



Environmental Management and Monitoring of Mining Operation in Lao PDR

Phengkhamla Phonvisai^{1*}, Jiragorn Gajaseni¹

¹Natural Resources and Environmental Management Center, Mae Fah Luang University, Chiangrai 57100, Thailand

*Corresponding Author's E-mail: phonvisai@gmail.com

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Abstract

Overall, mining projects make a significant contribution to gross of domestic product (GDP) in Lao People's Democratic Republic (Lao PDR). Benefits include increased export revenues, provision of royalty and tax income to the government, technology transfer, worker training and the creation of a skilled workforce. This can also lead to improved social, physical, legal and financial infrastructure due to development around the mining areas such as roads, electricity and water distribution. Managed properly, economic benefits from mining projects can benefit future generations, even after operations have ceased. For Lao PDR, rapid expansion of the mining sector is seen as vital to economic development. In the National Socio-Economic Development Plan, mining was prioritized as a key sector to help Lao PDR achieve its goal to graduate from its status as least developed country by 2020. Government revenues from mining projects are a major contributor to the country's National Growth and Poverty Eradication Strategy.

Environmental management and monitoring of the operations of mining projects are essential in order to identify and mitigate potential negative environmental impacts. Such impacts may be minimized through the use of mining industry best practice as well as compliance with Government of Laos (GoL) and international environmental standards and regulations. The environmental management and monitoring process first identifies and quantifies potential impacts of a mine's operation on land, water, atmospheric and biological resources, as well as on human settlements. Secondly, measures are proposed to avoid or mitigate identified adverse impacts, including a specific requirement for a mine closure and rehabilitation plan.

Keywords: mining law and regulations, mining operations, environmental management and monitoring.

Introduction

The Lao People's Democratic Republic (Lao PDR) is a landlocked country in the center of the Southeast Asian peninsula. The topography is predominantly mountainous, with almost 80 percent of the land hilly and mountainous terrain. The total population in 2012 was 6,4

million people. More than 80 percent live in the rural areas, with GDP per capita of USD 1,164 [1]. In the human development index ranking is 124th out of 169 countries [2].

At the present time, Lao PDR is attracting much foreign trade and investment as well as donor

attention and assistance. Foreign Direct Investment in Lao PDR has been taking place in five major sectors: hydropower, mining (Figure 1), trade, agriculture and the tourism industry, particularly in hospitality (hotels and restaurants) and local handicrafts. The economic growth this has generated is assisting the Government of Lao PDR in fulfilling its development objectives, though technical expertise and assistance is often sought through external providers.

The mining industry in Lao PDR is informally segmented into three different levels: artisanal, small and medium scale operations and large-scale mines [3].

Artisanal mining, which is widespread in rural communities, consists of panning for gold and precious stones and is largely undertaken to supplement agricultural and other rural income.

Small- and medium-scale mining partnerships (domestic companies with regional partners) have also attracted a great deal of negative attention in recent years and have also proved difficult to regulate effectively. Complaints arise of inadequate environmental oversight, lack of community consultation or compensation and the non-payment of taxes. Monitoring by government of these operations is difficult due to their large number and footloose approach to mining. Typically, these companies also lack experience and care in handling noxious chemicals, which has led to numerous health and environmental concerns [4].

Two large-scale mines operate in the Lao PDR that between them account for over 90% of total national mining production: the PBM Phu Kham copper-gold operation, located 120 kilometres north of Vientiane capital, and the MMG Sepon gold and copper mine located near Sepon, east of Savannakhet in the south [5].

Trade, foreign investment and, in turn, increased growth have the potential to radically alter a country's economy, people and environment. Done without concern for all three of these elements, growth can have perverse and often destructive consequences. However, when carefully considered, planned and implemented, this same growth has the potential to benefit society and the power to ensure environmental conservation. Whether this change is positive or negative is ultimately the responsibility of key decision makers within government, business and society at large [6].

Mining is singled out in the GOL's National Growth and Poverty Eradication Strategy [7] as a priority sector for investment, due to its potential for stimulating economic growth and increasing government revenue, which in turn can help to reduce poverty. The sector consists of five key groups: (1) metal minerals; (2) industrial minerals; (3) construction materials and dimension stones; (4) gems; and (5) fossil fuels. Until the late 1990s, only small mines and artesian mining operations could be found, and the industry represented just 0.56% of national GDP. However, recent successes of the Sepon gold and copper mine developed by the Australian -owned company Lang Xang Minerals (Oxiana Limited) have led to a flurry of foreign interest in the country's mineral assets. Private investment in the sector has grown by almost 34% over the last five years; in 2006, the sector was expected to represent nearly 10% of national GDP [8].

Mineral Exploration and Production Agreements (MEPA) which have been signed in Lao PDR, typically contain basic provisions stipulating ownership of mineral resources by the Lao nation and the development of those resources via agreements between the government, represented by the Foreign Investment Management Committee (FIMC), the relevant Ministry and the private investor. Licensees commit to fiscal obligations specified under the Mining Law, to properly comply with all customs, tax and other fiscal requirements [9].

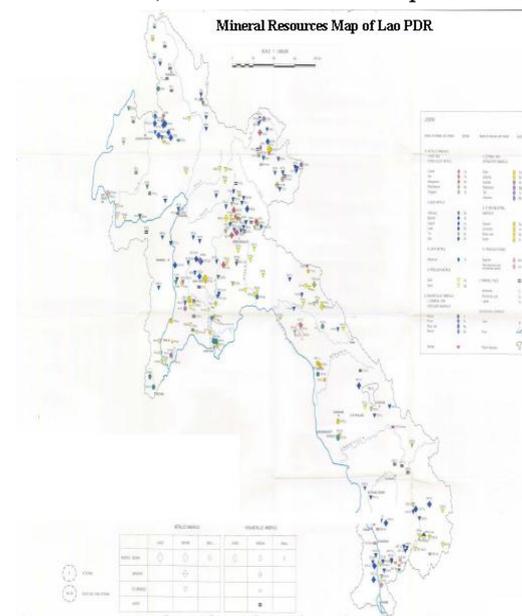


Figure 1 Map of Mineral Potential in Lao PDR
Sources: Department of Geology and Mines, 2003.

Rental fee:

A. For general survey and exploration works undertaken for different minerals, a rate of US\$0.5-1/ha/year applies.

B. For preparatory mining activities (the feasibility and construction phases) and for the mining of different minerals, the rate of US\$3-12/ha/year applies.

Royalty:

The Mining Law was activated in May 1997 and its Implementing Decree was approved in October 2002. Mining activities are governed jointly by the Foreign Investment Law, the Mining Law, the Implementing Decree and Ministerial Regulations as well as relevant fiscal and taxation Laws and Decrees.

Royalties for mineral production is calculated as a levy on the basis of the gross sales value of the mineral. The rate of royalty varies from 2-5%/ha/year applies (Table 1).

Table 1 Royalty from mining activities.

Mineral type	Royalty rate (%)
Gold	5%
Platinum	5%
Ruby	5%
Sapphire	5%
Emerald	5%
Silver	4%
Copper	3%
Lead	3%
Iron	2%
Zinc	3%
Tin	2%
Potash	2%
Gypsum	2%

(Source: Department of Geology and Mineral, MEM)

Tax:

In accordance with the Promotion and Foreign Investment Management Law, foreign investors shall pay annual profit tax at a uniform flat rate of 20%. For foreign investments involving natural resource exploitation and energy generation, specific taxes and royalties shall be prescribed in the MEPA. This rate of profit tax is negotiable, but income tax rates

in the range of 20-35% seem to be the norm in the mining sector at present [10]. A 10% tax levy is imposed on dividends and retained earnings. However, there is no similar or additional tax on exceptional profits which could be levied in the event of a windfall or unexpectedly highly profitable investment.

Import and re-export facilities:

Foreign investors must pay import duties on equipment, means of production, spare parts at a maximum rate of 1% of the value of imported items. Any imported equipment, machinery no longer needed for general survey, exploration, feasibility study, construction and production activities may re-export without restrictions on export of whatever nature, or sold in Lao PDR upon payment of any applicable duties on price of item at the time of sale [11].

Individual income tax for expatriate employees:

As a general rule, expatriate employees are subject to personal income tax depending on their length of stay in the country. Personnel working within Lao PDR shall pay personal income tax at a flat rate of 10% of income earned [10].

Filing Fees (issue and renewal):

- Prospecting license US\$ 15
- Exploration license US\$ 20
- Mining license (issue and renewal):
 - Large scale US\$ 100
 - Medium scale US\$ 80
 - Small scale US\$ 50
- Artisan mining license (issue and renewal) US\$ 5

Law and regulations applicable to mining operation

Mineral exploration and production agreements between the GOL and project developers must comply with prevailing environmental protection laws and regulations, and operators must ensure their activities minimize harm to the environment by following recognized modern mining industry best practices to protect natural resources against unnecessary damage, minimize pollution and harmful emissions, and dispose of wastes in a manner consistent with good waste disposal

practices, and to provide for the health and safety of its employees and the local community [12]. There is also a requirement for environmental management and monitoring in order to analyze the potential impact of the operation on land, water, air, and biological resources as well as affected human settlements, and to recommend measures for mitigating adverse impacts. Finally, there is also a specific requirement to stipulate a mine closure and rehabilitation plan [13].

The first EIA regulation was issued in 2000 and upgraded into the EIA Decree in 2010, which is the most recent decree that specifies the overall principles for EIAs [14]. It prescribes the thematic issues to be covered and the outputs expected at the different stages of the EIA process (pre-construction, construction, operation, and closure stages), and it addresses two categories of investment projects requiring environmental and social assessments:

- Category 1: Investment projects, which are small or create fewer impacts on the environment and society, and require initial environmental examinations (IEEs);
- Category 2: Large investment projects which are complicated or create substantial impacts on the environment and society, and require EIAs.

In relation to investment projects classified in Category 1 and Category 2, including projects provided for in Article 6 (2) of the EIA Decree, the project developer must first obtain an environmental compliance certificate before concluding any contracts for mining or extraction of mineral resources or for construction, before any business license can be issued, and before the developer can start to clear the area, start construction, or implement a project. An IEE or EIA must be designed with after studying multiple options so that the best option can be selected. Studies must cover impacts on antiquities, culture, and custom/traditions, planning solutions for negative impacts on the environment and society, participation of the people who will be affected by the investment project and other stakeholders in discussion process at all levels, and drawing up the budget for those activities. Project developers must ensure public participation and discussion with local administrators at all levels, with those who will be affected by investment projects

and other persons involved in the preparation and examination of IEE reports or EIA reports.

The main laws, regulations and policy relevant to permitting of a mining project in Lao PDR are summarized in Box 1. There is considerable potential for mineral development in Lao PDR the most economically important mineral resources are copper and gold, as well as potentially bauxite, gas and oil. Significant deposits of lignite, gypsum, and potash, as well as smaller deposits of gemstones and zinc have also been identified, but their combined economic importance is relatively small.

Deposits of bauxite have been prospected and explored at the Bolaven Plateau in the Southern Region. One firm has received a Production Agreement, and seven others are still prospecting. The environmental implications of open-cast bauxite mining cum alumina refining are significant. A large area would have to be cleared, and the waste water from the refinery would be highly polluted. Oil reserves were found in the Central North region, but commercial development did not follow and is unlikely in the foreseeable future. The prospects of finding gas are somewhat better. If exploratory drilling was to be successful and fields were developed, the gas would be exported to Thailand. From an environmental point of view, gas drilling operations would be comparatively clean and would not lead to major environmental damage. The drilling area and pipeline systems would occupy only a limited area of land [15].

The Mineral Law (2009) outlines the basis for the sustained growth of the sector. All investors and exploration teams are required to submit results of all their exploration and mapping activities to the Department of Geology and Mineral with MONRE for public disclosure upon termination of the concession. However, the different methods, scales, and definitions of all the different projects would need to be aggregated to provide a complete picture of mineral resource exploitation in the country. Planning of mining development is hampered by the lack of a consistent database [16]. The legal principles of data collection are generally followed, but the sector agencies lack the resources to build a systematic, comprehensive, and dynamic national database. The government intends to start building the necessary capacity

soon with support from the donor community. Multi-million dollar geological surveys are beyond the financial capacity of the mining authorities, and consequently it will take considerable time and resources to establish a database management system capable of harmonizing the diverse and complex datasets generated by different surveys [17].

Box 1: The laws and regulation of Mining Operation in Lao PDR. Mineral Policy and Legislation

The Minerals Law has been promulgated in December 2008 was replaced the Mining Law of May 1997. Implementing Decree of Minerals Law is still drafting and will be replaced the old one of October 2002. Other Laws include Investment Law, Fiscal Law, Taxation Laws, Land Law, Environmental Protection Law, Forestry Law, etc.

Few existing Mineral Exploration and Production Agreements (MEPA) which have been signed often contain basic provisions reiterating the ownership of mineral resources by the Laos Nation and the development of these reduces through agreements between the Government represented by the Ministry of Planning and Investment and relevant Ministerial and the investor. To date Exploitation Agreements have been signed after the completion of successful of Mineral Prospecting and Exploration agreements.

In order to assure sustainable mining/mineral development, investor related to mineral business must comply with following practices:

1. To mine in consistence with the National Socio Economic Development Plan and in consistence with the government strategy plan for the development of mining industry and development plan, and plan for integrate land use;
2. Assure balance between mining and socio-economic development activities, as well as natural resource conservation and environmental protection;

Remedy of any negative impacts that occur during mining and after mine closure and provide community development depending on the scale of the operating focusing on the ensuring of the creation of the job for the local people and aiming to create gradual economic development.

(Sources: Department of Geology and Mineral, MONRE)

Environment management and monitoring for mining operations

The proposed environmental management and monitoring for construction, operation and closure phases of project development must be detailed in an Environment Management and Monitoring Plan (EMMP) as a separate standalone document. The EMMP is to be updated annually throughout the project's duration, recording any changes to planned project activities, commitments, environmental and social conditions and legislative requirements [18]. The common issue of environment during the construction and operation of the mining goes deeper significant environmental problems may arise with respect to subterranean groundwater pollution. Some mines are conducted without effective environmental controls, with no proper environmental mitigation activities and lack of a longer term rehabilitation and reclamation program [19]. Due to the lack of implementing regulations, qualified specialists and overlaps' regarding roles and tasks between institutions involved

in mining activities the implementation of the regulatory framework by the relevant sector agencies is still partially weak or missing.

Need for environmental protection of all aware that mining activities and processing of minerals can be served as future precious sources of foreign currency earnings, contribute most profitable in form of direct and indirect revenue to the country. However, it can have serious and sometimes irreversible, environmental and social impacts if project are not properly planned and managed. Some of those impacts have already been observed in Lao PDR in association with past and current mining projects, including severe erosion, loss of vegetation, severe water pollution, massive siltation and toxic metal discharges. Environment Management and Monitoring for Mining Operations is in order to avoid or minimize negative environment impacts, investors concerning in mineral must perform measures such as:

1. Create a plan for the management of environment and plan of resettlement for people who are impacted from such business related to mineral in accordance with regulation;

2. Establish a plan for rehabilitation of mined out area and for mine closure to allow for other uses;

3. Be liable to pay compensation for damages incurred from the impact of the business operation related to mineral subject to relevant regulation;

4. To contribute to an environmental protection fund for the project;

5. Treat wastewater before discharging from the project in order to ensuring the health and life of the people, animal and the environment; and

6. To regularly summarize and report on assessment of social and environmental impact to the concerned mineral management/monitoring and inspection organization.

The project must develop an environmental management system (EMS) for the project, consistent with a recognized international standard such as ISO 14001. The management system provides the project proponent with a procedural framework for implementing, delivering, reviewing and maintaining the project's environmental and community policies and all its environment and social management targets [20].

Conclusion and recommendations

Minerals development in Lao PDR is rapidly becoming an important source of economic growth and poverty reduction. Along with ecologically sustainable development, by learning and applying the best practice as many countries have done with related to the national formulation policy, will allow Laos mining sector to ensure that the environmental concerns are being adequately considered and mitigated.

Mining operations in Lao PDR are expected to make a significant contribution to the national, regional and local economies. However, environmental and social baselines for such projects are changing significantly as each project is developed. Mining projects may inundate valleys and creeks surrounding the project with reservoirs. Over time, and depending on contaminant status, such reservoirs may develop into an important

fishery resource for local communities. Key environmental and social issues include:

- Erosion and sediment control, particularly during construction;
- Management of site water discharge, particularly from the tailings storage and the waste rock dumps;
- Management and transportation of hazardous materials;
- In-migration and managing the safety of people and communities that settle and use land near the project footprint; and
- Progressive rehabilitation and site closure, and potential for the return of land to the community after mining are complete.

Mitigation and management measures are identified in the EIA to address potential impacts. A detailed EMMP must be prepared as a separate document as part of the EIA process. The document must describe the proposed management and monitoring strategy for construction and operation of the project, consistent with Lao PDR legislation and international best practice for mining operations. A preliminary rehabilitation and closure plan must also be presented, outlining closure and initial rehabilitation plans. During project operation, further consultation with government and local communities will be required to refine the plan.

Under the Lao PDR legislative framework, project developers commit to establishing an environmental management system for each project that complies with national and international standards for environmental management systems, such as ISO 14001. This system provides the project developer with a procedural framework for implementing, delivering, reviewing and maintaining the project's environmental and community policies and all environmental and social management targets. Management of potentially hazardous materials must also be consistent with international standards. The EIA outlines the project's anticipated environmental and social impacts, based on the project's design. It also provides a professional management and monitoring program that is fully consistent with international mining standards. The effective implementation and regular updating of the program in response to changing needs will ensure that environmental and social impacts

attributable to mining projects are minimized, whilst maximizing environmental and social benefits.

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