turkana's extractive frontiers toward the shared prosperity that the Mining Act's royalty formula and the Constitution's Article 69 commitments already, on paper, promise. Realising that promise now depends on the county government, national ministries, and development partners translating documented intent into verified, audited, and locally accountable practice, an agenda for which the primary fieldwork outlined in Section 6 remains the essential next step.

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