UNDERSTANDING ENVIRONMENTAL HARMS AND LEGAL PROTECTION OF MYANMAR'S MINING INDUSTRY

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Abstract

This study analyses the environmental harms caused by Myanmar's mining industry and evaluates the legal frameworks governing environmental protection. Although mining remains a vital contributor to the national economy, it has generated severe ecological consequences such as water and air pollution, deforestation, and biodiversity loss. The research employs doctrinal and case analysis to examine national legislation, including the Environmental Conservation Law (2012), the Myanmar Mines Law (1994, amended 2015), and the Environmental Impact Assessment Procedures (2015), alongside relevant international environmental principles such as the precautionary and polluter-pays principles. The findings reveal weaknesses in enforcement and persistent legal challenges, particularly in illegal and unregulated mining zones. Based on this analysis, the paper proposes actionable recommendations to strengthen Myanmar's legal and institutional responses to environmental degradation in the mining sector.

Keywords: Environmental harms, legal frameworks, enforcement weakness, sustainable mining

Introduction

Myanmar's mining sector is crucial to its economy but presents significant environmental challenges. Rapid mining activities have led to serious issues such as deforestation, water pollution, and habitat loss, threatening both ecosystems and local communities. Although Myanmar has established legal frameworks, including the Environmental Conservation Law (2012) and the Myanmar Mines Law (1994), the Law Amending the Myanmar Mines Law (2015), the enforcement of these laws is often limited. Factors such as corruption, regulatory influence, and insufficient compliance monitoring can obstruct the safeguarding objectives of these regulations.

This research will explore the environmental harms associated with mining in Myanmar and the legal challenges that hinder effective regulation. By examining existing legal frameworks and relevant case studies, it will emphasize the need for improved enforcement and alignment with international environmental standards to promote sustainable mining practices in Myanmar.

Materials and Methods

This research employs a qualitative approach that combines doctrinal analysis and case law analysis to examine the legal framework governing environmental protection in Myanmar's mining sector. The doctrinal component involves interpreting and analysing key environmental statutes, including the Environmental Conservation Law (2012), the Mines Law (1994, amended 2015), the Environmental Impact Assessment Procedures (2015), and the Conservation of Biodiversity and Protected Areas Law (2018). These are examined alongside relevant international environmental instruments such as the Rio Declaration on Environment and

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Development (1992) and the Convention on Biological Diversity (1992) to assess Myanmar's alignment with global environmental principles and obligations.

The case analysis component focuses on two significant examples of environmental harm in the mining sector — the Hpakant jade mining region in Kachin State and the Letpadaung copper mine project in Sagaing Region. These case studies were selected due to their national importance, extensive documentation, and relevance to issues of environmental degradation, community displacement, and legal enforcement challenges. Legal documents, governmental reports, policy papers, and court-related materials are examined to evaluate how existing laws have been applied in practice and to identify weaknesses in regulatory oversight.

Both primary and secondary data sources are utilized to ensure a comprehensive understanding of Myanmar's environmental legal framework. Primary sources include international conventions, domestic legislation, policy documents, and reported cases, while secondary materials comprise academic books, peer-reviewed articles, and legal commentaries addressing environmental law and mining governance. These materials are systematically analysed to identify regulatory gaps, enforcement weaknesses, and potential reforms, enabling the study to propose actionable recommendations for strengthening environmental governance and legal accountability within Myanmar's mining industry.

Water Pollution: Legal Gaps in Controlling Mining Effluent

The environmental impacts of mining on water resources occur in various forms, primarily through the release of mine runoff into groundwater, surface water, and streams, as well as the improper disposal of wastewater and acid mine drainage.[1] Mining operations often involve the use of harmful chemicals such as mercury, cyanide, and sulfuric acid to extract minerals, which can leach or spill into nearby water bodies, severely affecting aquatic ecosystems and human health[2].

The mining industry's significant contribution to water pollution stems from the use of toxic chemicals, heavy metal contamination, acid mine drainage (AMD), erosion, sedimentation, and reduced water availability. For example, gold mines in Kachin State pose a threat to Indawgyi Lake, Myanmar's largest inland freshwater lake, which provides essential resources for local communities. Excessive sedimentation, largely due to gold mining, has caused the lake to become shallow and muddy, harming fish populations and livelihoods. Cyanide, mercury, and other toxins regularly seep into water systems, causing contamination and posing severe health risks to communities who rely on the lake's resources.[3]

When exposed to air and water during mining, sulphide minerals generate AMD, releasing sulfuric acid and heavy metals into nearby rivers, streams, and lakes. This further degrades water quality, making it unsuitable for both aquatic life and human use. The mining practices in places like Tachilek[4] and Shwegyin[1] Township have exacerbated these issues, where

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[1] SGU Geological Survey of Sweden, "Mines and environmental impact", https://www.sgu.se/en/mineral-resources/mines-and-environmental-impact/

[2] Alex G. Stewart, (2019), "Mining is bad for health: a voyage of discovery", Environ Geochem Health, vol.42, p.1153.

[3] Maran, Mekong Eye, (2022), "Illegal gold mining threatens freshwater lake in Myanmar", https://www.mekongeye.com/2022/11/14/illegal-mining-threatens-freshwater-lake.

[4] Poe Phyu Zin, Myanmar Now, (2023), "Myanmar's gold mines destroying environment and lives",

local environments face increased soil erosion and water contamination due to illegal and unregulated mining activities.

In Hpakant, mining companies frequently violate legal requirements regarding mine tailing disposal, contributing to sediment build-up in the Uru River and causing frequent flooding in nearby communities. Despite mandates for environmental protections, such as keeping tailings 500 feet from water sources, enforcement remains inconsistent, exacerbating water pollution.[2] This situation reflects a systemic failure to apply fundamental environmental principles—particularly the precautionary principle and the polluter-pays principle—in the governance of mining operations.

Myanmar's Environmental Conservation Law (2012) mandates specific environmental quality standards, including emissions, effluent limits, and solid waste management criteria. It also emphasizes the establishment of treatment facilities for toxic substances to address water pollution.[3] These provisions embody the precautionary principle, which requires preventive measures to be taken even when there is scientific uncertainty about potential environmental harm. However, in practice, this principle is weakly applied, as preventive mechanisms such as pre-operation environmental monitoring, early warning systems, and timely inspections are either absent or inadequately implemented—particularly in remote and conflict-affected regions such as Hpakant.

Under the EIA Procedures (2015), mining projects that significantly impact water resources are subject to EIA requirements. These procedures mandate thorough assessments of the potential environmental impacts, including water quality, and may require the implementation of water management plans as part of the Environmental Management Plan (EMP). Projects with severe adverse impacts must undergo detailed Environmental Impact Assessments (EIAs), which include comprehensive water management strategies to minimize harm.[4]

The Water Resources and Rivers Conservation Law (2006) provides a framework for managing and conserving Myanmar's water resources. It mandates environmental impact assessments for activities that may affect rivers and other water bodies[5] and prohibits resource extraction within restricted zones of waterways. The law also establishes rights and obligations for the conservation of water resources, although enforcement challenges continue to hinder its full application in mining regions. however, enforcement agencies rarely impose penalties or require restoration from offending companies, allowing polluters to externalize environmental costs to local communities and ecosystems.

Consequently, the weak application of both the precautionary and polluter-pays principles perpetuates water pollution in Myanmar's mining regions. The weak enforcement, limited institutional capacity, and insufficient monitoring mechanisms have undermined the effectiveness

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https://myanmar-now.org/en/news/myanmars-gold-mines-destroying-environment-and-lives/.

[1] The Burma Environmental Working Group (BEWG), (2011), "Burma's Environment: People, Problems, Policies", pp.62-64.

[2] Ibid.

[3] Section 10, the Environmental Conservation Law (2012).

[4] Article 91 (a), Environmental Impact Assessment Procedure (2015).

[5] Section 6 (g-1), the Water Resources and Rivers Conservation Law (2006).

of these foundational principles, resulting in ongoing environmental degradation and public health risks in Hpakant and similar mining areas.

Air Pollution: The Ineffectiveness of Emission Standards

Mining activities generate substantial air pollution through dust, emissions from heavy machinery, and the release of toxic gases like sulphur dioxide (SO_2) and nitrogen oxide (NOx). Despite the National Environmental Quality (Emission) Guidelines (2015) setting emission limits, enforcement remains inadequate, especially in key mining regions like Hpakant, where air pollution has led to respiratory diseases in local communities. Airborne pollutants such as particulate matter (PM) are rampant due to poor regulation of blasting, transportation, and processing activities. Though legal provisions exist, penalties for non-compliance are not stringent enough, allowing air pollution to persist.

Air pollution is a local, regional, and global concern, with health impacts that extend beyond the immediate emission area. It affects populations in low-income, middle-income, and high-income countries, particularly in Southeast Asia and the Western Pacific regions.[1] Mining contributes significantly to air pollution at various stages, including exploration, construction, development, and operational activities. Mining sites accumulate large amounts of material and small-sized particles easily dispersed by wind, leading to increased levels of dust and particulate matter.

One of the largest environmental threats mining poses is air pollution, particularly through the emission of particulate matter, toxic gases, and smelting by-products. Particulate matter (PM), which includes sulphates, ammonia, nitrates, black carbon, sodium chloride, and mineral dust, is a widespread concern in mining, often being emitted in large quantities during operations.[2] These particles pose severe risks to human health, causing respiratory issues and aggravating conditions like asthma, heart disease, and lung cancer.[3] Besides harming human health, particulate matter can damage livestock and crops, and its effects are exacerbated by mining's proximity to densely populated areas.

Mining activities also release various toxic pollutants into the air, such as sulphur dioxide (SO_2), nitrogen oxides (NOx), and heavy metals including lead, mercury, cadmium, and arsenic. The release of these pollutants primarily occurs during drilling, blasting, and crushing processes. Coal mining in Shan State, for example, has severely degraded air quality, impacting local communities. Mining in Northern Shan State has destroyed farmland, caused water and air pollution, and led to significant health risks for over 3,000 local villagers. Increased traffic from coal transport worsens the air quality, especially in dry seasons, and has caused accidents.

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[1] World Health Organization, (2022), "Ambient (outdoor) air pollution", https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health?gclid=EAIaIQobChMIqsqahcWYgAMVHCiDAx3mJgQNEAAYASAAEgKJOfD_BwE.

[2] World Health Organization, (2022), "Ambient (outdoor) air pollution", https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health?gclid=EAIaIQobChMIqsqahcWYgAMVHCiDAx3mJgQNEAAYASAAEgKJOfD_BwE.

[3] Earthworks, "Impact of Metal Mining on Air Quality", https://earthworks.org/issues/gold-mining-and-air-quality/.

Despite ongoing negotiations between mining companies and local villagers, no satisfactory resolution has been reached, and pollution continues to harm local populations.[1]

Noise and vibration from mining activities also contribute to air pollution, primarily through blasting, ore stockpiling, and transportation. These impacts lower the quality of life in nearby communities and degrade the surrounding environment.

To reduce the environmental impact of mining, the Ministry of Natural Resources and Environmental Conservation issued the Environmental Quality (Emission) Guidelines (2015)**,** mandating that mining companies comply with standards related to air emissions, wastewater management, and noise levels control. These guidelines are particularly relevant for projects requiring Environmental Impact Assessments (EIAs) or Initial Environmental Examinations (IEEs). Specific effluent standards apply to mining activities, covering both construction material extraction and mineral mining operations.[2] As part of the EIA process, the guidelines aim to protect ecosystem health by setting explicit emission and effluent limits.

Additionally, mining companies must adhere to the Prevention of Hazardous Chemicals and Related Substances Law**,** which governs the handling, transportation, storage, and disposal of chemicals. These regulations require companies to minimize the environmental impacts of hazardous substances, emphasizing the importance of following directives for safe chemical management. Air pollution from mining activities in Myanmar poses significant risks to both the environment and public health, exacerbated by poor regulation and enforcement.

Strengthening and enforcing air quality regulations, establishing effective monitoring systems, promoting cleaner mining technologies, and undertaking restoration efforts are essential steps to reduce pollution. Further, engaging local communities, collaborating with NGOs and international organizations, and investing in technology to minimize emissions are crucial for improving air quality and safeguarding public health in Myanmar's mining regions.

Wildlife and Habitat Destruction: Limited Legal Protections

The Conservation of Biodiversity and Protected Areas Law (2018) provides legal protections for wildlife; however, these are frequently violated, particularly in mining regions like Hpakant and Shan State. Large-scale mining operations disrupt ecosystems through deforestation and habitat destruction, displacing animal species and fragmenting ecosystems. This degradation threatens biodiversity and leads to species decline. Despite Myanmar having 46 protected areas[3], many mining projects operate illegally within or near these zones due to weak enforcement and limited government oversight.

Wildlife species live in interdependent communities where their survival depends on soil conditions, local climate, altitude, and other features of their habitat. Mining directly and indirectly damages wildlife by altering ecosystems and landscapes. One of the most significant

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[1] EJatlas Southeast Asia Team, (2019), "Nam Ma coal mines, Shan state, Myanmar", 2019, https://ejatlas.org/conflict/nam-ma-coal-mining-and-extrajudicial-killings-shan-state-myanmar.

[2] Ministry of Natural Resources and Environmental Conservation, National Environmental Quality (Emissions) Guidelines (2015), pp.115-117.

[3] AFoCO-EML, "Forests and forestry in Myanmar: an overview of forestry laws, policies, and strategies", (2021), https://afocosec.org/newsroom/news/forestry-news/forests-and-forestry-in-myanmar-an-overview-of-forestry-laws-policies-and-strategies/.

impacts is the clearing of vegetation, which destroys habitats that many species, particularly those dependent on natural drainage systems, rely upon. Not only do mining operations within the mining area affect wildlife, but associated activities—such as the dumping of overburden, tailings deposition, and infrastructure development—further degrade ecosystems and fragment habitats.

The construction of mining infrastructure such as roads, ports, railways, and power lines create barriers to wildlife migration and increases habitat fragmentation. This fragmentation isolates populations, disrupts migration patterns, and limits resources, leading to species decline and genetic issues like inbreeding. Additionally, the thousands of acres of land destroyed during mineral extraction exacerbate habitat loss, as plants and trees are cleared and animals lose critical living spaces.

Mining operations also produce large amounts of dust and particulates, which can adversely affect wildlife. Pollutants contaminate the air and soil, disrupting plant growth and harming animals' respiratory systems. Such pollution degrades ecosystems, disrupting the balance necessary for wildlife survival. Noise, vibration, and machinery movements at mining sites create additional stress for wildlife, altering behaviour, communication, and mating patterns.

The impacts of mining on wildlife are evident during the construction phase of mining sites, where significant changes in vegetation, landscape, and hydrology occur. These changes not only affect the immediate mine site area but can be seen from kilometres away, affecting the broader region. Such impacts often lead to a loss of biodiversity and the destruction of wildlife habitats.

In Myanmar, The Myanmar Forestry Policy (1995) emphasizes sustainable forest resource management and wildlife habitat protection. This policy outlines strategies for forest conservation and development, ensuring the protection of wildlife and their habitats.[1] Forest Law further requires anyone intending to develop or undertake economic projects on forest-covered land to obtain approval from the Ministry and comply with **Environmental Conservation Law** and relevant regulations.

The Forest Law also mandates that entities granted the right to extract forest products or natural resources must undertake reforestation efforts at their own expense.[2] These reforestation projects aim to restore ecosystems and ensure the return of native wildlife. Similarly, the Conservation of Biodiversity and Protected Areas Law (2018) focuses on implementing Myanmar's biodiversity strategy, conserving wildlife and ecosystems, regulating wildlife trade, and safeguarding endangered species.[3] The National Steering Committee oversees the implementation of these conservation objectives.

Mining operations are particularly concerning in areas near or overlapping with national parks and protected zones, such as Alaungdaw Kathapa National Park, Indawgyi Wildlife Sanctuary, and Inlay Lake Wildlife Sanctuary. Excavation activities are prohibited in these restricted areas to preserve wildlife and their habitats, but illegal mining often occurs due to poor regulation.

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[1] Ministry of Natural Resources and Environmental Conservation, Myanmar Forest Policy (1995).
[2] Section 16, the Forest Law (2018).
[3] Section 3, the Conservation of Biodiversity and Protected Areas Law (2018).

Under the Law Amending the Myanmar Mines Law (2015) and Myanmar Mines Rules (2018)**,** mine permit holders are required to set aside funds for environmental conservation and mine closure activities. These efforts include land rehabilitation, reforestation, and the restoration of mining sites to productive states after mining ceases.[1] [2] Rehabilitation is essential to re-establish ecosystems and allow wildlife to return to these areas.

Mining activities have significant negative effects on wildlife, including habitat destruction, fragmentation, and pollution. The contamination of ecosystems disrupts wildlife habitats and food sources, contributing to species decline.

To mitigate these effects, stricter enforcement of legal protections, more comprehensive environmental impact assessments, and collaboration with stakeholders are essential. Enhanced regulatory oversight and commitment to rehabilitation and conservation efforts are crucial to protecting Myanmar's wildlife from the destructive effects of mining.

Land Degradation and Deforestation: Inadequate Rehabilitation Efforts

Land degradation and deforestation are widespread in Myanmar's mining regions, particularly in jade and gemstone extraction areas. Although the Law Amending the Myanmar Mines Law (2015) mandates that mining companies undertake land reclamation and restoration after operations cease[3], compliance is weak. However, many companies either fail to comply with this requirement or engage in minimal rehabilitation efforts. As a result, vast tracts of land remain scarred and unproductive long after mining activities end.

Regions like Letpadaung, where high levels of acidification from mining have rendered agricultural land unusable, exemplify the failure of rehabilitation policies. Without proper soil treatment and reforestation, these areas suffer from long-term ecological damage, leaving local communities with degraded land that can no longer support farming or natural vegetation.[4]

Mining activities—especially in extensive areas dedicated to jade, gold, gemstones and copper—result in significant environmental damage. These operations lead to land-use changes and adverse environmental impacts, including deforestation, erosion, contamination, and soil profile alteration. Mining often clears large forested areas to excavate mineral-rich pits and construct access roads for heavy machinery. The demand for energy and storage facilities at mining sites necessitates additional infrastructure, while the labour required for these operations contributes to migration and the expansion of settlements, exacerbating deforestation.[5]

Most mining-related deforestation in Myanmar is driven by gold and coal extraction, though mining for other minerals such as copper, iron ore, and bauxite also contributes to habitat loss. The dense vegetation found in wetlands plays a crucial role in stabilizing soil and preventing erosion; however, massive flooding and landslides in affected communities have been linked to deforestation. The erosion caused by both mining and the loss of vegetation

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[1] Rule 185, the Myanmar Mines Rules (2018).
[2] Section 13 (e-2), the Law Amending the Myanmar Mines Law (2015).
[3] Section 13 (e-2), the Law Amending the Myanmar Mines Law (2015).
[4] The Burma Environmental Working Group (BEWG), (2011), "Burma's Environment: People, Problems, Policies", p.62.
[5] World Bank Group, (2019), "Myanmar Country Environmental Analysis", https://www.worldbank.org/en/country/myanmar/publication/myanmar-country-environmental-analysis.

significantly increases the risk of mudslides, as tree roots no longer anchor the soil. During heavy rainfall, the absence of trees allows substantial amounts of soil to wash away, leading to the destabilization of the landscape.

Erosion also facilitates the flow of contaminants into water supplies, polluting streams, lakes, and other sources, which in turn compromises the quality of drinking water. The consequences of deforestation extend beyond soil erosion; it adversely affects the animal species dependent on forest habitats and threatens overall biodiversity.

The severity of these environmental impacts varies based on the type of minerals extracted, mining methods employed, local geology, and the effectiveness of environmental management practices implemented by mining companies. While most legal mines are established outside forest reserves and protected areas, illegal open-pit mining—often along rivers and streams—remains a significant driver of deforestation. For instance, illegal surface mining along the Uru and Chindwin Rivers in Hommalin Township has led to substantial environmental degradation.[1]

The Hpakant jade mining site in Kachin State serves as a stark example of these challenges. Unauthorized jade mining is prevalent in the area, with poorly regulated operations causing massive environmental damage and frequent human fatalities. Scavengers seeking jade left behind by machinery often risk their lives, as landslides and debris from unstable mine dumps are common. Since 2015, over 500 people have reportedly died in landslides in Hpakant, highlighting the lethal dangers associated with these mining activities.[2]

Most of Myanmar's gemstone mining areas, particularly in conflict-affected regions like Hpakant and Khamti Township, pose significant regulatory challenges for the government. Despite regulations requiring compliance with environmental laws, enforcement remains weak. Large machinery exacerbates environmental destruction, carving out extensive valleys and creating massive waste piles that destabilize the surrounding area.

Local communities near mining operations suffer severe environmental degradation and health risks, forcing drastic economic changes. For instance, in the Letpadaung copper mining area, high levels of sulfuric acid in the soil and water have made farming impossible, pushing residents into artisanal mining and transforming the local economy from subsistence-based to cash-based.[3]

The mining project has neglected its environmental responsibilities, harming villagers' health and livelihoods. A 2015 waste spill in Wet Hme village contaminated farmland, destroying crops—yet the company neither cleaned up nor compensated affected farmers. Subsequent tests revealed dangerous levels of toxic metals (arsenic, copper, and lead) in the soil.[4]

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[1] John Sai Luu, (2022), "Analysis: Myanmar's gemstone riches bring poverty and environmental destruction", Mongabay, https://news.mongabay.com/2022/04/analysis-myanmars-gemstone-riches-bring-poverty-and-environmental-destruction.

[2] Ibid.

[3] The Burma Environmental Working Group (BEWG), (2011), "Burma's Environment: People, Problems, Policies", p.62.

[4] Amnesty International, (2017), "Mountain of trouble: Human rights abuses continue at Myanmar's Letpadaung mine", https://www.amnesty.org/en/documents/asa16/5564/2017/en/.

Additionally, emissions from the Moe Gyo sulfuric acid factory, which supplies the mines, have been linked to health crises, including increased cases of children born blind.[1]

While Myanmar's legal framework outlines safeguards for land acquisition, implementation often fails to protect communities. According to Section 9(e), the Land Acquisition, Resettlement and Rehabilitation Law (2019) mandates that projects requiring land acquisition, including mining operations, must conduct Environmental Impact Assessments and socioeconomic impact assessments before approval.[2]

These assessments must align with Myanmar's Environmental Conservation Law and international best practices, ensuring that environmental degradation and community displacement are minimized. However, enforcement remains inconsistent, particularly in remote mining regions where regulatory oversight is weak. This gap often leads to unchecked ecological damage and conflicts with local communities.

The recurring landslides in Hpakant clearly demonstrate the weak implementation of the Precautionary Principle under Principle 15 of the Rio Declaration. Foreseeable risks to life and the environment were ignored as jade mining operations proceeded without adequate environmental and geotechnical assessments. The fatal incidents in 2015, 2020, and 2023, caused by the collapse of unstable tailings heaps, indicate non-compliance with Section 7 of the Environmental Conservation Law (2012) and Rule 176 of the Myanmar Mines Rules (2018), which legally require operators to prevent environmental degradation and ensure site safety.

Government responses have remained reactive, focusing on post-disaster measures rather than preventive enforcement. Allowing mining and waste dumping in geologically unstable areas constitutes a breach of the State's duty of due diligence in environmental protection. This conduct is inconsistent with the core obligation of the Precautionary Principle, which mandates preventive action even in the absence of full scientific certainty. The repeated landslides in Hpakant therefore exemplify Myanmar's failure to apply precautionary environmental governance in the mining sector.

Similarly, the Polluter Pays Principle (Principle 16 of the Rio Declaration) is poorly implemented in Myanmar's mining governance. Polluting companies rarely bear the full cost of environmental restoration, and affected communities are left uncompensated for damages. The lack of effective enforcement mechanisms under the Environmental Conservation Law and the Myanmar Mines Law allows operators to externalize environmental costs onto the public. This failure undermines both accountability and deterrence, enabling recurring cycles of deforestation, land degradation, and community displacement.

Section 59(c) allows the state to reclaim land if mining causes environmental harms, health risks, or breaches agreements.[3] While this holds companies accountable, enforcement is weak due to economic and political pressures favouring extraction. Cases of pollution and deforestation without consequences show the law's limited impact, reflecting broader challenges in Myanmar's environmental governance.

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[1] The Guardian, (2012), "Burma: riot police move in to break up copper mine protest", https://www.theguardian.com/world/2012/nov/29/burma-riot-police-mine-protest.

[2] Section 9(e), the Land Acquisition, Resettlement and Rehabilitation Law (2019).

[3] Section 59(c), the Land Acquisition, Resettlement and Rehabilitation Law (2019).

The Myanmar Investment Law further mandates that investors using state-owned land submit proposals[1] adhering to environmental and social safeguards, including international best practices.[2] However, weak enforcement allows harmful practices to continue, leaving communities without recourse when land is seized, livelihoods are destroyed, or pollution goes unaddressed.

While the Myanmar government and international organizations recognize the need to mitigate mining's negative impacts on water, air quality, soil, biodiversity, forests, and wildlife, challenges remain in implementing effective governance and environmental regulations. Strengthening the application of the Precautionary and Polluter Pays Principles within Myanmar's legal system is essential to ensure that mining companies are held financially and legally responsible for rehabilitation, environmental restoration, and compensation. Without stricter enforcement of rehabilitation and investment in sustainable land restoration, Myanmar's mining areas will continue to face irreversible environmental damage, threatening both ecosystems and livelihoods.

Collaborative efforts among the government, mining companies, and civil society are essential to ensure sustainable and responsible mining practices, prioritize environmental protection, uphold local community rights, and promote transparency and accountability within the mining sector. Enhanced enforcement of existing laws and regulations, alongside proactive rehabilitation efforts, are crucial for addressing the ongoing threats of land degradation and deforestation in Myanmar's mining regions.

Discussion

Precautionary Principle

The precautionary principle, outlined in Principle 15 of the Rio Declaration, mandates that states take preventive action when there is a risk of environmental harms, even if full scientific certainty is lacking.[3] In Myanmar, the principle is embedded in the **Environmental** Conservation Law (2012), which mandates precautionary measures to prevent environmental degradation.[4] However, enforcement is weak, and harmful mining practices such as deforestation, habitat destruction, and pollution often go unchecked. The Environmental Impact Assessment (EIA) Procedures (2015) are meant to assess risks before project approval, but insufficient assessments and ineffective monitoring lead to the continuation of harmful practices. Strengthening these enforcement mechanisms is essential for effective application in Myanmar's mining sector.

Polluter Pays Principle

The polluter-pays principle**,** outlined in Principle 16 of the Rio Declaration, asserts that those responsible for environmental harms should bear the costs of remediation.[5] Myanmar's

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[1] Section 36 (d), the Myanmar Investment Law (2016).
[2] Section 65 (g), the Myanmar Investment Law (2016).
[3] Principle 15, Report of the United Nations Conference on Environment and Development, United Nations, Rio De Janeiro (1992), p.6.
[4] Section 7, the Environmental Conservation Law (2012).
[5] Principle 16, Report of the United Nations Conference on Environment and Development, United Nations, Rio De Janeiro, 1992, p.6.

Environmental Conservation Law (2012) incorporates this principle, requiring mining companies to cover environmental clean-up costs.[1] Despite this, corruption and weak regulatory oversight enable many companies to avoid fulfilling their responsibilities. The law specifies that those who benefit from natural resources must contribute to environmental protection, and the Law Amending the Myanmar Mines Law (2015) also reinforces this by requiring companies to fund rehabilitation activities during mine closure.[2] Enhancing legal accountability and imposing stricter penalties for non-compliance could improve the effectiveness of this principle in Myanmar's mining industry.

Sustainable Development

The principle of sustainable development emphasizes balancing economic growth with environmental protection. Myanmar's mining sector has the potential to contribute to economic development, but this must be done sustainably. The **Environmental Impact Assessment (EIA)**, guided by Principle 17 of the Rio Declaration, is an essential tool to assess and mitigate the environmental impacts of mining projects.[3] However, many mining companies conduct inadequate EIAs, and local communities often have little input in decision-making. To align mining activities with sustainable development goals, reforms are needed to improve the transparency and enforcement of EIA procedures, ensuring that environmental and social impacts are considered at every stage.

The Myanmar Investment Law integrates sustainable development by requiring investors to carry out environmental and social impact assessments in line with relevant laws. In accordance with the responsibilities outlined in the law, investors must obtain a Permit or Endorsement from the Commission for investments requiring prior approval under the Environmental Conservation Law and its environmental impact assessment procedures. Furthermore, during the permitted investment period, investors must submit updates on the status of their environmental and social impact assessments to the Commission.[4]

Section 71 of the Myanmar Investment Law also mandates that investors also need to carry out health assessment, cultural heritage impact assessments, environmental impact assessments and social impact assessments according to the type of investment activities in accordance with the relevant laws, rules, regulations and procedures during the investment period.[5] These requirements are vital for ensuring that mining activities contribute positively to local communities and ecosystems. Additionally, mining companies are bound by legislation to fund rehabilitation activities and ensure that the land is restored post-mining operations, as stipulated in the Law Amending the Myanmar Mines Law (2015).

Responsible Mining and Global Frameworks

The concept of responsible mining, as articulated through global frameworks such as the Stockholm Declaration (1972) and Rio Declaration (1992), establishes fundamental principles for

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1 Section 7 (o), the Environmental Conservation Law 2012.
2 Section 16 (e-2), the Law Amending the Myanmar Mines Law (2015).
3 Principle 17, Report of the United Nations Conference on Environment and Development, United Nations, Rio De Janeiro, 1992, P.6.
4 Section 65 (q), the Myanmar Investment Law (2017).
5 Section 71, the Myanmar Investment Law (2017).

sustainable mineral extraction. These international agreements emphasize environmental protection, intergenerational equity, and meaningful community participation. Myanmar's diverse mining sector faces the ongoing challenge of implementing these global standards within local contexts.

Across Myanmar's mining regions, distinct environmental challenges test these international principles. In Kachin State's jade mining areas, landscape transformation and hydrological impacts raise important questions about sustainable rehabilitation approaches.[1] The Letpadaung Copper Mine in Sagaing Region has caused severe environmental damage, including destruction of farmland through bulldozing and contaminated soil dumping, toxic wastewater runoff that killed crops, and pollution from sulfuric acid production impacting community health.[2] Along the Irrawaddy River, gold mining activities highlight the need for effective sediment control measures to maintain riverine ecosystem integrity.[3]

Unregulated mining operations in southern Myanmar's Tanintharyi Region have caused severe environmental degradation, including widespread deforestation, toxic contamination of waterways from heavy metals, destruction of aquatic ecosystems, and landscape erosion leading to hazardous flooding, while inadequate rehabilitation of mined areas leaves lasting damage to both terrestrial and coastal environments.[4]

The Chindwin Basin's rich biodiversity—including 370+ bird species, 155 fish species (54 endemic), and endangered mammals like tigers and pangolins—faces severe threats from unregulated mining (gold/copper/jade), logging, and agricultural expansion. Mining operations pollute rivers and wetlands, destroying critical fish spawning grounds and migratory bird habitats, while deforestation and land conversion jeopardize forest ecosystems. Local communities dependent on these resources for food and livelihoods are increasingly vulnerable, necessitating urgent conservation measures to prevent irreversible ecological damage.[5] These regional variations collectively underscore the importance of adapting international mining standards to local conditions.

Myanmar's regulatory framework, including the Environmental Conservation Law (2012) and Mining Rules (2018), provides a foundation for implementing global principles. However, opportunities exist to strengthen their application through enhanced environmental impact assessment methodologies and more robust community consultation processes.

The Stockholm Declaration's Principle 21, which addresses states' responsibilities for transboundary environmental protection, and the Rio Declaration's Principle 10 on public participation offer particularly relevant guidance for these improvements.

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[1] Global Witness Report, (2015), "Jade: Myanmar's Big State Secret" https://www.globalwitness.org/en/campaigns/natural-resource-governance/myanmar-jade/.

[2] Business & Human Rights Resource Centre, (2024), "Myanmar: Letpadaung copper mine project sparks ongoing protests, land disputes & security concerns", https://www.business-humanrights.org/en/latest-news/myanmar-letpadaung-copper-mine-project-sparks-ongoing-protests-land-disputes-security-concerns/.

[3] Kachin News Group, (2024), "Illegal gold mining increases on Ayeyarwady River in Shwegu Township", https://www.bnionline.net/en/news/illegal-gold-mining-increases-ayeyarwady-river-shwegu-township

[4] Hein Thar, (2023), "Poisoned earth: Unregulated mining ravages Myanmar's deep south. Frontier Myanmar" https://www.frontiermyanmar.net/poisoned-earth-unregulated-mining-ravages-myanmars-deep-south/.

[5] Daniel, R, (2019), "Chindwin Basin biodiversity faces serious threats, urgent conservation measures needed, say SEI's scientists", https://www.sei.org/features/chindwin-basin-biodiversity-faces-serious-threats-urgent-conservation-measures-needed-say-seis-scientists/.

Practical implementation pathways could include adopting best available technologies for mine waste management, especially in sensitive ecosystems like Tanintharyi's coastal areas. For riverine mining operations, sediment control measures aligned with the precautionary approach would help balance extraction needs with environmental protection. Across all regions, establishing transparent monitoring systems and grievance mechanisms would advance both environmental outcomes and community trust.

The transition toward responsible mining practices in Myanmar presents both challenges and opportunities. By drawing on the foundational principles of international environmental agreements while adapting to local ecological and social contexts, Myanmar's mining sector can progress toward a more sustainable model. This evolution requires ongoing dialogue between policymakers, operators, and affected communities to develop solutions that address both development needs and environmental responsibilities. Such balanced approaches lie at the heart of global mining frameworks and represent the path forward for responsible mineral development.

Legal Enforcement Challenges

Illegal mining is widespread in conflict-affected areas like **Kachin State**, where central government control is weak. Myanmar’s legal system struggles to regulate these areas due to ongoing armed conflicts and the presence of ethnic armed groups. Illegal mining not only worsens environmental degradation but also fuels local conflicts by funding armed groups. Strengthening governance and improving legal oversight in conflict zones are critical to addressing these issues.

Issues related to corruption within Myanmar’s regulatory bodies can hinder the effective enforcement of environmental laws. Mining companies may sometimes find ways to navigate legal requirements through informal agreements, which can lead to environmental challenges. Enhancing transparency and accountability within regulatory agencies is essential for improving the implementation of laws such as the Mines Law (2015) and Environmental Conservation Law (2012).

Public participation in environmental governance is a cornerstone of international environmental law, as seen in Principle 10 of the Rio Declaration.1 In Myanmar, local communities affected by mining operations often lack the resources to participate in environmental decision-making processes. Strengthening legal frameworks to ensure that affected communities have a say in mining projects is essential. Myanmar’s Environmental Impact Assessment (EIA) Procedures (2015) formally require consultation with affected communities at all stages of mining operations. However, weak enforcement, lack of transparency, and insufficient monitoring have rendered these safeguards ineffective, perpetuating environmental harms and disregarding community rights. Efforts should focus on better enforcement, independent community monitoring, and stronger accountability to ensure real participation and compliance with environmental and social safeguards.

[1] Principle 10, Report of the United Nations Conference on Environment and Development, United Nations, Rio De Janeiro, 1992, p.5.

Conclusion

Myanmar's mining industry has caused severe environmental damage, including water and air pollution, deforestation, and biodiversity loss. Although the country's legal framework such as the Environmental Conservation Law (2012) and Mines Law (2015)-provides a basis for environmental protection, weak enforcement, corruption, and lack of transparency have rendered these laws ineffective. To mitigate mining's destructive impacts, Myanmar must strictly enforce key environmental principles, including the precautionary principle, the polluter-pays principle, and sustainable development. Moving forward, strengthening governance, ensuring transparency, and empowering local communities in oversight will be essential to curb environmental degradation and promote a more sustainable and accountable mining sector.

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