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Balancing Growth and Ecology: A Study of Granite Mining and Sustainable Development in Telangana

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Abstract

Telangana's granite sector is an important part of its mining and natural-stone economy, providing raw material, employment and export earnings while simultaneously creating environmental, regulatory and social challenges. This paper examines the granite business in Telangana through the lens of sustainable development balancing economic value-addition and livelihoods with environmental protection and regulatory compliance. Using secondary data (state economic reports, export statistics, environmental impact assessments) and case-based evidence from recent enforcement actions, the paper identifies key sustainability gaps and proposes practical measures for green mining, value chain strengthening, worker welfare and improved governance.

Key words: *Granite; Mining; value addition; Growth*

1. Introduction

Telangana is one of India's major granite-producing states, with districts such as Karimnagar, Warangal, Mahabubnagar, and Sircilla known for their extensive deposits of high-quality natural stone. The granite industry supplies raw material to construction, interior design, and export markets. It also supports ancillary sectors such as transport, small-scale polishing units and fabrication workshops, thereby playing a crucial role in rural and semi-urban economies.

Despite this industrial importance, the expansion of quarrying has raised significant concerns about environmental sustainability. Granite extraction often results in large-scale landscape modifications, dust emissions, groundwater decline, and loss of biodiversity. At the same time, labour safety, informal employment, and community welfare issues persist in mining areas. Achieving sustainable development requires a balanced approach where economic gains do not come at the cost of ecological damage or social inequity. This study investigates how Telangana's granite sector can move toward sustainable practices while maintaining economic growth.

2. Objectives

- To describe the current structure and economic role of the granite business in Telangana.
- To identify the main environmental and social impacts of granite quarrying and processing in the state.
- To review existing policy and regulatory frameworks that governs granite mining and processing.

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- To recommend sustainable interventions (technical, managerial and policy) to align the sector with sustainable development goals (environmental protection, decent work, local economic development).

3. Review of Literature

- Hilson (2002) emphasized that mining can contribute to regional development only when environmental and social safeguards are integrated at all stages of extraction. His work laid the foundation for understanding sustainability challenges in small and medium-scale mining operations, similar to those in Telangana's granite sector.

- Bebbington et al. (2008) demonstrated that mining's benefits are not uniformly distributed; communities near mining sites often bear environmental costs while receiving few economic advantages. This aligns with local experiences in Telangana granite clusters where workers often remain in the informal economy.

- Studies by Maringanti (2012) and later analyses of Karimnagar granite belts showed that rapid quarry expansion led to landscape alteration, groundwater fluctuation, and conflicts over land rights. These case studies emphasize the need for participatory governance and sustainable mining plans.

- Tiwari & Jain (2014), show that quarry workers face high exposure to silica dust, leading to respiratory diseases such as silicosis. Informal labour patterns and lack of personal protective equipment (PPE) were identified as common issues. The Ministry of Environment, Forest & Climate Change (MoEFCC, 2016) reported that minor mineral extraction (including granite) often fails to comply with standard EIA norms, especially regarding dust suppression, waste management, and reclamation. Telangana quarries reflect similar gaps in monitoring and implementation.

- Raina (2017) examined the impacts of stone quarrying in India and found that dust emissions, groundwater depletion, and habitat fragmentation were the most critical issues. These findings are consistent with environmental challenges seen in Telangana's granite belts.

- Sarma (2019) analyzed mining governance in South Indian states and found recurring cases of illegal extraction, royalty evasion, and inconsistent enforcement—issues frequently observed in the granite mining regions of Karimnagar and surrounding districts.

4. Methodology

This paper uses a mixed-methods approach focused on secondary data and case evidence:

- Desk review of government publications (Telangana socio-economic outlook, Mines & Geology GO's and notifications), trade/export data and Environmental Impact Assessments/Environmental Management Plans submitted for granite/quarry projects.

- Content analysis of recent news reports and court/tribunal filings related to compliance and revenue disputes.

- Synthesis of academic literature and industry notes to propose practical sustainable interventions. Where available, district-level EIA summaries were examined to illustrate local practices and mitigation measures. (Sources include state Mines & Geology, TGPCB EIA documents, and trade reports and media records.)

5. Geological & industrial profile

Granite occurrences in Telangana are widespread in certain districts; quarry operations range from small-scale local quarries supplying aggregate to medium/large operations producing blocks and slabs. The industry includes extraction (quarry), primary processing (block cutting, slab production) and secondary finishing (polishing, fabrication), with a

spread of informal and formal enterprises across the value chain. Export and domestic construction demand drives much of the higher-value activity .

5.1 Environmental impacts and mitigation

Primary environmental concerns are fugitive dust (PM), noise, blasting impacts, groundwater disruption, unmanaged waste rock Removal, topsoil leading to barren land and Disturbance to natural hill formations and biodiversity reduction. Environmental impact assessments submitted in Telangana identify common mitigation measures: water spraying/dust suppression, wind-break tree belts, sedimentation ponds for runoff, controlled blasting schedules, monitoring of air and water quality, and progressive rehabilitation of worked-out benches. Enforcing these measures consistently across many small quarries remains a challenge.

5.2 Regulatory framework & governance issues

Telangana's Mines & Geology Department administers leases and rules for minor minerals; the state has updated GOs and lease rules to improve oversight, levy fees and manage transfers. Nonetheless, media and tribunal records reveal implementation gaps: unpaid dues, unauthorized transport of granite, cases of leases being operated without current consents, and action by the Telangana Pollution Control Board (TGPCB) on violations near geo heritage sites. Strengthening lease monitoring, digitization of transport/production records and transparent revenue collection are key governance priorities.

5.3 Economic and social dimensions

Granite mining supports direct and indirect employment quarry workers, truckers, processors and artisans but many workers are informal, seasonal, and vulnerable. Studies show recruitment practices are often informal, migration common, and welfare/OSHA-type safeguards limited. Enhancing worker welfare (formal contracts, PPE, health checks) and incentivising local beneficiation (fabrication units, skill training) can improve incomes and reduce leakages in the value chain.

Table – 1: Local Impacts of Granite Mining in Telangana

Impact Type	Positive Outcomes	Negative Outcomes
Environment	None significant unless managed scientifically	Dust, noise, groundwater depletion, land degradation, biodiversity loss
Social	Generates jobs and local livelihood	Health issues, migration, safety risks, community displacement
Economy	Export income, state revenue, demand for support industries	Revenue leakages, low value addition, informal labour economy

Value addition and market strategy

To increase sustainability and income retention locally, the sector must move beyond raw block exports to higher value processing (cut-to-size slabs, polishing, engineered stone, and finished products). Market diversification and branding (regional stone varieties, "Telangana granite" certifications) plus quality control labs and logistics improvements will increase resilience against export volatility. Export data shows variability highlighting the need for product diversification and domestic market strengthening.

6. Practical sustainability interventions

- **Short-term (operational)**

Mandatory dust-suppression (water trucks, enclosures for cutting units), regular ambient air monitoring, and wheel washing at exits, controlled blasting windows, and sedimentation /settling ponds.

- **Medium-term (planning)**

Progressive land rehabilitation (bench stabilization, topsoil replacement, afforestation), creation of Common Facility Centres (CFCs) for beneficiation and worker training, and adoption of energy-efficient machinery (e.g., wire-saw tech).

- **Policy/institutional**

Digitized production and transport tracking, stricter enforcement of revenue collection and community benefit agreements (CBAs) is linking part of district mineral fund spending to local infrastructure and livelihoods. EIA and EMP templates already in use in Telangana projects provide practicable measures to standardize.

7. Financing, incentives & institutional support

To ensure adoption, small operators need access to finance and shared infrastructure. State industrial policy and investment promotion frameworks can provide incentives for clusters (tax breaks for value-addition units, capital subsidies for cleaner tech, and low interest loans for CFCs). Public private partnerships (PPP) for common polishing/processing centres and targeted training programs with the state's industrial and skill development departments will foster sustainable employment and reduce informal practices.

Table-2 Sustainable Development Framework for Granite Sector

Sustainability Dimension	**Present Situation**	**Required Improvements**
Environmental	Dust, blasting & land damage common	Rehabilitation plans, dust control, water recycling, monitoring
Social	Informal labour & safety issues	PPE, worker contracts, medical checks, training
Economic	Raw blocks exported → low value addition	Promote processing units, branding, export diversification
Governance	Cases of illegal transport/dues	Digital tracking, strict lease audits, community benefit sharing

8. Conclusion

Granite mining in Telangana stands at a critical intersection between economic growth and environmental responsibility. The industry provides employment, foreign exchange and industrial development, yet its sustainability remains challenged by land degradation, pollution, regulatory violations, and limited value addition within the state. True development must therefore move beyond extraction-based revenue and aim for a balanced structure where environmental care, community well-being and economic progress coexist harmoniously.

Strengthening governance enforcement, integrating digital monitoring of quarry output, ensuring labour safety, and mandating rehabilitation plans are immediate requirements. In the long term, Telangana must promote granite-processing clusters, skill development programs, research into eco-friendly mining techniques, and establish community benefit agreements so that mining-affected regions directly gain from resource extraction. With a holistic and systematic approach, the granite sector can transform into a model of sustainable natural resource management, offering durable economic returns while preserving ecological integrity for future generations.

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