

Chapter 1 Overview of the Study

1.1 Background of the Study

The geology of Cambodia strongly indicates that it is rich in mineral resources. Information on the country's mineral resources is out-of-date, and a legal framework and regulations are also lacking. Furthermore, the Cambodian government is not sufficiently prepared to handle private sector-funded mining development, especially as it relates to concession holder management, information dissemination, and environmental issues. The government must address these issues and improve its role in promoting private investment.

To increase private investment in the Cambodian mining industry in the future, the government needs to prepare organizations and institutions to handle private investment smoothly. For that purpose, the government must strengthen the skills of its staff, and also improve available information on mineral resources, which is important for promoting exploration. To proceed appropriately with mining development, it is necessary to prepare specific and reasonable mine management guidelines, including mine supervision, mine inspection and environmental management.

1.2 Purpose of the Study

The purpose of this study is to promote the Cambodian mining industry, with the following points:

- (1) Compiling information on Cambodian geology and mineral resources, and providing it effectively both nationally and internationally.
- (2) Creating an “action plan for investment promotion”.
- (3) Creating an “action plan for reforming organizations, nurturing human resources, and improving environmental management, supervision, and inspection of mines”.
- (4) Strengthening the capacity of the General Department of Mineral Resources (hereafter, the GDMR), which has the central role in the development of mineral resources.

1.3 Target Area for the Study

The target area for the study is the entire country of Cambodia.

1.4 Method and Contents of the Study

The study consisted of two stages: Stage A, which involved “Promoting Investment in the Mining Industry and Improving Information on Mineral Resources”, and Stage B, which involved the “Formulation of Medium- and Long-term Priority Action Plans”.

Stage A: Promoting Investment in the Mining Industry and Improving Information on Mineral Resources.

- Assessing the current state of the mining sector, and review geology and mineral resource information.
- Creating an action plan for investment promotion.

- Identifying high-priority medium/long-term issues.
- Drafting 1:200,000 and 1:1,000,000-scale geological and mineral resource maps.
- Identifying anomalies from analyses of rock and soil samples.
- Creating a basic design for a new GIS database and web site.

Stage B: Formulation of Medium long-term Priority Action Plans

- Completing action plans for investment promotion.
- Creating action plans for reforming organizations, nurturing human resources.
- Creating action plans for mine safety and environmental management.
- Completing the 1:200,000 and 1:1,000,000-scale geological and mineral resource maps.
- Completing the handbook of mineral resource potential.
- Developing the new GIS database and website.

1.5 Site Studies

(1) Implementation of the Studies

- The site studies were carried out in the following time periods: Number 1, from 24 August to 9 October, 2008 (47 days); Number 2, from 2 October to 20 December, 2008 (80 days); Number 3, from 11 January to 27 February, 2009 (48 days). Number 4 (1st part), from 17 May to 23 June, 2009 (38 days), and the 2nd part from 3 August to 28 August, 2009 (26 days); Number 5, from 20 October to 3 December, 2009 (45 days); Number 6 (1st part), from 25 January to 18 February, 2010 (25 days), the 2nd part from 5 March to 12 March, 2010 (8 days), and Number 7, from 23 May to 16 June, 2010 (25 days). Number 8 was scheduled for 25 July to 31 July, 2010. The JICA study team completed the site studies as scheduled.

(2) Study Team Members

Table 1.1 Team Members List

Name	Assignment	Name	Assignment
Masaharu Marutani	Team leader/ Mining promotion policy	Hidehiro Ishikawa	Geology A (Satellite imagery analysis)
Richard Terry Thompson	Mining investment A	Haruo Harada	Geology B (Evaluation of mineral resources)
Kenichi Kumagai	Mining investment B/ Mining development plan	Kazushige Wada	GIS database/ Website designing
Naoya Takebe	Organization institution/ Nurturing human resources	Kaori Eiju/ Ryuta Shukuwa	Coordinator
Kazuki Shingu	Environmental management/ Mine safety		

(3) Meeting with the Cambodian Side

- The JICA study team had meetings with the Council for the Development of Cambodia (CDC), GDMR, Ministry of Environment (MOE), Ministry of Public Works and Transport (MPWT), the Embassy of Japan, and the JICA Cambodia office. During these meetings, the study team explained about the Inception Report at the 1st site study.
- During the 4th site study, the JICA study team held a steering committee meeting with the MIME/GDMR on 19 May 2009 where they discussed and revised the contents of the

progress report and obtained agreement from the Cambodian side.

- On 15 June 2009, the JICA study team met with the Minister of the MIME to report on the progress of this project and on revisions made to the progress report. They also agreed to assist with participation in the PDAC (Prospectors & Developers Association of Canada) conference that would be held in Toronto, Canada in March 2010. As a result, they received a letter from the MIME minister dated 17 September which stated that two officials from the GDMR would be attending the PDAC conference.
- As part of the 6th site survey, the Study Team held the 2nd steering committee meeting with MIME and GDMR on 28 January 2010. At the meeting, the contents of the interim report were discussed, and it was agreed by both sides that the revised version of the interim report would be submitted by early April.
- The Study Team held the 3rd steering committee meeting with MIME and GDMR during the 8th site survey on 27 July 2010. At the meeting, the contents of the Draft Final Report were discussed, and it was agreed by both sides that the Draft Final Report could become the Final Report by including the comments from the Cambodian side.

(4) Organization of the Workshop and the Seminar

- **First Workshop**

On 23 August 2008, the study team leader and the GIS database expert gave an overview of this study and of the design of the GIS database and website. This workshop was attended by 20 participants, including senior officials from the MIME/GDMR, JICA officials, and experts from the Study Team.

- **Progress Workshop**

On 20 May 2009, the study team leader gave a presentation about the progress of this study, various team members gave presentations about conditions in their respective fields, and the head of the GDMR gave an introduction to the mining sector of Cambodia. Special greetings were extended to the Secretary of State and Under Secretary of State of MIME, and to the Deputy Resident Representative of the JICA Cambodia Office. There were a total of 43 people in attendance from the MIME/GDMR, JICA, and the study team.

- **Interim Workshop**

On 4 June 2010, the study team leader gave a presentation about the review of this study, and various team members gave presentations in their respective fields about satellite image analysis, the results of geological and geochemical surveys, various action plans, and construction of the GDMR web site. The GDMR expressed their wish for JICA to complement the satellite image analysis and geochemical surveys continually. There were many questions and significant comments on the action plans. Special greetings were extended to the Secretary of State. There were a total of 26 people in attendance from the MIME/GDMR, JICA, and the study team.

- **Final Seminar**

On 29 July 2010, the final seminar entailed discussion and confirmation about the

future course of the Cambodian mining sector. It started with a welcome address by the Senior Representative of JICA Cambodia Office and an opening address by the Minister of MIME, which were followed by presentations by all of the members of the JICA Study Team. In attendance were about 70 people involved with MIME/GDMR, seven other relevant Cambodian ministries, UNDP, the First Secretary of the Japanese Embassy, the JICA Headquarters and the Japanese Chamber of Commerce in Cambodia.

(5) International Seminars

- **Cambodia Mining Seminar held in Japan**

To promote mining investment and provide information about the state of mining and mineral resource potential in Cambodia, a seminar was held in Tokyo under the auspices of JICA on 22 January 2010. Among the participants were two Cambodian officials, and over 60 persons from Japanese trading companies, banks, mining companies, government organizations, etc.

- **PDAC 2010**

The PDAC (Prospectors and Developers Association of Canada), which is one of the world's largest mining conferences and exhibitions, is held every March, in Toronto, Canada. A Cambodia exhibit booth was set up at the PDAC 2010, from 7 to 10 March 2010. It featured geological and mineral resource maps depicting the results of the present study, and gave mining-related people from many countries an introduction to the state of mining and mineral resource potential of Cambodia, in order to promote investment in the Cambodian mining sector. There were roughly 200 active visitors to the Cambodian booth, representing mining companies, exploration companies, investment companies, investment consultants, etc.

1.6 Composition of the Task Force

Table 1.2 List of Task Force Members

	Name	Position
Chief of the Task Force	Mr. Peng Navuth	Deputy Director General, General Department of Mineral Resources
Member	Mr. Yos Mony Rath	Director, Department of Mineral Resources
Member	Mr. Sieng Sotham	Director, Department of Geology
Member	Mr. Sim Sisokhaly	Director, Department of Mineral Resources Development
Permanent Member	Mr. Chrea Vichett	Deputy Director, Department of Mineral Resources Development – In charge of Mining Law/ Policy
Member	Mr. Eam Seak Bo	Chief of Laboratory Office, Department of Geology – In charge of Geology
Member	Mr. Sok Sophorn	Official from the Mapping Office, Department of Mineral Resources – In charge of Geology
Member	Mr. Kong Makara/ Mr. Ou Chak	Chief, Mineral Resources Development Office/ Deputy-Chief of the Data Management Office, Department of Mineral Resources Development – In charge of GIS
Member	Mr. Sok Sokha	Official from the Department of Mineral Resources – In charge of GIS

Chapter 2 Mining Investment Foundation

2.1 Overview

Recently, against a backdrop of intensive international demand for metal minerals, investment in the mineral sector of Cambodia has been increasing, and by the end of January, 2010, all known mineral deposits were covered by mineral concessions.

In the Kingdom of Cambodia, the GDMR of the MIME manages the mining sector. The Law on Management and Exploitation of Mineral Resources (hereafter, “Mining Law”) was implemented in 2001. In addition, various Sub-decrees, inter-ministerial Prakas and Prakas related to mining law, which correspond to mining regulations, have been issued. There are six categories of mineral licenses. The two mineral licenses that are particularly related to this study are mineral exploration licenses (hereafter, “exploration licenses”) and industrial mining licenses (hereafter, “mining licenses”). Before exploration can begin, a preliminary survey must be conducted jointly with the government. The procedures for acquiring mining licenses are controlled by the GDMR. However, the acquisition of an industrial mining license requires the approval of the Council for Development of Cambodia (hereafter, “CDC”).

Laws that govern investment include the Law on Investment (1994) and subsequent amendments (2003). Incentives for mining licensees are also provided for by the investment law and regulations.

Infrastructure for energy and transportation has been developed in Cambodia. However almost all mineral concessions are located in remote areas that are distant from of the main infrastructure.

2.2 Mining Policy

2.2.1 National Strategic Development Plan 2006-2010

The current national development plan of Cambodia is called the “National Strategic Development Plan” (hereafter NSDP2006-2010). The goals and strategies are being organized and implemented through the “Rectangular Strategic Plan”. The Rectangular Strategic Plan was adopted by the RGC in 2004 to address governance and socio-economic development issues and efforts. The concepts of the Plan are shown Fig.2.1.

The basic tenet of the Rectangular Strategic Plan is for the Government “to promote economic growth, full employment for Cambodian workers, equity and social justice, and enhanced efficiency of the public sector”. “Good governance” is set as the core. To achieve these goals, the following measures are promoted:

- (1) Fighting corruption
- (2) Legal and Judicial reform
- (3) Public administration reform
- (4) Armed forces reform and demobilization

Within the outer four circles are ‘growth rectangles’ which represent
(Rectangle 1) enhancement of the agricultural sector
(Rectangle 2) continued rehabilitation and construction of physical infrastructure

(Rectangle 3) private sector growth and employment, and
 (Rectangle 4) capacity building and human resource development

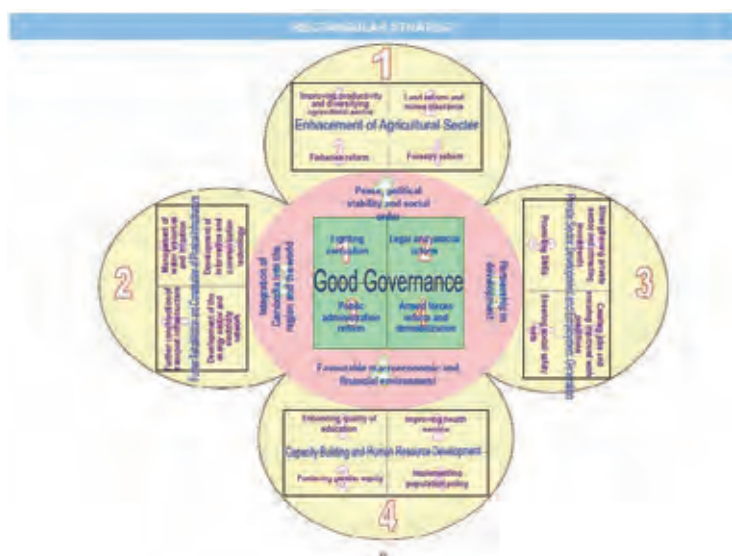


Fig.2.1 Rectangular Strategy Plan (after, PRSP2006)

<Comments>

Four factors within the Rectangular Strategy, that is, 1) Good Governance, 2) continued rehabilitation and construction of physical infrastructure, 3) private sector growth and employment, and 4) capacity building and human resource development, are also important for the mining sector. The mining sector must identify specific issues with each factor and work to resolve them.

According to the NSDP, key private sectors are agriculture, fisheries, petroleum and natural gas, and tourism; no specific reference to the mining sector was found in the original Plan. However, in 2008 the Plan was revised so that in Phase II of the Rectangular Strategy, the mining sector is recognized as a major means of attracting foreign investment.

Nevertheless, the Government has to be aware of the following characteristics of the mining sector:

- Mining requires a long period from exploration to exploitation.
- Mining requires huge amounts of capital for operations and other expenditures.
- Mining requires special equipment that has to be imported.
- Mining is very sensitive to occurrence conditions such as ore grade and geotechnical conditions, as well as volatility in price.
- The prices of metals are determined on the international market; however they do not always reflect production costs.
- Mining requires infrastructure that gives high international competitiveness (to lower unit costs to the miners) in order to increase value-adding.
- After mine closure, a large amount of expenditures are required for site reclamation.

2.2.2 Mining Policy

A comprehensive mining policy has not yet been prepared. Currently, only construction minerals (legally), and gold and gemstones (illegally) are being mined. Moreover, approximately 100 metal mineral concessions have been established under the Law and Agreement on Metallic Mineral Exploration and Exploitation (hereafter called “Mineral Agreement”). The minerals of Cambodia are managed and controlled under the Mining Law; as well as with supplementary Sub-decrees, Prakas and exploration and exploitation agreements.

<Comments>

The MIME is working to attract foreign investment in mining; therefore, the Ministry should inform investors worldwide about the security and international competitiveness of mining investment by publicizing Cambodia’s mining policy.

Also the mining policy has a solemn duty to explain to the nation, especially the inhabitants of candidate mining areas, about the potential for mining development to make a great contribution to the national and local economies, to minimize the negative impacts on the environment and communities, and to promote smooth mining development.

2.2.3 Third Five-Year Strategy of National Development of the Mineral Sector, 2006-2010

The Third Five-Year Strategy of National Development of the Mineral Sector, 2006-2010 (SNDMS) was prepared by the Department of Mineral Resources Development (hereafter DMRD) and submitted to a committee organized by the GDMR for discussion. Afterward, the GDMR submitted this Strategy to the MIME for review and approval, but it has not been approved yet. This Strategy is considered to be an action plan that should be undertaken by the GDMR.

(1) Strategies (Summary)

- a) Strengthening the enforcement of the Law and Agreement on Metallic Mineral Exploration and Exploitation (hereafter called “Mineral Agreement”)
- b) Eliminating illegal mining, especially illegal gemstone and gold mining
- c) Evaluating technical reports on mineral exploration in concession areas
- d) Attracting private investment in the mineral sector
- e) Developing sustainable socio-economies
- f) Developing human resources and strengthening national capacity

2.3 Mining Administration

2.3.1 The Process for Reviewing Mining Law and Regulations

Fig.2.2 shows the process for reviewing laws and regulations in Cambodia, especially Ministerial orders (Prakas), Sub-decrees, and laws. Prakas are approved after a review by a ministerial committee headed by the minister; Sub-decrees are approved by a council of ministers headed by the Prime Minister. In addition, proposed laws must be passed by the National Assembly and the Senate and signed by the King before they become official.

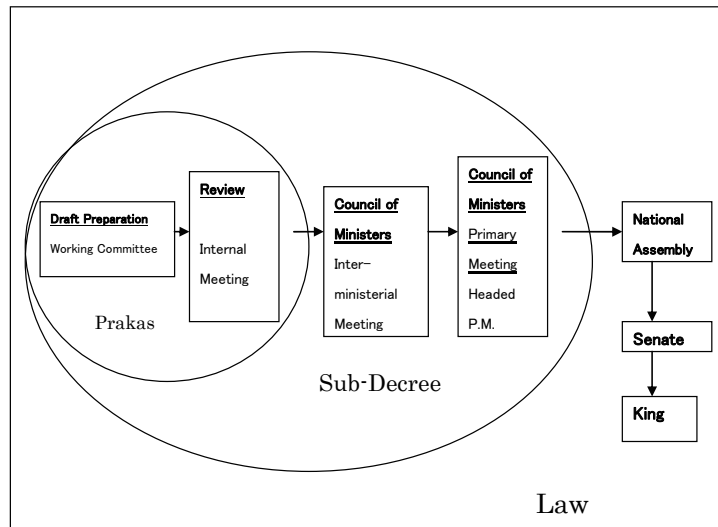


Fig.2.2 The Process for Reviewing Mining Law and Regulations

With regard to the review system, a permanent working committee organized by the Director of the General Department, which makes the drafts of mining law and regulations. Drafts are reviewed in the ministry by a ministerial committee composed of the Minister, the Secretary of State, the Under Secretary of State and members of the working committee. In addition, the working committee evaluates technical reports, requests and proposals submitted by mining-related companies, and the results are sent to the Minister for review and approval.

<Comments>

Successful mining promotion and mining investment require the cooperation of stakeholders in mining development. In other words, if suitable measures for security, rights, international competitiveness, etc., are not provided to investors (mining concessionaires), they may withdraw from Cambodia; also, if the environment, health and safety, daily life, customs, etc., of affected communities are jeopardized, there will be opposition to mining that will hold up development. To avoid such situations, it is necessary to formulate mining measures which reflect the opinions of stakeholders or which they can be persuaded to accept.

2.3.2 Mineral License Acquisition Process

According to the Mining Law, mineral licenses are classified into six categories. In this section, the acquisition process of the exploration license and mining license is discussed. Fig.2.3 shows the current mineral licenses acquisition process.

First, the mining investor shall be registered as a Limited Liability Company by the Minister of Commerce. Next, the investor shall personally deliver a copy of Business Registration Certificate and other required documents to the MIME, in order to apply for registration as a mining company.

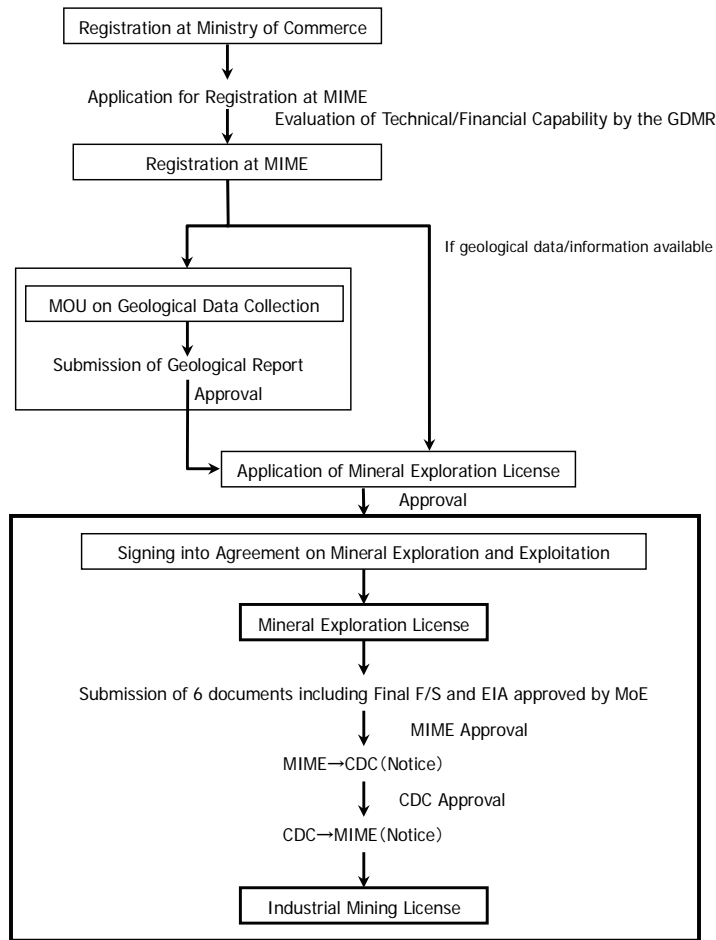


Fig.2.3 Mineral License Acquisition Process

(1) Memorandum for Understanding on Geological Survey

After the completion of registration at the two ministries, the company is eligible to apply for a mineral license. According to the Mining Law, the company is technically able to acquire an Exploration License directly; in real life, however, they apply to the GDMR for a Memorandum for Understanding on Geological Survey (hereafter, “MOU”). The main contents of the MOU are summarized as follows:

- The objective of the MOU is for the company and GDMR to work together to conduct a preliminary geological survey on the mineral deposit that is the target of the application.
- No large-scale digging and drilling/sampling that will disturb the natural resources or environment is allowed.
- The MOU is invalid if the company does not start cooperative work within sixty (60) days after the date the MOU is signed.
- The expenses for this cooperative work are borne by the company.
- The company provides OJT, with appropriate remuneration and accommodation, for two members of the GDMR staff.
- The Period of the MOU is six (6) months, and can be extended only one (1) time for a period of three (3) months.

- The company provides monthly progress reports to the GDMR.
- Within thirty (30) days prior to the expiration, the company shall submit to the MIME a report on the geological data collection. Once the geological data are verified, the company may apply to the MIME for an Exploration License.

<Comments>

All of the expenses related to survey, and remuneration and accommodation of the GDMR staff working as OJT trainees, are paid by the company. There is a monitoring system at GDMR that is designed to prevent collusive relationships between the GDMR staff and the company. Technically, the company may apply for an Exploration License subject to the results of the report, but the standards for evaluating the results at the GDMR are not clear. In order to improve the quality of the geological information, the standards for the report must be attached to the MOU.

(2) Agreement on Metallic Minerals Exploration and Exploitation

After the approval of the geological report provided for in the MOU, if the company intends to apply for exploration, it has to enter into an Agreement on Metallic Minerals Exploration and Exploitation (hereafter, “Mineral Agreement”) with the MIME. The exploration and mining licenses shall be issued under the terms and conditions of the Mineral Agreement.

<Comment>

The articles are equivalent to those prescribed in the mining laws and mining regulations in other countries. After the arrangement of the mining law and regulations is completed, procedures can be streamlined by direct licensing, rather than licensing through a mineral agreement.

(3) Comments from Concessionaires about Mining Administration

Face-to-face interviews were carried out at five foreign affiliates to get feedback on mining administration. The following comments were made during those interviews:

- (1) The Mineral Agreement is unclear, and there is much concern about whether a Mining License can be obtained or not.
- (2) In order to start a project and begin operations, a company needs to visit the MIME and GDMR to carry out the procedures, but there is little coordination between other organizations
- (3) It is difficult to rent land.
- (4) Exploration costs are high. Salaries related to the training of government staff (at the company's site) must be paid by the company, but this expense cannot be deducted as an operating cost.
- (5) In most cases, the export of raw ore and concentrate is prohibited. Such restrictions hinder the development of mines.
- (6) Costs for landmine removal and road repairs should be paid by the government.
- (7) In some cases, a concession has partly overlapped with an agricultural concession of another company. Overlap with other concessions is an obstacle to exploration activities.

<Comments>

These comments point to inadequate governance which is likely to be a significant barrier that discourages investors from investing in mine development.

The mining administration of Cambodia has just begun and is in the trial-and-error phase. Institutional flaws are unavoidable. However, to mend such flaws, it is essential that the MIME and GDMR investigate mining sites and collect opinions from a large number of concessionaires through questionnaires and interviews.

2.3.3 Financial Administration of the MIME and GDMR

Total expenditures in 2005 were US\$ 500 million. The statistics show that in 2006 the MIME budgeted approximately 35 billion riels (US\$ 8.8 million), approximately 61% of which were expended as subsidies to public companies to fill the loss in their finance and as contributions for social aid to the international organizations such as the UNIDO and CCOP (Table 2.1). The next largest portion of the budget, approximately 24%, is in the form of “immovable currency” that is earmarked to remove landmines from sites of dam construction. Accommodations and travel expenses, which can be filed as expenses for geological surveys, have been paid out of the general fund for miscellaneous services. The budget for miscellaneous services amounted to about 2.9 billion riels (US\$ 0.7 million), approximately 8% of the total budget.

Table 2.1 MIME Budget and Actual Results

		(unit:1000rial)			
		2003	2004	2005	2006
Budget (A)	Purchased				
	Services outside				
	Other Services	2,603,000	2,498,000	2,327,000	2,865,000
	Tax and Duties	7,000	7,000	15,000	15,000
	Salary	1,817,246	1,730,000	1,910,000	2,491,528
	Subsidy and Social aid	45,000	45,000	73,000	21,496,942
	Immovable Currency				8,271,064
Total		4,472,246	4,280,000	4,325,000	35,139,534
Actual (B)	Purchased				
	Services outside				
	Other Services	2,102,093	1,825,864	2,050,270	2,652,317
	Tax and Duties	6,946	6,706	13,658	13,897
	Salary	1,429,972	1,437,812	1,793,758	2,465,833
	Subsidy and Social aid	30,624	35,888	72,654	21,302,102
	Immovable Currency			13,061,870	8,271,064
Total		3,569,635	3,306,270	16,992,210	34,705,213
Difference (A) – (B)	Purchased				
	Services outside				
	Other Services	500,907	672,136	276,730	212,683
	Tax and Duties	54	294	1,342	1,103
	Salary	387,274	292,188	116,242	25,695
	Subsidy and Social aid	14,376	9,112	346	194,840
	Immovable currency			-13,061,870	
Total		902,611	973,730	-12,667,210	434,321

MIME Statistics

The budget of the MIME is distributed among its headquarters and branch offices in 24 provinces. Funds for the GDMR are included in the budget for the MIME's headquarters but there is no special budget for the GDMR.

Table 2.2 shows total amounts of mining-related taxes and fees and their annual averages in the past five years.

Table 2.2 Royalties, Land Rents and Fees related to Mining (2003-2007)

Type of Expense	Riels	US\$	US\$/Yr
Registration Fees	43,200,000	10,800	2,160
License, Renewal, Right Transfer Fees	932,020,000	233,005	46,601
Land Rentals	4,559,600,440	1,139,900	227,980
Royalties for Construction Materials	9,291,210,617	2,322,803	464,561
Total	14,826,031,057	3,706,508	741,302

(Source: MIME Statistics)

<Comments>

80% of royalties are allocated to the central government. A Prakas specifies that 10% of the royalties allocated to the central government, or 8% of the total royalties, are to be spent for geological and mineral surveys. The remaining 20% is allocated to provinces. In short, approximately US\$37,000 can be spent a year for surveys. However, the actual amount for geological and mineral surveys allocated to the DoG is about US\$2,000. The most important issue for the GDMR to encourage mining investment in the present phase is geological and mineral surveys. Therefore, at least the amount specified in the Prakas must be spent for geological and mineral surveys.

2.4 Legal Framework for the Mining Sector

2.4.1 Cambodian Legal Framework for the Mining Sector

The law and sub-decrees for the mining sector are listed in Table 2.3. There are a total of 25, consisting of 1 law, 6 sub-decrees, 11 prakas and 7 miscellaneous notifications.

Table 2.3 Cambodian Legal Framework for the Mining Sector

No.	Name
1	Law on Management and Exploitation of Mineral Resources (Mining Law)
2	Sub-decree on the Principles of Investment in Mineral Resources
3	Sub-decree on the Amendment of Article 1 of the Sub-decree mentioned above
4	Decision on the Establishment of a Sand Management Committee
5	Decision on the Establishment of an Inter-ministerial Commission to Control and Solve the Soil Excavating Issues around the Areas of Phnom Penh City
6	Decision on the Establishment of an Inter-ministerial Inspection to Inspect Results of Mineral Explorations Done by Companies Approved by Concerned Ministries-Competent Institutions
7	Government Order on the Prevention and Elimination of Forestry Cutting and Illegal Occupation of Forest Land
8	Sub-decree on the Suspension and Revocation of Mineral Licenses
9	Sub-decree on the Power and Roles of Officials Appointed to Inspect and Report Activities of Mineral Exploration and Mining
10	Sub-decree on the Determination of Mineral Resources Areas
11	Sub-decree on Conditions for Issuing and Extending Mining Licenses and Transferring Mining License Rights
12	Inter-Ministrial Prakas on Fees for Registration, Issuance, Renewal, and Right Transfer of Mineral Licenses, Annual Land Rental for Concession for Mineral Exploration and/or Mining and Royalty Rates of Mineral Resources

13	Prakas on Royalties for Construction Materials
14	Prakas on Registration and Conditions for Issuing and Extending Mineral Licenses and Transferring Mineral License Rights
15	Prakas on Uniforms for Officials of GDMR and DIME
16	Prakas on Gemstone Management Mechanism
17	Prakas on the Establishment of Competent Officials to Enforce the Mining Law
18	Circular on the Prevention of Illegal Mining Activities in Provinces in the Kingdom
19	Circular on the Suspension and Revocation of Mineral Licenses
20	Organization Chart of the GDMR
21	Prakas on the Functions of the DMR
22	Prakas on the Functions of the DoG
23	Prakas on the Functions of the DMRD
24	Prakas on the Establishment of an Inspection Office under the DMR
25	Prakas on the Establishment of a Revenue Office under the DMRD

2.4.2 Law on Management and Exploitation of Mineral Resources

(1) Law on Management and Exploitation of Mineral Resources

The Law on Management and Exploitation of Mineral Resources (hereafter called “Mining Law”) consists of nine chapters.

<Comments>

There are some portions of the Mining Law which seem to require modification in order to encourage investment, in other words, transparency, governance, incentives, and consistency in royalties and taxes. Although mining license applications focus on technical and financial capabilities, there do not appear to be standards by which these capabilities can be evaluated. To avoid such opacity, licensing on a first-come-first-served basis should be considered. The introduction of a first-come-first-served process and information technology will streamline application processes, resulting in increased convenience for investors.

With respect to guarantees of concession rights, if there is confirmed overlapping of mining licenses, the conditions should be clarified. In addition to specifications for resolving disputes with overlapping agricultural concessions, criteria and conditions to grant a mining license for a concession that overlaps with another mining concession should be specified. For example, the definitions of "large-scale project" and "special benefits" in the Mineral Agreements are unclear. Meanwhile, security of tenure, whether or not operations from exploration to mining are ensured, is a critical concern for investors.

With respect to the bidding system, bidding on areas where governmental surveys were conducted may help to provide funding for future surveys. However, this will require provisions to ensure fairness and transparency. The issues of abandonment, mortgage, assignment, or inheritance of a mineral license, should not be subject to approval but should rest with concessionaires. Pricing of minerals should depend on the principles of market economics, and consultation with the government is unnecessary. Taking into consideration the special stringent conditions inherent with the mining industry such as high risk, high development cost, and a long development period, the mining sector should be given preferential treatment to attract investment.

It is preferable to revise Cambodian mining law by referring to, for example, mining

laws of Canada, Australia, and South American countries, with guidance from international institutes, so that it can include measures to strengthen investment that are tailored for Cambodia.

(2) Laws and Regulations related to the Mining Law

According to the Mining Law, the following provisions must be detailed in a Sub-Decree or a Prakas.

(1) Provisions to be stipulated in sub-decrees

- Criteria for issuing a mining license, reports required to issue a mining license, contents and procedure of the final F/S)
- Suspension and revocation of mineral licenses
- Authority and obligations of relevant officials

(2) Provision to be stipulated in Prakas

- Formats, revising plans, contents of reports, procedures, and guidelines for financial guarantees that relate to appropriate mining operations
- Rates and payment procedures of royalties and investments for relevant officials:
Inter-ministerial Prakas

(3) Other provisions

- Conditions related to the extension and assignment of a mining license (sub-decrees)
- Fees related to the registration of mining and extension and assignment of a mining license (Inter-ministerial Prakas)
- Land rents related to exploration and mining (Inter-ministerial Prakas)
- Conditions related to the registration of mining and extension and assignment of a mining license (Prakas)
- Ensuring location of mineral resource areas (sub-decrees)
- Fees for registration of mining and extension and assignment of mining licenses (Inter-ministerial Prakas)

<Comments>

One sub-decree stipulates that applications for mineral exploitation can be filed at the CDC one-stop-shop after the completion of the preliminary survey and mineral exploration upon recommendation from the MIME. This provision is likely to spoil the one-stop-service function. Another sub-decree prohibits the export of many kinds of minerals so that they can be supplied to local industries to manufacture fine products, which can be exported. This sub-decree is designed to foster the development of industries with high added value in the nation and thus increase employment, and its ideals are understandable. However, many investors in metal mining are looking to export basic mineral products, because costs for power are high and processing techniques are low in Cambodia. Taking this situation into account, this sub-decree should be considered for revision at an appropriate time. In a draft for royalties, the rate for the final product processing is lower than the rates for other processes. These rates reflect the intent of this sub-decree.

2.4.3 Investment Law

(1) Council for the Development of Cambodia

The government of Cambodia, which realizes that nationwide economic development should be based on the sound growth of the private sector, has launched various reform programs to promote private investment. One of these programs is the Council for the Development of Cambodia (hereafter CDC) that was established under the Investment Law of 1994.

The CDC is organized into three committees, i.e., the Cambodian Rehabilitation and Development Board involved with the country's rehabilitation and development, the Cambodian Investment Board (CIB) involved with private investment, and the Cambodian Special Economic Zone Committee which is involved with special economic zones of the country under the direct control of the Chairman. The CIB, an executive body for private investment, is composed of eight bureaus.

Although the CDC has duties as a one-stop service organization related to private investment, it requires the approval of the Council of Ministers for matters related to investment projects which

- have investment capital of US \$50million or more
- involve the exploration and exploitation of minerals or other natural resources
- have a long-term strategy, or
- involve infrastructure concessions.

(2) Investment Laws

The Law on Investment was implemented in 1994 in part to establish an investment licensing system. A major revision was made to the Law in 2003 to simplify the licensing system, increase its transparency, and make it predictable, automatic and non-arbitrary.

<Comment>

One of the major problems facing the Investment Law and the relevant laws seen from the viewpoint of the mining sector is that although special depreciation or tax holidays and tax exemptions for imported machinery or materials are granted to Qualified Investment Projects (QIP), tax exemptions for imported equipment or materials are the only tax credit granted to mining projects and the reason for this is not clearly explained. Such unfair treatment should be corrected.

2.4.4 Tax System

Table 2.4 shows a list of Cambodian taxes.

The rate of the corporate profit tax is 20% for general corporations, but a much higher rate of 30% is imposed on the mining industry.

Table 2.4 Tax Scheme of Cambodia

Tax	Rate
Profit Tax (Article 1- 23, Chapter 1)	
<ul style="list-style-type: none"> For legal persons 	20% (unless investment incentive rate of 9% or 0% are applied)
<ul style="list-style-type: none"> Oil and gas production sharing contract and the exploitation of natural resources including timber, ore, gold, and precious stones. 	30%
Minimum Tax (Article 24, Chapter 1)	
<ul style="list-style-type: none"> To be applied only for the real regime If the profit tax amount exceeds 1% of annual turnover, the taxpayer pays only the tax on profit. 	1% of annual turnover
Withholding Tax (Article 25 - 28, Chapter 1)	
<ul style="list-style-type: none"> Income received by individuals for services such as management, consulting, etc. Payment of royalties for intangibles and interests in mineral resources. Payment of interest by a resident taxpayer carrying on business, other than domestic banks or financial institutions. 	15%
<ul style="list-style-type: none"> Income from the rental of movable or immovable property. 	10%
<ul style="list-style-type: none"> Interest payment by domestic banks to residents with fixed term deposit accounts 	6%
<ul style="list-style-type: none"> Interest payment by domestic banks to residents with non-fixed term deposit accounts. 	4%
<ul style="list-style-type: none"> Payment to non-residents : Interest, royalties, rent and other income connected with the use of property, dividends, payment for management or technical services. 	14%
Tax on Salary (Article 40 - 54, Chapter 2)	
To be withheld monthly by employers	
<ul style="list-style-type: none"> 0 Riels - 500,000 Riels (Approx. USD 125 or less) 500,001 Riels - 1,250,000 Riels (Over 125 - 312.5) 1,250,000 - 8,500,000 Riels (Over 312.5 - 2,215) 8,500,000 - 12,500,000 Riels (2,215 - 3,125) Over 12,500,000 Riels (Over 3,125) For fringe benefits Non-residents 	<p>0%</p> <p>5%</p> <p>10%</p> <p>15%</p> <p>20%</p> <p>20% on market value</p> <p>Flat rate of 20%</p>
Value Added Tax (Article 55-84, Chapter 3)	
<ul style="list-style-type: none"> Taxable person : Any person subject to the real regime system Registration: All companies must complete registration for VAT before commencing business. Others must register within 30 days after their taxable turnover for the preceding consecutive three months exceeds: <ul style="list-style-type: none"> 125 million Riel for goods 60 million Riel for services Taxable supply <ul style="list-style-type: none"> Supply of goods or services by a taxable person in Cambodia Appropriation of goods for his/her own use by a taxable person Making of a gift or supply at below cost of goods or services Import of goods into Cambodia Standard tax rate Tax rate for the goods exported from Cambodia and services executed outside of Cambodia Input tax credit is deductible against the output tax amount Monthly filing: The VAT declaration must be submitted on or before the 20th day of the following month. 	<p>10%</p> <p>0%</p>
Other Taxes (Article 85, Chapter 4)	
Specific Tax on Certain Merchandise and Services	
<ul style="list-style-type: none"> Tickets for local and international air transportation Local and international telecommunications Beverages Tobacco, entertainment, large automobiles, motorcycles from 125 cc upwards Petroleum products, automobiles more than 2,000 cc 	<p>10%</p> <p>3%</p> <p>20%</p> <p>10%</p> <p>30%</p>
Property Transfer Tax	
For the transference of ownership of real property and certain types of vehicles as a result of direct transfer or a contribution of share capital to an enterprise	4% on transfer value
<ul style="list-style-type: none"> Prohibited to issue certificates of ownership of property until the Property Transfer Tax has been paid. 	
Tax on Unused Land	
<ul style="list-style-type: none"> Committee for Evaluation of Undeveloped Land, in cooperation with municipal and provincial authorities, decides whether a plot is "unused" or not and the amount of tax liability. Taxable for the portion over 1,200 square meters. 	2% on the assessed value of unused land
Patent Tax	
<ul style="list-style-type: none"> For annual business registration 	Approx. USD300-
Tax on House and Land Rent	
	10% of the relevant rental fees
Import Duty	
	Varies (4 bands - 0,7,15, and 35%)
Export Duty	
	Varies (Mostly 10%)

Source: Cambodia Investment Guidebook

2.5 Cambodian Natural and Social Environments

2.5.1 Overview of the Cambodian Natural Environment

Cambodia is located in the southwest of Indochina, and borders on Vietnam, Thailand and Lao PDR. The total area of the country is 181,035km², which is approximately half the size of Japan. Cambodia has a tropical monsoon climate, with a rainy season from June to October, and a dry season from November to May, and average annual rainfall of 2,300mm. Average annual temperature is 27.7 degrees Celsius, and the hottest months, April and May, both have an average temperature of over 30 degrees Celsius. 62% of the country is covered by forest, and most of the plains are savanna lands interspersed with tall conifers. The Mekong River flows through the central part of the country from north to south, and Lake Tonlesap is located in the northeastern part of the country.

2.5.2 Valuable Species

Cambodia is abundant in fauna and flora, including some indigenes. Cambodia is a sanctuary for many large mammals such as rhinoceroses, elephants, tigers, etc., birds such as frigate birds, vultures, floricans, etc., reptiles such as crocodiles, turtles, etc., and some fishes. The number of endangered species has increased due to recent industrial growth and tourism. Consideration of flora and fauna will be indispensable for Cambodia to achieve balanced development in the future.

2.5.3 Protected Areas

Twenty-three of Cambodia's protected areas are managed by the MoE and 10 are managed by the MAFF. The protected areas consist of (1) National Parks, (2) Wildlife Sanctuaries, (3) Protected Landscapes, (4) Multiple Use Areas and (5) Protected Forests. The total area of protected areas is 3,134,471 ha, and the total area of protected forests is 1,490,500 ha. The total of both areas is 4,624,971 ha which is equal to about 25.5% of the total area of the country.

2.5.4 Ethnic Composition

Cambodia is a multiethnic country with an ethnic composition of 90% Khmer and 10% minorities (Vietnamese, Chinese, etc). Provinces where many minorities live include Rottanakiri, Kratie and Mondulkiri.

2.5.5 Unexploded Bombs (UXBs) and Landmines

It is said that there used to be 4 million to 6 million landmines and more than 2.4 million UXBs, owing to the Vietnam War and subsequent 20-years of internal fighting. Cambodia is one of the countries most devastated by UXBs and landmines in the world. Between 1976 and 2006, around 60,000 people were injured by these hazardous materials. Currently, these materials are being removed by four groups: CMAC (Cambodian Mine Action Center), Royal Cambodian Armed Forces (RCAF), and two NGOs (MAG and Halo Trust).

Even though clearance activities have been implemented by the abovementioned four groups, surveys in forests and deep underground have not been advanced. Numerous UXBs and landmines have forced mining companies to waste a lot of money trying to locate hazardous materials.

2.6 Laws and Regulations Related to Environment in Mining Activities

Laws and regulations related to environment in mining activities are: the Law on Management and Exploitation of Mineral Resources (hereafter, “Mining Law”), the Law on Environmental Protection and Natural Resource Management (hereafter, “Environment Law”), the Law on Forestry, the Protected Area Law, the Subdecree on the EIA Process, the Subdecree on Water Pollution Control, the Subdecree on Solid Waste Management, and the Agreement on Mineral Exploration and Exploitation.

2.6.1 Law on Management and Exploitation of Mineral Resources (Mining Law)

Article 21 defines requirements for environmental protection and mining safety as responsibilities of every concessionaire and subcontractor. As an additional duty, the article states that the appointed competent officials must control the implementation of regulations on the health and safety of workers and people and environmental protection.

However, safety and environmental items are not defined in detail in the Mining Law. It should be noted that there is no Mine Safety/Environment Law that defines safety and environment in mining activities apart from the Mining Law. Therefore, the legal system is not sufficient to manage the mining industry in regards to nature or safety.

2.6.2 Law on Environmental Protection and Natural Resource Management (Environment Law)

The Law on Environmental Protection and Natural Resource Management (hereafter, Environment Law) was promulgated in December, 1996. The main objectives of this law are to:

- (1) Protect the health of Cambodian citizens and increase environmental quality by protecting against and suppressing pollution;
- (2) Examine environmental impacts of proposed projects;
- (3) Ensure that mining operations maintain, manage, develop and utilize natural resources in a reasonable and sustainable manner.
- (4) Enable Cambodian citizens to participate in environmental protection and natural resource management.
- (5) Suppress actions that can lead to environmental destruction.

This law also stipulates management principles for environmental and natural resources, defining the EIA criteria for every type of project. It also defines monitoring, record-keeping and inspections for factories, pollution sources, industrial sites, and sites of natural development activity. However, there are no specific or detailed regulations for mining operations.

2.6.3 Law on Forestry

This law defines the framework for managing, harvesting, using, developing and conserving the forests of Cambodia. The objective of this law is to ensure the sustainable management of these forests for their social, economic and environmental benefits, including conservation of biological diversity and cultural heritage.

The law stipulates that extraction of resources including quarrying, soil and sand excavation, mining, etc., conducted within the Permanent Forest Reserves, shall require a prior study-evaluation from the MAFF, and authorization from the government. Such authorization shall state the measures required for environmental protection and restoration of sites for quarrying, soil and sand excavation, mining and other natural resources extraction.

The law also stipulates the basic conditions for mining activities within Permanent Forest Reserves.

2.6.4 Protected Area Law

The new Protected Area Law was ratified by the Parliament in December 2007, and enacted in January 2008. This law states that protected areas are divided into 4 management zones, as described as follows:

1. **Core zone:** Management areas of high conservation value containing threatened and critically endangered species, and fragile ecosystems.
2. **Conservation zone:** Management areas of high conservation value containing natural resources, ecosystems, watershed areas, and natural landscapes located adjacent to the core zone.
3. **Sustainable use zone:** Management areas of high economic value for national economic development and management, and conservation of the protected areas themselves thus contributing to the local community, and improvement of ethnic minorities' livelihoods. The RGC may permit development and investment activities in these zones in accordance with requests from the MoE.
4. **Community zone:** Management areas for socio-economic development of local communities and indigenous ethnic minorities.

The issuance of land titles or permits to use lands in this zone requires prior approval from the MoE in accordance with the Land Law. Namely, in Core and Conservation zones, even access to the zones is severely limited. In Sustainable and Community zones, development is possible only when the government permits it. If a project is located in a Core zone or Conservation zone, no mining development, construction of infrastructure, eco-tours, etc, are permitted.

2.6.5 Sub-decree on the Environmental Impact Assessment Process

This is an auxiliary subdecree for the Environmental Law which obligates the MoE to examine EIAs. EIA reports must describe a) environmental impacts caused by project activities, and b) environmental protection measures to stop or minimize each impact.

Submission of EIAs is regulated according to the kind and scale of project, but all mining projects must submit an EIA regardless of their scale of operation. A flowchart of the EIA procedure related to the mining sector is shown in Fig.2.4.

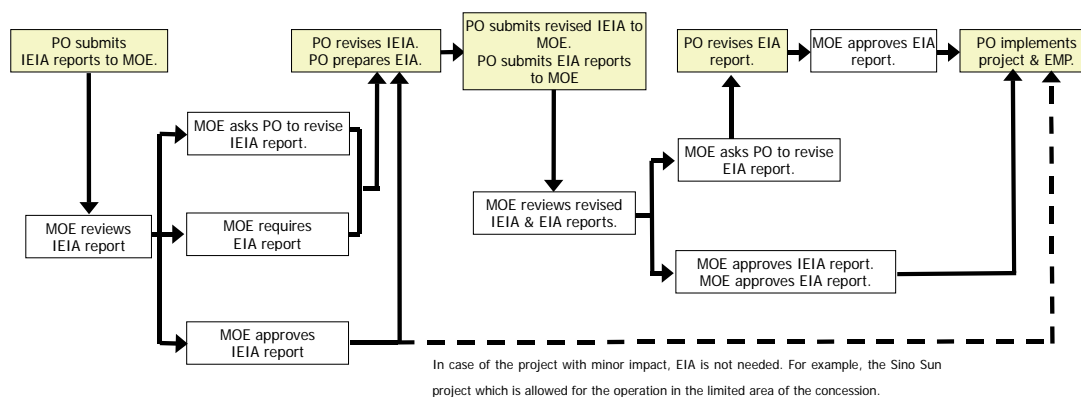


Fig. 2.4 The EIA Procedure for Mining Projects

2.6.6 Sub-decree on Water Pollution Control

The purpose of this subdecree is to regulate water pollution control in order to prevent and reduce the pollution of the public water areas to protect human health and conserve biodiversity. This subdecree applies to all sources of pollution of public water areas.

Various types of hazardous substances are described in this subdecree. For example, mercury and its compounds, cadmium and its compounds, 16 metals and their compounds, and cyanides and fluorides are named as hazardous mining-related substances.

The problem is whether or not these regulations can be maintained. In particular, it will be difficult for the MoE to realistically carry out monitoring and inspection of public water areas after full-scale mining operations begin.

2.6.7 Sub-decree on Solid Waste Management

The purpose of this subdecree is to ensure that solid waste is managed in a technologically safe and proper manner in order to protect human health and conserve biodiversity. This subdecree applies to all activities related to the disposal, storage, collection, transport, recycling, and dumping of garbage and hazardous waste.

The mining industry may produce a great deal more hazardous waste during mining operations (as stripped waste or dump for drifting) and processing (as tailings) than other industries. Historically, major pollution due to mining waste has occurred. Therefore, solid waste from mining must be strictly supervised.

2.6.8 Agreement on Mineral Exploration and Exploitation

This agreement includes detailed regulations on environmental management, such as “Obligations” and “Environmental Protection”.

These are not specific to a certain company, but rather are general and common to all companies. Therefore, this agreement should stand as an independent Mine Safety/Environment Law, including more specific items, and the other legal regulations mentioned above. This new law could be easy to understand and help to simplify management of the mining sector.

2.7 Environmental Administration

The Ministry of Environment (hereafter, MoE) oversees environmental conservation, and prevents and minimizes pollution. To acquire a license for a mining project, a foreign investor must first sign a mine development agreement with the GDMR to obtain exploration rights. After that, the investor must submit the EIA (approved by the MoE) and final feasibility study to the MIME and receive approval from the CDC.

The purpose of the MoE is to ensure sustainable development in Cambodia, with special emphasis on

- 1) Implementing environmental management, and formulating national and provincial action plans for the environment;
- 2) Drafting and enforcing environmental laws;
- 3) Examining EIAs for business projects and activities, and suggesting recommendations and EIA examination procedures;
- 4) Providing guidelines to the relevant ministries for reasonable and sustainable maintenance, development, and management of Cambodia's natural resources.
- 5) Promoting management of protected areas and creating new protected areas in cooperation with the government agency for protected areas.

There are a total of 1,384 MoE employees, including 529 in the head office in Phnom Penh, and 855 in provincial offices.

The MoE currently monitors air and water quality in Cambodia. Environmental monitoring is currently carried out only in Phnom Penh, the economic center of the country. In the future, this monitoring should be expanded into economically developing areas, such as areas with new mining operations.

2.8 Infrastructure

2.8.1 Roads

The road network of Cambodia is comprised of arterial roads administered by the Ministry of Public Works and Transportation (MPWT), and rural roads administered by the Ministry of Rural Development. The total road extension of Cambodia in 2006 is shown in Table 2.5. The road density of Cambodia is 0.218 km/km² for total roads, and 0.063 km/km² for national and province roads, which are both lower than in neighboring countries. The present situation of the road network in Cambodia is shown in Fig. 2.5.

Table 2.5 Road Network Length

Road Classification	Length (proportion)	No. of Bridges (length)	Management Authority
1-digit national roads	2,097.280km (5.31%)	589 (17,643m)	MPWT
2-digit national roads	2,704.737km (6.85%)	698 (15,710m)	
Provincial roads	6,692.440km (16.95%)	904 (16,309m)	
Rural roads	28,000km (70.89%)	N/A	MRD
Total length	39,494.457km (100.0%)	2,121 (51,917m)	

Source: LRCS Inventory, 2006 and MRD Inventory 2006



Fig.2.5 Existing Road Network

2.8.2 Railways

As shown in Fig. 2.6, there are two railway lines in the country: the Northern Line, which connects Siphon and Phnom Penh, and the Southern Line, which connects Phnom Penh and Sihanoukville.

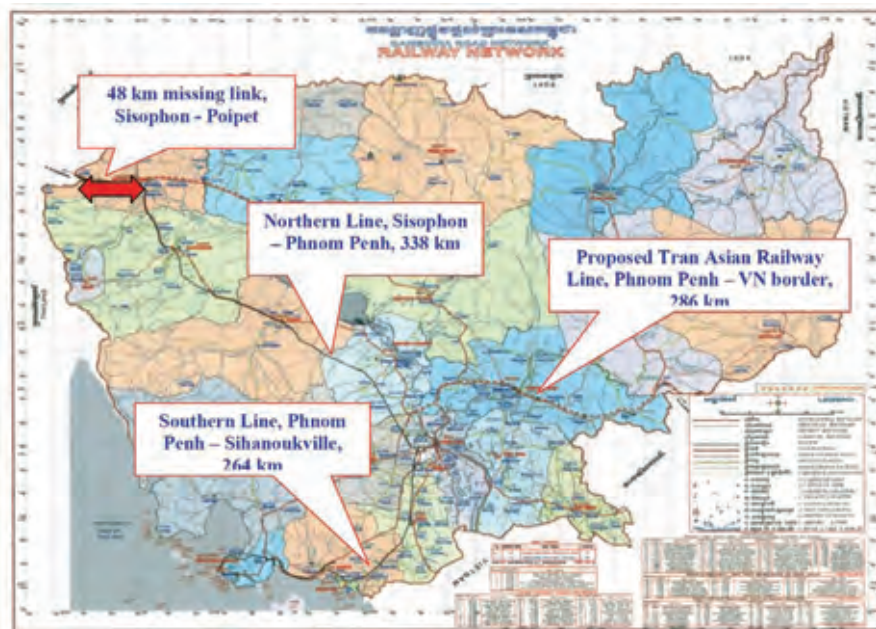


Fig.2.6 Railway Lines in Cambodia (after ADB Study)

2.8.3 Inland Waterways

Cambodia has a total of 1,700 km of navigable inland waterways. The main channel of the Mekong River accounts for 30% of this total, the Tonle Sap River accounts for 15%, and the Bassac River accounts for 5%. The maximum navigable types of ships (red: at the time of

On August 21, 2009, the Royal Government signed an agreement with JICA to provide a Japanese ODA loan for the Sihanoukville Port Multipurpose Terminal Development Project, including a bulk terminal for wood chips. This bulk terminal is designed for a water depth of 13.5m, draught of 12m, and quay length of 260m, and it will be completed in 2014. Since the bulk terminal is expected to handle approximately 500,000 tons of wood chips per year (and accommodate 50,000-ton class ships), it will have sufficient terminal capacity to handle ore as well. “Handy” type ore vessels of the 30,000 ton class will be able to dock at the quay.

2.8.5 Electric Power

The present situation of electric power supply in Cambodia is described below.

- The amount of annual electric power used per capita: 60kWh
- The electrification rate is about 20% for the national average, 60% for city homes, and 10% for rural areas.
- Electric power rates: US 9-25 ¢ for the electric power system of state-owned EDC (Électricité du Cambodge), and US40-80 ¢ for the electric power system of the regional electric power supplier DEE (Rural Electricity Enterprises) in rural areas
- Total electric power capacity: 300MW (200MW in Phnom Penh)
- Electricity generated in 2006: 1,200GWh
- Power generation system: Diesel power generation accounts for at least 90% of production.

The following matters are reported as problems with the electric power system.

- There is no national high tension cable network.
- The system is too dependent on one type of fuel.
- The import duty on petroleum is high.
- Production costs are high.
- Growth of demand is low.
- Investment is stagnant.

2.9 Mining Development and Infrastructure

Infrastructure has a major influence on mining investment for development and operating costs. Transport costs have a particularly big influence on relatively cheap minerals (limestone, bauxite, coal, and iron ore). Transport costs are affected by mode of transport, state of infrastructure, and distance transported. The unit price of electric power is a matter of great concern for mining investors.

Fig.2.9 shows the mineral potential areas, surrounding roads, and the construction plan for the power transmission lines. If the construction of roads and electric power network proceeds smoothly, mining development may gain momentum by around 2015.

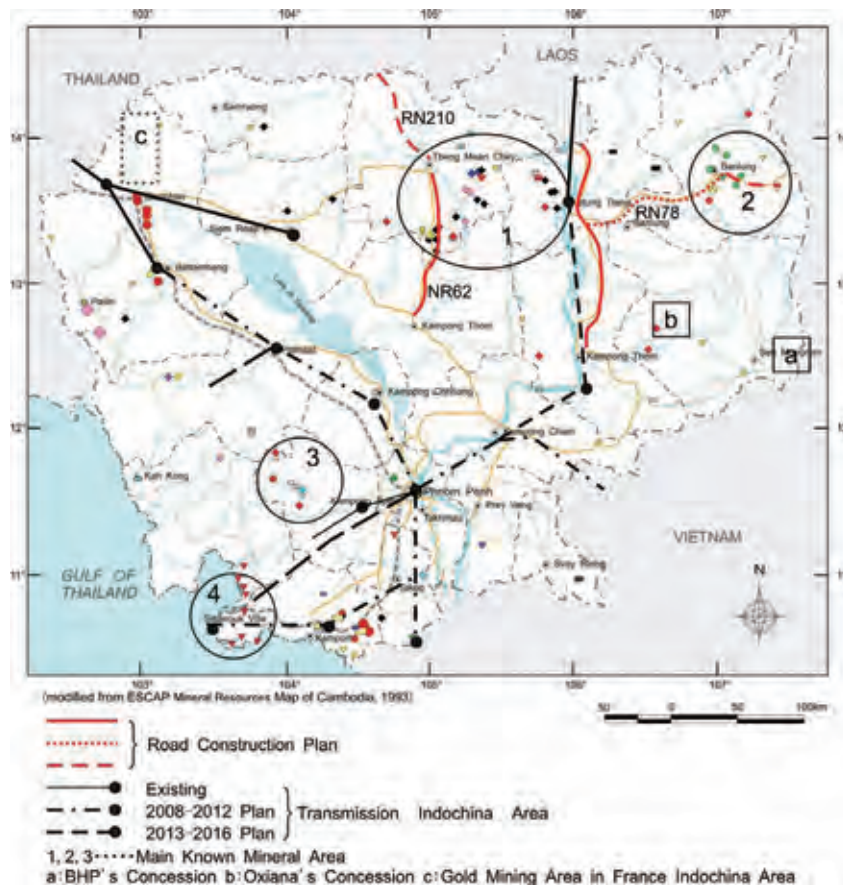


Fig.2.9 Mineral Potential Areas and Infrastructure

The majority of metal mineral deposits exist in the intermountain areas in Cambodia, and it is not possible to invest scarce national economic resources thereto without sufficient consideration. Therefore, the measures to be taken with regard to infrastructure improvement for mining development as the government should be determined as follows:

- 1) First, mineral resources should be evaluated, and it should be clarified which regions have the highest metal grade and volume, which regions have minerals that have potential for increased future demand, and which regions have minerals that could be mined to contribute to the local economy.
- 2) If a considerable contribution can be expected, mining infrastructure development should be undertaken as a national development strategy in that region; (when there are two or more, then in the region with the greatest potential).
- 3) Subsequently, infrastructure development of the second-most highly contributing region should be undertaken by utilizing a part of the increased annual revenue (if any) received from mining development.

Of course, if there is any region that has sufficient infrastructure and has a kind of mineral which can make a considerable economic contribution, or there is a high grade deposit of a metallic mineral that does not require infrastructure (for example, gold), then development of that region should have priority and the necessary measures should be taken. It will be more effective to utilize a part of the increased annual revenue obtained from the most promising

projects to develop infrastructure for other promising mineral(s).

In order to materialize such a policy, there must be cooperation among the relevant ministries & agencies, mining companies, and affected communities, and it is also important to establish an organization (committee) for that purpose.

Chapter 3 Current State of the Mining Sector and its Tasks

3.1 Current Mining Activities in Cambodia

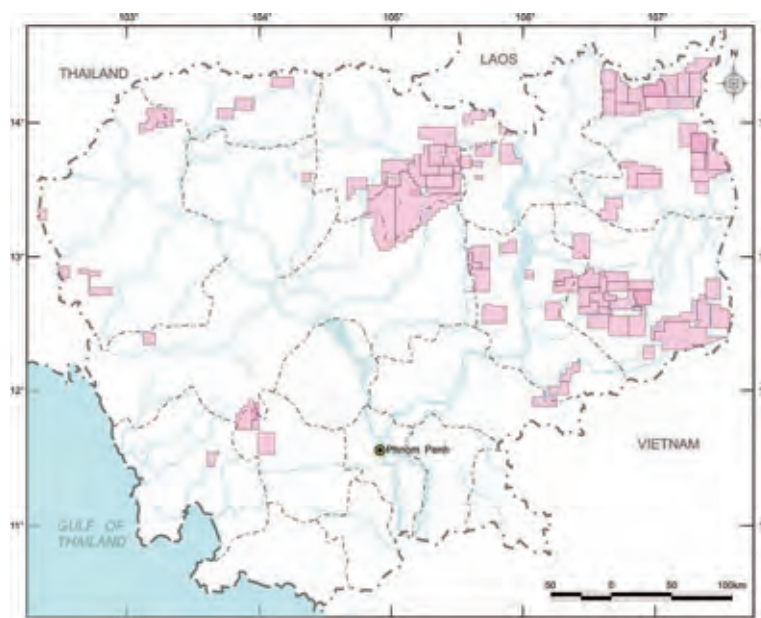
Cambodia's mineral resources are managed in three categories: metal mineral resources, nonmetal mineral resources, and construction materials. Nonmetal mineral resources include coal, gems, limestone, etc., and construction materials include stone (facing and dimension), marble, gravel, sand, aggregate, clay for bricks and tiles, etc. Mineral concessions are managed in two categories: metal/nonmetal mineral resources and construction materials.

Current legal mining production is carried out only for construction materials. Metal/nonmetal mineral resources are currently not legally exploited. Only 85% of companies extracting construction materials are registered. The current states of metal mineral concessions, illegal artisanal gold miners, and construction material mining are described here.

3.1.1 Activities in Metal Mineral Concessions

Sixteen iron deposits are concentrated mainly in the northern provinces, including Stung Treng, Preah Vihear, Oddar Mean Chey, and Battambang. Most of the deposits are skarn type of the late Triassic age and have an iron content of up to 68% in some places. Two bauxite deposits are known, in Battambang and Mondulkiiri. The more important deposit is that of Mondulkiiri, where lateritic bauxite with alumina grade varying from 25 to 35% covers large areas on the basaltic plateau. Base metals containing zinc, lead, copper, and other sulfide minerals are found in twelve places in various provinces. Gold is one of the main commodities of Cambodia. A total 19 gold deposits and occurrences are known in the country and 7 of them were discovered by chance by farmers during the gold rush of the 1980s.

There are various exploration activities in Cambodia, based on these mineral occurrences. As of January 2010, there were a total of about 100 concessions, which were owned by 50 companies. Fig.3.1 shows a map of metal concessions in the country.



(source: GDMR)

Fig.3.1 Map of Metal Concessions in Cambodia

This figure shows that concessions are concentrated in the northeastern part of the country. Nationalities of concessionaires include Cambodian, Chinese, Korean, Australian, Thai, and Japanese (participating in joint ventures). Targets are gold, iron, and base metals. Most of

these concessions are under exploration, and some companies have already found ore reserves and will begin production in the near future. By analyzing interviews 32 domestic and foreign private concession holding companies, the study team divided the companies into the following three groups:

Group 1: Large and small mining companies which are actively engaged in exploration, and intend to open mines if they find good deposits.

Group 2: Mainly junior companies which are actively engaged in exploration, but do not intend to open mines even if they find good deposits, because opening a mine requires a lot of investment.

Group 3: Small companies which do not have modern exploration technology, and intend to transfer concession rights and implement exploration jointly with junior companies.

The first and second groups have some comments and requests for the GDMR, and it seems to be important for the GDMR to address these comments and requests in order to promote more mining activities in Cambodia in the future. The comments and requests are as follows:

- a) Exploration agreements are not based on a global standard, and they are inconsistent, with conditions differing from company to company. Procedures for the MOU and agreements are variable by company.
- b) There is anxiety about concessions, because there is no guarantee of mining tenure.
- c) The basic geological infrastructure is insufficient. But, there is no other way for companies to begin with very basic surveys.
- d) It takes a long time to travel to sites because of insufficient transportation infrastructure.
- e) There are potential risks of UXBs and landmines at sites, and a great deal of money must be spent to detect and clear them.
- f) There is no coordination between the MIME, MoE, MAFF, customs office, etc.
- g) There are no experienced geologists and mining technicians/engineers in the country, so mining companies must hire staff from other countries. It might be difficult to open mines without good quality workers.
- h) The GDMR has not provided any incentives and assistance for mining development.
- i) Some mineral concessions sometimes overlap with other concessions for forestry, agriculture, etc.
- j) It takes a lot of time to explain the contents of exploration work to national, provincial, county, and community officials separately.
- k) Some companies want to export intermediate products, but the GDMR doesn't allow it.

3.1.2 Illegal Artisanal Gold Mining

In the late 1980s, more than 10 gold occurrences were found, and many farmers engaged in gold mining. As a result, gold rushes occurred in several districts of Cambodia. However, mining and processing skills were still primitive. Fig.3.2 shows principal illegal gold mining districts.

However, the gold grade of the placer deposits gradually decreased, and placer mining became unprofitable due to lower gold recovery through traditional panning. Mercury amalgamation was introduced into Cambodia from Vietnam. After several years, cyanide processing was also introduced to recover more gold from low-grade ore. With the introduction of new technology, underground mining with vertical shafts and horizontal drifts was begun 30m to 40m beneath the surface in addition to shallow placer mining. Even in this stage, mining operations were carried out individually without mechanization.

In these artisanal gold mining districts, the local environments were severely impacted by the lack of tailing dams and the improper treatment of toxic chemicals. In addition to the mine workers, residents of the broader local communities were also affected by these illegal mining activities.

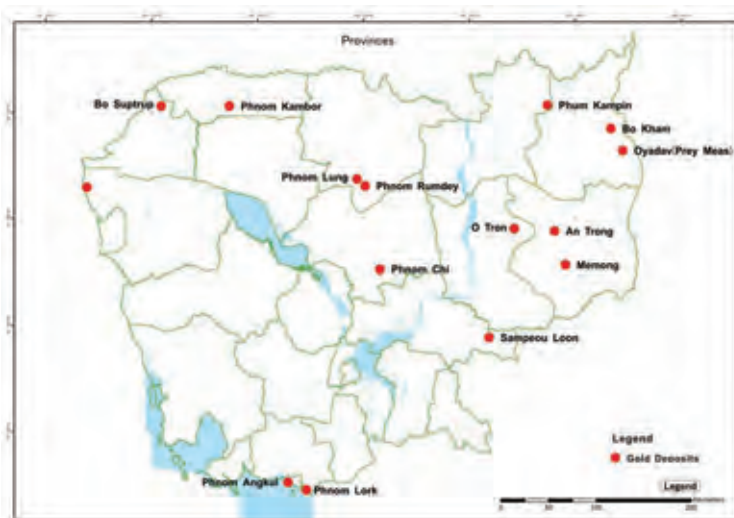


Fig.3.2 Main Illegal Gold Mining Districts (source: DoG)

3.1.3 Other Mining Activities

In the concession areas for construction materials and non-metal minerals, a total of 21 companies are engaged in mining and exploration activities for coal, limestone, gem, phosphate, and sand. The only sector that is currently operating under official license is the construction materials sector. The GDMR has collected and compiled production data for this sector since 2003, as shown in Fig.3.3. Production of construction materials has increased year after year due to large domestic demand accompanying the economic growth of Cambodia. Particularly, noteworthy is that production in 2007 was about 7 times that of 2006, which is an incredible jump.

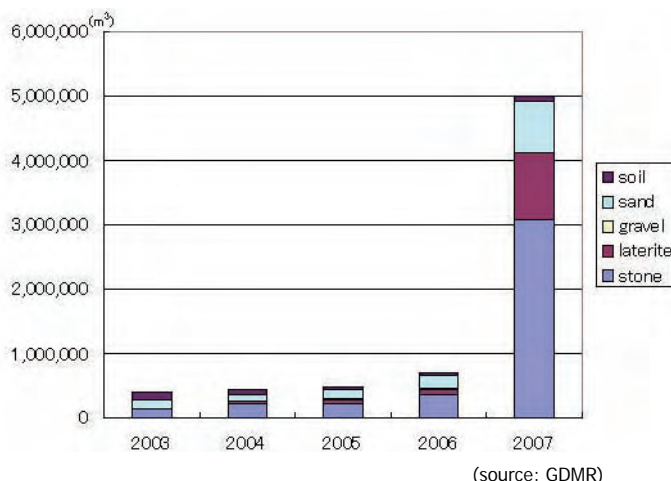


Fig.3.3 Production of Construction Materials in Cambodia (source: GDMR)

3.1.4 Inspection of the Concessions

Conditions were observed and assessed at metal exploration concessions and the concessions of four (4) construction materials companies (based in Singapore, Cambodia and Japan). The metal exploration concessions that were visited were owned by Sophorn Theary Peanich (Cambodia), Southern Gold (Australia), Sino Sun (China) and Steung Treng Mineral JV (Vietnam). Except for Sino Sun, they were all in the preliminary prospecting stage, and geological surveys, electric exploration, trenching and drilling work had been done. The chief issues common to the concession areas include: difficulty in accessing the concession areas (which are impossible to reach during the rainy season), trouble in coordinating mineral concessions with agricultural concessions, and the lack of mining experts (Table 3.1). The operations of the four construction material companies are summarized in Table 3.2.

Table 3.1 Summary of Metal Exploration Concessions

Name	Sophorn Theary	Southern Gold	Sino Sun	Steung Treng Mineral
Main business	crude rubber	Exploration	Excavation of natural resources	Exploration
Nationality	Cambodia	Australia	China	Vietnam
Capital	US\$ 2 million	4 million Riels	US\$ 2 million	US\$ 5 million
Concession	Acquired year	2008	2007~2008	2007
	Start year of exploration	2008	2007	2007
	Area	56km ²	1,638km ²	112km ²
	Remarks	70m length drillings	Soil analysis, trench, drillings	Scheduled produced ore in recent years
Location	Svay Siem Reap	Snoul Kratie, etc.,	Memot, Kampong Chan	Thalabarevat, Stung Treng
Type of license	exploration	exploration	exploration	exploration
Target mineral	gold	gold, non-ferrous metals	gold	iron
Employees	5	40 (only dry season)	130 (presently 2)	300 (maximum)
Current issue	absence of mining experts	UXBs, infrastructure	non	non
Request for GDMR	non	support to exploration companies	non	quick official procedure

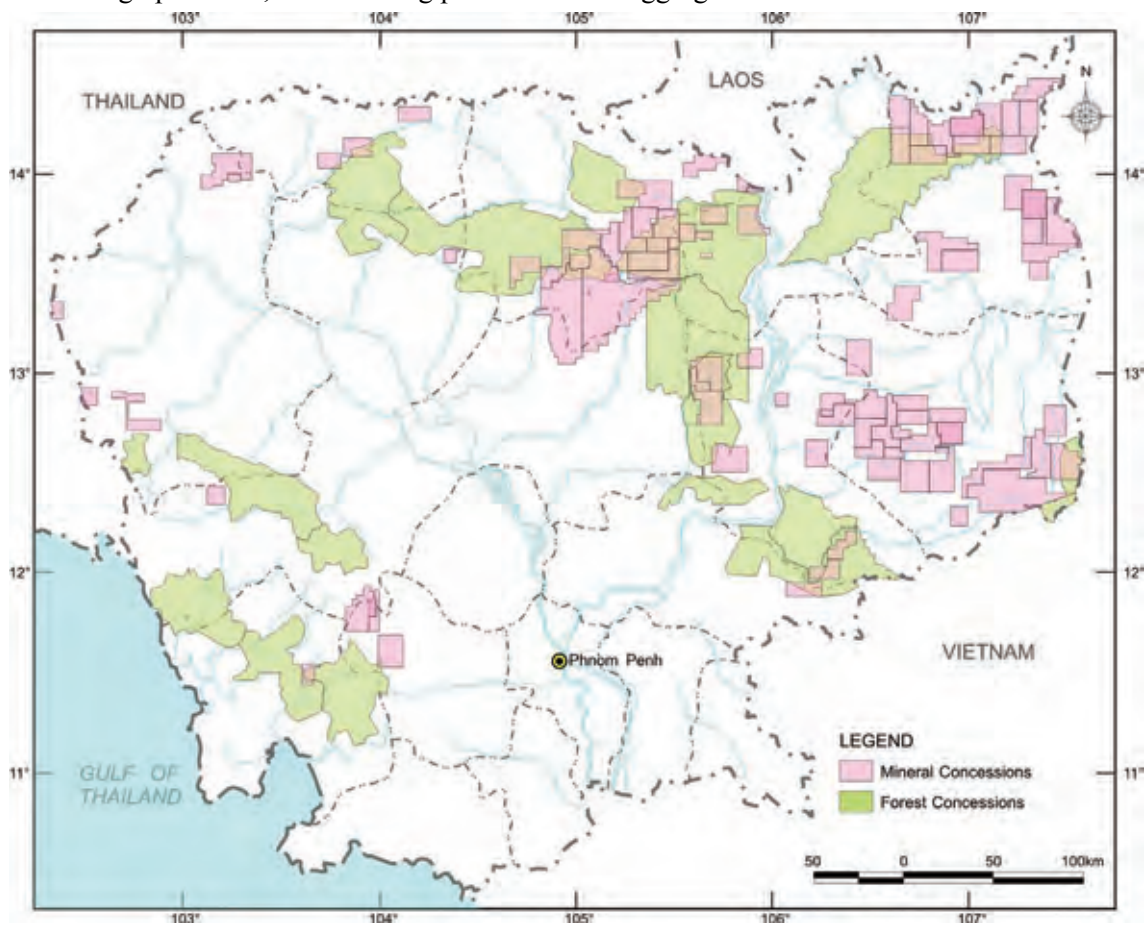
Table 3.2 Summary of Construction Materials Concessions

name	Swee Quarry, Cambodia	Taiwan Kamhwa	Ly Chhuong	World Kaihatu Kogyo	
main business	crushed rock	crushed rock	crushed rock	crushed rock	
nationality	JV of Singapore and Cambodia	Cambodia	cambodia	cambodia	
capital	US\$2million	US\$700,000	US\$500,000	ND	
concessions	attained	2006	1992	2006	
	production	2007	1007	2007	
	area	8ha	12.5km ²	6ha	ND
	note	started from the beginning	started from JV with Taiwanese co.	transferred from Penich co.	started from the beginning
location	Phnom Sam Bour, Kanpong Speu	same as left	Phnom Cheal, Kanpong Speu	Cha Quk Village, Kanpong Speu	
type of licese	exploitation	exploitation	exploitation	exploitation	
Kinds of products	5 kinds	5 kinds	4 kinds	3 kinds	
last production	105,000m ³	60,000m ³	101,000m ³	1,000m ³	
mining method	open pit with benches	open pit without bench	open pit without bench	open pit without bench	
mining machines	compressor (2), drill (2), backhoe (3) wheel loader (3), dump truck (8), wa	Drill (2), loader (2) backhoe (3) dump truck (7), generator (2)	drill (2), backhoe (2), dumptruck (4) generator (2)	drill (2), backhoe (2), loader (4), dump truck (3), generator	
processing machines	crushing plant (primary to tertiary)	crusing plant (primary to tertiary)	crushing plant (primary to forth)	2 sets crushing plants (1st to 2nd)	
last sales	US\$61,000(as of 2007)	ND	US\$180,000	ND	
kast cost	US\$60,000(as of 2007)	ND	US\$200,000	ND	
last profit	US\$1,000 (as of 2007)	ND	deficit	ND	
employees	Total 26	Total 30	Total 25	Total 36	
average salary	US\$40 to 155	US\$120	US\$65	US\$50 to 800	
last accidents	none	none	none	none	
environmental issues	none	none	none	none	
safety & envionmental m	Planting, spraying, protective tools	safety training, protective tools	planting, no needing safety training	safety training, protective tools	
current issues	they can sell only 1 product.	price is decreasing.	hard to expand marketing.	hard marketing, increased oil price.	
request for GDMR	none	hard to inform blasting to illegal residents. to decrease royalty and income tax	to support marketing.	need time to attain spareparts. none	

3.2 Mining Activities and Environmental Management

3.2.1 Forest Resource and Mining Activities

Fig.3.4 shows that many mineral concessions overlap forest concessions. If the logging ban is lifted in the future, this could cause problems. In addition, logging is necessary for mining operations, but obtaining permission for logging from the MAFF seems difficult.



(source: GDMR, MAFF)

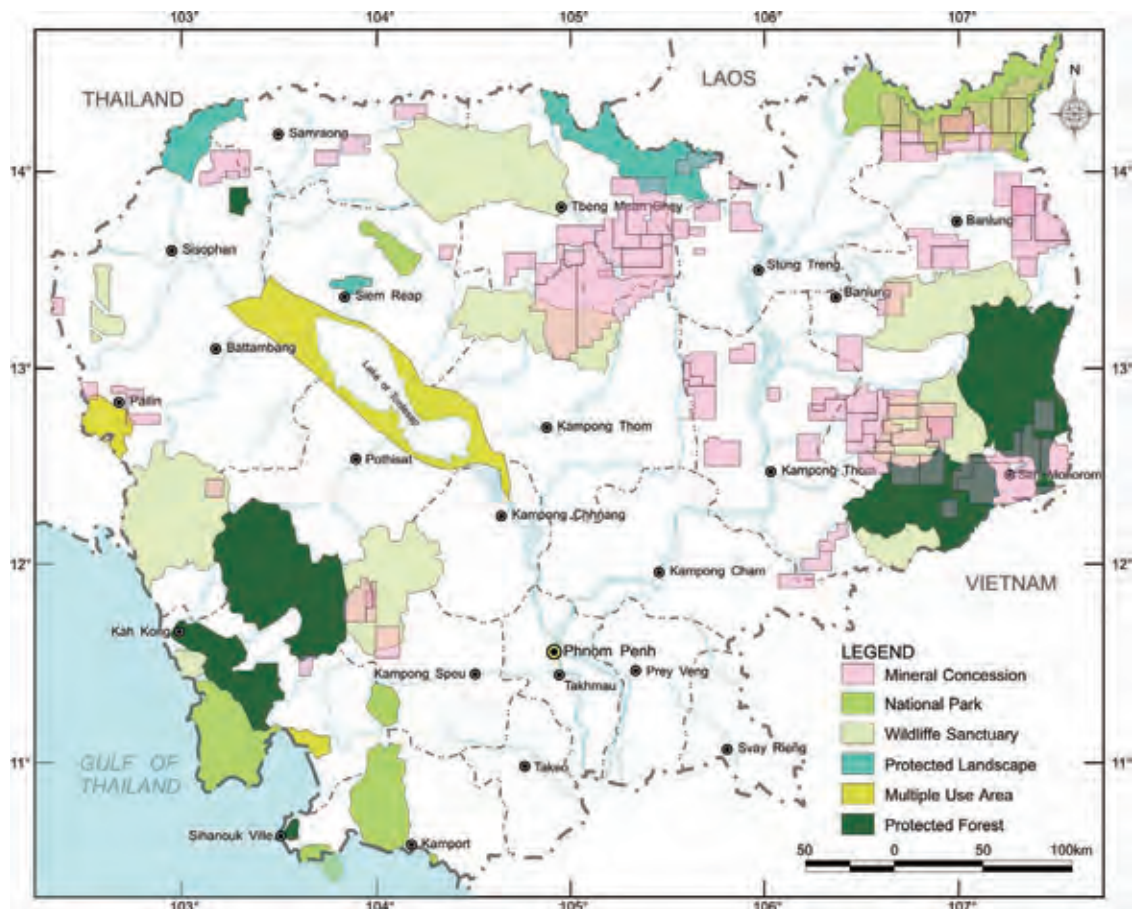
Fig.3.4 Forest Concessions and Mineral Concessions

There are many difficulties facing an exploration company's work. There may be other mineral concessions that overlap with Economical Land Concessions (ELCs), which impede smooth exploration. Exploration work, which is the first step in mining development, must be given free rein. Mining development is impossible without substantial ore deposits, and unlike other economic activities, such as agriculture, mining cannot be moved to another location. Therefore, the Cambodian government should determine its policy from a broader viewpoint to attain more positive economic development, particularly taking account of mining development.

3.2.2 Protected Areas and Mining Development

As mentioned above, mining development in protected areas is extremely difficult due to the newly promulgated Protection Law. Fig.3.5 shows a map of protected areas overlapped

with a map of concessions. Many concessions are located in protected areas, so future problems are expected.



(source: GDMR, MoE, and MAFF)

Fig.3.5 Protected Areas and Mineral Concessions

There are many mineral concessions in national parks and wildlife sanctuaries. As the current operations are in the exploration stage, their impacts on these protected areas are small and minor. However, if ore deposits are discovered and mines are opened in the future, it may be very difficult to mitigate the impacts on protected areas, even if an EIA has been done.

As in other countries, not many mining activities are allowed in protected areas where endangered species and other wildlife have their habitats. If some ore body were found after exploration, an EIA for exploitation would be needed to study the possibility of development.

3.2.3 Ethnic Minorities and Mining Activities

Fig.3.6 shows an ethnic minority distribution map overlapped with concessions. There are many concessions in areas inhabited by minorities. When mining activities begin on a large scale, problems such as involuntary relocation of inhabitants and forfeiture of livelihoods may occur. Groups like ethnic minorities are particularly vulnerable to the impacts of environmental and economic activities, and have little access to economic decision-making. Therefore,

appropriate consideration must be given to their situation.

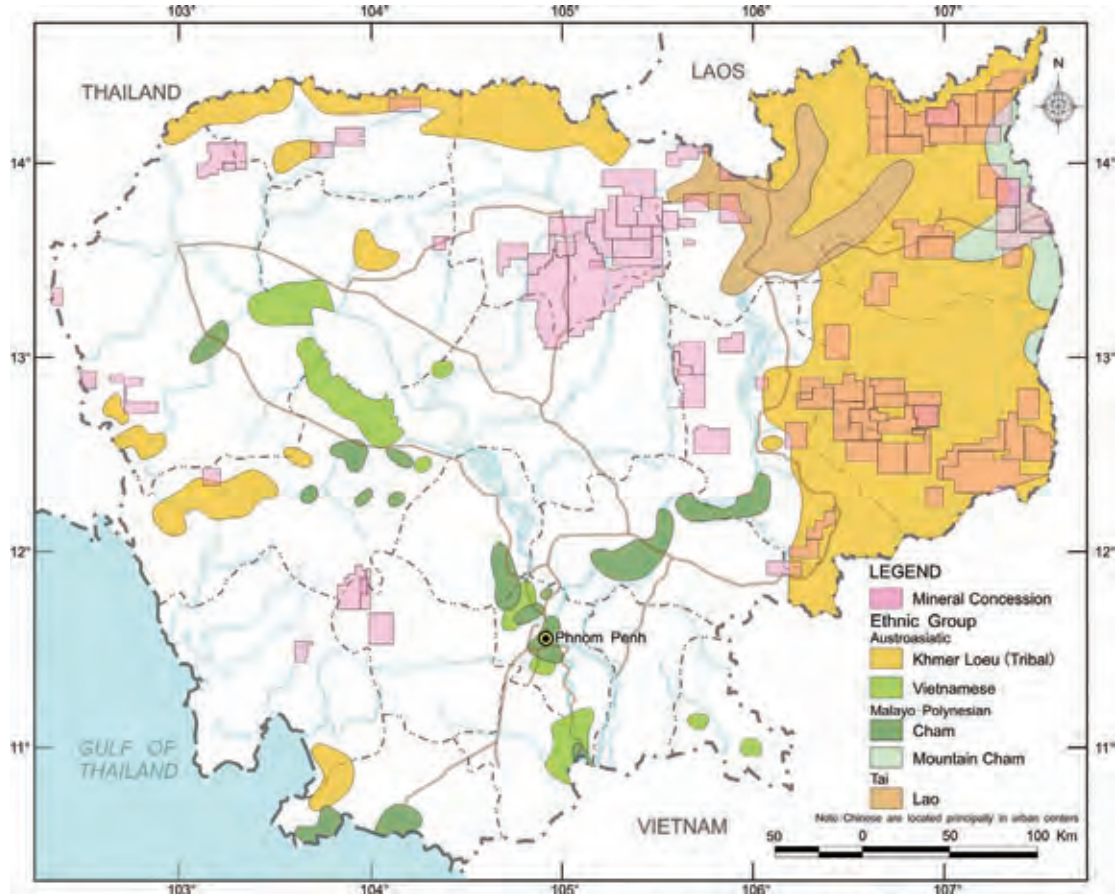
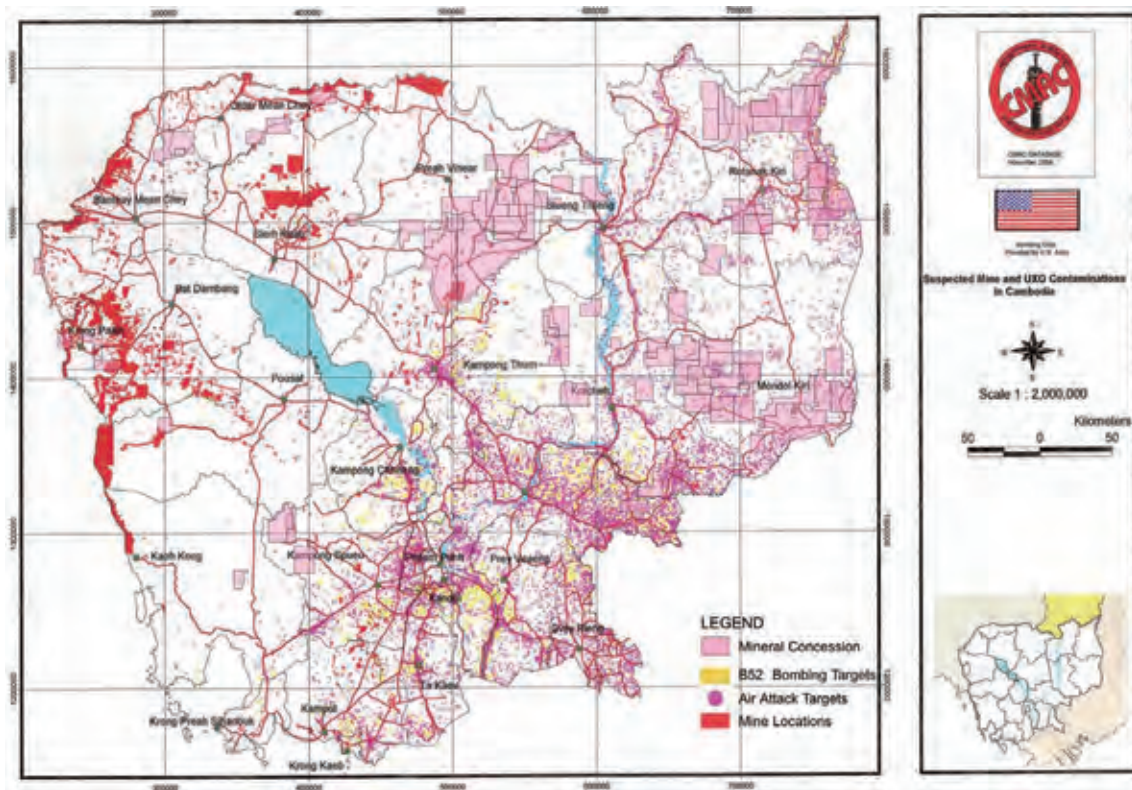


Fig.3.6 Ethnic Minorities and Mineral Concessions

3.2.4 UXBs & Landmines and Mining Activities

Fig.3.7 shows a map of possible UXBs and landmine locations overlapped with concessions. As UXBs and landmines are scattered throughout Cambodia, all concessions pose the risk of unexpected explosion. As a result, companies engaged in exploration must spend a great deal of money to detect these UXBs and landmines. Therefore, UXBs and landmines present a major disincentive for potential mining investors.



(source: GDMR, CMAC)

Fig.3.7 UXBs & Landmines and Mineral Concessions

3.2.5 Mining Activities by Artisanal Gold Miners

Regarding environmental contamination caused by the artisanal gold mining activities, there are following two countermeasures:

1) Illegal Artisanal Gold Mining Activities

The GDMR should know the exact operational status of artisanal mines, and if there are any problems, the GDMR should supervise them to minimize environmental impacts. The first step in understanding this issue is to get the exact information on artisanal operations, and for the GRMR to take the initiative in pushing this forward.

2) Environmental Contamination Issues

The exact conditions at contaminated sites should be ascertained through detailed surveys. Since each solution differs according to the extent and degree of contamination, and the seriousness of environmental damage, the state of contamination should be ascertained through scientific analysis of data on surface and underground water and soil samples collected from contaminated sites. In addition, workers, children, and others should be monitored in order to determine whether or not environmental contamination is having an adverse effect on human health.

3.3 EITI and Foreign & Domestic Investment in Mining Exploration and Development

As the Cambodia mining sector develops, and its Institutions, Mining Policy, Laws and Regulations are brought into conformity with global best practices, it will be a natural step to adopt the Extractive Industries Transparency Initiative (EITI) guidelines that form the basis for governance in the sector.

The following two tables evaluate a number of factors in Cambodia that are negative and positive in terms of investor perception.

Table 3.3 Cambodia – Negative Investment Factors

CATEGORY	NEGATIVE FACTORS	REMEDIAL ACTION
Geography & Climate	<ul style="list-style-type: none"> - Forested Mountain -High seasonal rainfall -Open borders difficult to patrol -Tropical climate creates health issues 	<ul style="list-style-type: none"> -Requires long term approach to planning and building new roads, bridges, possibly railways and drainage -Mining sector specialists need to train border police -Mining companies should be obliged to participate in local health education & care
Infrastructure	<ul style="list-style-type: none"> -Poor road network impassable in monsoon -Only railway is from capital to coast -Mekong un-navigable by large vessels -Power network incomplete -Poor fixed telecoms beyond cities -Few river bridges – long transit times 	<ul style="list-style-type: none"> - Plan and build roads, drainage, power grid, telecoms system, and bridges in areas of mining potential - Consider long term possibilities for Mekong navigation & coordinate with railway planning in mining areas
Institutions	<ul style="list-style-type: none"> -MIME has little autonomy -MIME capacity insufficient -Geological survey under-equipped and under-funded -Office facilities need upgrading -Organisation needs restructuring to redefine responsibilities, purpose & focus 	<ul style="list-style-type: none"> -Prepare MIME business plan to define responsibilities, purpose and focus -MIME needs to prepare a capacity and training plan -Refurbished premises & re-equipped premises are needed for geological survey
Safety	<ul style="list-style-type: none"> -Unexploded ordnance (UXO) prevalent -Criminal gangs can disrupt travel -Risk of harassment at borders 	<ul style="list-style-type: none"> -Focus UXO activity onto mineral potential areas -Improve policing and customs resources
Technology and labour skills	<ul style="list-style-type: none"> -No tradition of formal mining -Higher mining education was halted -Not yet enough mining related education 	<ul style="list-style-type: none"> -Build on the mining & geology capability in the Cambodia Technology Institute -Encourage more education exchanges for top students & establish degree level mining education courses at university
Information infrastructure	<ul style="list-style-type: none"> -Insufficient capacity to manage sector -Reporting systems are inadequate -Need for specific limits on time taken to deliver information to investors 	<ul style="list-style-type: none"> -Define needs of sector, especially reporting -Establish simple working procedures, practices & documents -Train users thoroughly -Phase in implementation after training
National development program	<ul style="list-style-type: none"> -Needs to be related to mining policy, strategy & prospects - Natural resources policy urgently needed 	<ul style="list-style-type: none"> -Reconsider the national plan to integrate mining needs. -Should mining be a priority?
Economic Policy	<ul style="list-style-type: none"> -Importance of sector potential should be better communicated -Must create a facility to allow Cambodian people to invest in sector -Investment promotion activity in mining sector is at a very low level. 	<ul style="list-style-type: none"> -Develop best and worst case forecasts and targets to improve sector performance -Focus investment promotion activity on best long term opportunities -Develop mechanisms to encourage local and international investment
Mining Tax regime	<ul style="list-style-type: none"> -Needs updating to allow for international trends in mining taxation policy -Needs to consider methods of collecting tax from small scale and artisanal miners -Taxes, Royalties and Duties structure needs to be thought through to establish long term stability and competitiveness. 	<ul style="list-style-type: none"> -Adapt or change tax regime to be highly competitive with similar jurisdictions -Slowly introduce taxation to the small-scale and artisanal sector. Use training, better pricing and incentives to achieve this -Modify the whole approach to Government revenue derived from mining taxes
Mining Policy	<ul style="list-style-type: none"> -Urgently required together with a linked strategy and complete overhaul of Mining Law and regulations 	<ul style="list-style-type: none"> -There needs to be significant focus on the potential of the sector -Senior administration officials need to be

		educated about the mining sector's potential for national revenue development
Mining Law	-Need to be oriented to encourage more foreign participation and joint ventures in sector	-Upgrade to latest international standards and best practices
Regulations	-Inadequate and unimplemented -Requires trained resources to implement	-Establish an inspectorate based at the GDMR -Train a corps of inspectors -Establish regional bases -Educate impacting organisations e.g. local and provincial government

Table 3.4 Cambodia – Positive Investment Factors

CATEGORY	POSITIVE FACTORS	COMPETITIVE ADVANTAGE
Geography & Climate	-Geography permits multiple dam construction -High seasonal rainfall -High average temperatures -Cambodia at base of Mekong region and offers access to maritime trade -Regional geology offers potential mineral occurrences	-Abundant cheap electric power -Modern mining uses much water, its abundance implies low cost supply -No heating of plant, workshops, or equipment needed -Potential for bulk river transport is high -Much unexplored territory encourages risk-taking subsidiary company investment
Infrastructure	-Low population density -Government can align development to mining sector needs	-Time to improve infrastructure is reduced & small local populations see benefits -Needs can be tuned to specific projects
Institutions	-MIME can be improved quickly -MIME staff are competent (but more specialists are needed) -Office and laboratory easily improvable	-Modernization of MIME will place it ahead of competing departments within the region -Improvement of laboratories will enable better internal control of operating companies -Office upgrade will improve efficiency
Safety	-Relatively low crime rate	-Reduces security costs
Technology and labour skills	-Large young population keen to work in technical industries -also keen on receiving graduate education	-Training is wanted & readily accepted -Cambodia Technical Institute is ready to offer earth science and mining courses
Information infrastructure	-The overhaul of this will enable implementation of a very efficient system	-Opportunity to help MIME formulate a rational reporting regime
National development program	-Can be educated about the importance of the mining sector during the current deep recession	-There are about two years during which the Cambodian mining sector may be prepared for Mining investment
Economic Policy	-Importance of sector is understood by some politicians and economists -Government is developing a market economy	-Investment promotion in mining is considered important by MIME administrators -Economy is becoming more market oriented
Law & Taxes	-Complete overhaul of Mining sector governance will permit introduction of best practices throughout the sector	-Two-year recession must be used to plan and implement a complete law and tax overhaul
Regulations	-By adopting international best practices, investors should be free from intrusive regulations	-Early bird investors should be able to guide the government on appropriate measures

Given that Cambodia offers a virtually unexplored geological terrain, it is clear that many companies considering the exploration potential have been deterred by some risk factors. These issues must be addressed in order to improve the mining investment climate in Cambodia.

Chapter 4 Organizational Reform and Capacity Building

4.1 Current Status of the Organization of the GDMR and its Issues

4.1.1 Current Status of the GDMR

(1) Overview of the GDMR

The functions of the GDMR are as follows:

- Conducts and manages geological and mineralogical development
- Disseminates and enhances geological and mineralogical information
- Encourages the exploration, for potential evaluation and exploration, of mineral resources, gravel, sand, and construction materials
- Conducts and enhances geological surveys

More specifically, the GDMR:

- works out strategies, policies, and plans for optimized development and utilization of mineral resources based on available geological information
- collects geological information on mineral resources and disseminates it to potential investors
- develops laws and regulations for fair and proper development and utilization of mineral resources in Cambodia
- issues licenses for exploration of mineral resources to investors
- issues licenses for exploitation of mineral resources to investors
- supervises and determines whether exploration and exploitation activities in Cambodia are fairly and properly executed by investors

(2) The Composition of the GDMR

The GDMR is composed of four departments. They are: the Department of Geology (DoG), the Department of Mineral Resources Development (DMRD), the Department of Mineral Resources (DMR) and the Department of Construction Material Resources (DCMR).

Table 4.1 shows the main fields and activities of the four departments.

Table 4.1 Characteristics and Activities of the Departments of the GDMR

Department	Main field	Activities	Inner organization	Remarks
DoG	Development	<ul style="list-style-type: none"> • Geological research • Exploration for geological research • Hydrogeology and Environmental Impact Evaluation 	<ul style="list-style-type: none"> • Map Construction Office • Geological Research Office • Geological Environment Office • Experimental Office 	<ul style="list-style-type: none"> • Key actor in GDMR's competitiveness
DMRD	Planning/ Control	<ul style="list-style-type: none"> • Formulating plans, strategies and programs • Evaluating investors' documents • Managing revenue for GDMR 	<ul style="list-style-type: none"> • Mineral Resource Development Office • Cooperation Office • Data Management Office • Revenue Office 	<ul style="list-style-type: none"> • Coordinating activities for the four departments (training needs, data management and international cooperation)
DMR	Customer management	<ul style="list-style-type: none"> • Supervision and inspection of investors' exploration and exploitation activities 	<ul style="list-style-type: none"> • Metallic Minerals Office • Non-Metallic Minerals Office • Gemstone and Coal Materials Office • Mining Inspection Office 	<ul style="list-style-type: none"> • Regulator of mining companies

DCMR	Customer management	• Supervision and inspection of investors' exploration and exploitation activities	• Crushed Stone Office • Sand Construction Office • Clay Construction Office • Administration Office	• Regulator of mining companies
------	---------------------	------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------	---------------------------------

(3) Changes in the Operations Environment

Exploration work is rapidly increasing year by year. The revenue from royalties from construction materials has been increasing in the past several years. The number of companies which pay royalties to the GDMR is increasing, and the nationalities of these companies are diversifying. Exploitation of metallic minerals is expected to increase mining operations.

4.1.2 Comments on the Current Situation

(1) An appropriate approach for the GDMR

- Expand its operations to meet increasing demands by customers
- Be a customer-friendly organization which can provide high quality service
- Be transparent to both customers and staff
- Create value for its customers

(2) Issues Faced by the GDMR

1) Constructing a more strategy-conscious organization for daily operations

The following two strategies are important.

- One is a strategy for maximum utilization of mineral resources in Cambodia through domestic consumption and export.
- The other is a strategy for how to invite quality investment, considering that mineral resources will eventually be depleted.

2) Strengthening flexibility to provide services which are necessitated by expansion of operations

In order to respond in a timely manner to the needs of operational expansion, it is necessary to increase the number of staff for current and new operations. To overcome these problems,

- the existing operational system should be streamlined
- some staff should be reassigned from their current position to a new position
- training of staff for new operational areas should be accelerated

3) Developing operations manuals for standardized operations and slim organizations

4) Strengthening the management systems for enhancing the quality of daily operations

The GDMR faces three problems in enhancing the quality of daily operations.

- Difficulties in communication
- Developing an IT system
- Much room for awareness of customer satisfaction

5) Designing operating systems which place high priority on capacity building for staff

6) Enhancing geological research capability

To engage in first-class research, two conditions must be met.

- First, it is imperative for researchers to have access to high-tech equipment that can

handle GIS and satellite analysis. However, the DoG cannot afford such equipment.

- Second, it is also necessary for researchers to be well trained in using such high-tech equipment. In this regard, staff at the DoG lacks opportunities for training due to budget constraints.

A new institute should be established as soon as possible. It will be necessary for the Cambodian government to ask their support for international cooperation.

4.1.3 Strategies for Solving Issues

(1) Clarification of Prioritized Areas and Allocation of Human Resources to these Areas

It is necessary to assign staff to strengthen the following areas.

1) Enrichment of overall strategic business planning for the GDMR

An office has been set up to integrate the strategic business plans prepared by each department into an overall strategic business plan. The main topics are as follows:

- Nationality and investment behavior of potential investors
- Potential minerals to be developed and their areal distribution
- Potential areas to be developed
- Prioritized R&D activities
- Human resources development
- International cooperation

The following is priority work to be done by the newly created planning section.

- Analysis of the factors underlying stagnant mining investment and measures to accelerate investment
- An address by the Director General of the GDMR to all staff regarding management policy

2) Development of new Laws and Regulations

It is necessary to develop new laws and regulations related to mine safety and environmental protection. Additional staff will be assigned to their development.

3) Environmental Impact Assessments

Demand for environmental impact assessments will increase.

4) Strengthening of Management Information Systems (MIS)

Plans call for assigning IT specialists to enhance the efficiency of daily operations at the GDMR and to introduce a computer system into management. Their job will be to construct a new MIS.

5) Assignment of a planning officer for personnel management

For capacity building of all the staff, a special officer is assigned. The officer's main duties are as follows:

- Develop personnel files for all staff members
- Ask all staff about their expectations for capacity development
- Develop a capacity building plan for all staff members

6) Public relations functions

The role of the public relations officer is to inform the Cambodian people about the kinds of mineral resources.

7) Coordinating functions

The newly assigned coordinating officer communicates with the MoE and other organizations.

8) New business development

The GDMR is a governmental organization, as well as a service organization for the mineral resources development industry. The following are some examples of their services:

- Consulting services for foreign investors in the mining sector
- Preparation and sales of maps and information related to mineral resources
- Lectures on mining and mineral resources development

9) Follow-up office

Follow-up officers check whether staff undertakes their work in line with internal regulations set forth in the operations manuals, as well whether they make best efforts for capacity building. Follow-ups are conducted once a year, and take around one month. The results of the follow-ups will be submitted to the DGMR. A summary of the results and recommendations will be given to the Director of each Department, as well.

(2) Restructuring of the DoG

The DoG will be updated through human and material resources. The following two improvements are important.

- Support of the DoG by international donors is sought, because the machinery and facilities they currently use are old-fashioned and insufficient. The equipment should be updated.
- Carrying out chemical analytical work with a newly equipped laboratory will result in a closer connection with the related departments.

(3) Creating a more efficient operations system that makes the best use of Human Resources

This issue is solved through efficient operations and enhancement of the current staff's motivation. Efficiency of operations is improved through the following.

- Preparation and use of operations manuals: streamlining and standardization of operations
- Introduction of MIS: quality improvement in operations
- Capacity building for each staff member: communication between a newly assigned planning officer for personnel management and staff

4.1.4 Resources for the Reforms

To implement the above reforms, it is necessary to secure two types of resources: 1) human resources, and 2) financial resources.

With respect to human resources, staff is required for three areas: management, customer service, and specialists in geology.

As for management staff, three sources seem to be available. The first is freshmen who are assigned by MIME to the GDMR every year. The second is to reassign staff members to new positions to increase the efficiency of operations. The third is to accommodate staff from international donor organizations.

In regards to financial resources, in addition to the MIME's budget, two sources are being sought. One is support from international organizations. In this case, the support would be limited to the acquisition and installation of special equipment. The other is a training budget which is provided by investors under the Mineral Agreement concluded between investors and the MIME.

4.2 Current Status and Issues with Capacity Building

4.2.1 Current Situation

Capacity building in the GDMR has two components. One benefits the staff of the DoG and the DMR. The other targets the entire staff of the GDMR.

With respect to capacity building for resource development, programs developed by international organizations or an on-the-job training (OJT) program should be available. With respect to capacity building for the entire staff, the GDMR has not developed a specific program.

Operations at the GDMR are currently undertaken by staff who studied geology and mining engineering at the Russian Institute of Technology. However, since the closing of that Institute, there is no organization in Cambodia which provides the necessary instruction in geology and mining engineering.

4.2.2 Current Status of Support for Capacity Development

(1) Past Examples of International Training of GDMR staff

Over the past several years, the GDMR has sent several staff members to China, Thailand, Japan, and elsewhere for training.

(2) International Training Plan at the GDMR

At present, two plans are under consideration. One is a course for improving English language proficiency in Australia. The other is a plan to take a training course in GIS technology, which would be administered by a private Cambodian company. Capacity building has been attempted in technical areas, but not in management.

(3) Higher Mining Education in Cambodia

Since 1964, the Institute of Technology of Cambodia (ITC) has provided higher education up to the graduate level. Within its rural engineering department, there are two courses: *Water Resources* and *Geo-Techniques*. The *Geo-Techniques* course includes cement excavation, water control, soil testing, and geologic structures & civil engineering, but there is no course or lectures on geology, mineral deposits, mining engineering, or mineral resources development.

4.2.3 Comments on the Current Situation: Issues and Countermeasures

Capacity building of staff will bear fruit only when the following 3 conditions are met: 1) the capabilities of individual staff members are strengthened, 2) the GDMR organization is strengthened, and 3) there is strong support from the Cambodian government.

(1) Capacity Building of Individual Staff Members

There are two ways for the GDMR to achieve this. One is to train them through daily operations at the GDMR, that is, through on-the-job training. The other is to send the staff members to some specialized training course outside of the GDMR, that is, off-the-job training. Needless to say, on-the-job training would be the preferred method.

Management people at the GDMR stressed that following areas are to be prioritized for training.

Department of Geology

- Geological survey skills for mapping
- Petrographic and mineralogical testing
- Application of geophysics to mineral exploration (Electric method)
- Advanced GIS
- Satellite image analyses

Department of Mineral Resources Development

- Mining policy
- Evaluation of mineral resources potential

Department of Mineral Resources and Department of Construction Material Resources

- Environmental management and engineering
- Mining management (Mineral economics and mineral tax regime)
- Mining management (Auditing accounts)
- Relationships and research (Advanced English)

(2) Strengthening the GDMR's Organization

1) Creating a "Good Organization"

- A strong guiding principle for the organization
- Performing tasks in accordance with the corporate philosophy
- Clearly defined responsibilities and duties of each staff member
- Smooth communication between top management and staff

2) Strong leadership

It is important to assign a new department person who pays attention to whether or not each staff member is working to their fullest capacity. A specialist in personnel matters at the proposed new Department of Administration and Planning would undertake this work.

3) Good communication

Close communication and regular meetings in the office will help staff to grow.

(3) Support from the Government

The government should send a message of strong commitment to mineral resources development to the Cambodian people, and back up the MIME, especially.

Chapter 5 Geology and Mineral Resources

5.1 Present State of Information on Geology and Mineral Resources

Geological maps of 1:200,000 in scale and explanatory booklets were published by the French BRGM (Bureau des Recherches Geologiques et Minieres) in 1972 and 1973. All 1:200,000 geological maps were digitized, and a 1:500,000 geological map was compiled based on the 1:200,000 maps.

Table 5.1 Existing Documents on Geology and Mineral Resources in Cambodia

TITLE	SCALE	YEAR	EDITOR	NOTE
Geological maps and notes in French	1:200,000	1972 - 1973	BRGM	14 sheets cover whole territory
Geology of Kampuchea, Laos and Vietnam	1:1,000,000	1991	Geological Survey of Vietnam	2 nd Edition is available
Atlas of the Geological Resources of the ESCAP Region	1:500,000	1993	ESCAP	Geology and Mineral Resources
Mineral deposits in Cambodia	Booklet only	1999	GDMR	No attached map
Geological Map of Cambodia	1:1,000,000	2003	GDMR	Digital version

BRGM: Bureau of Geological and Mining Research

ESCAP: Economic and Social Commission for Asia and the Pacific

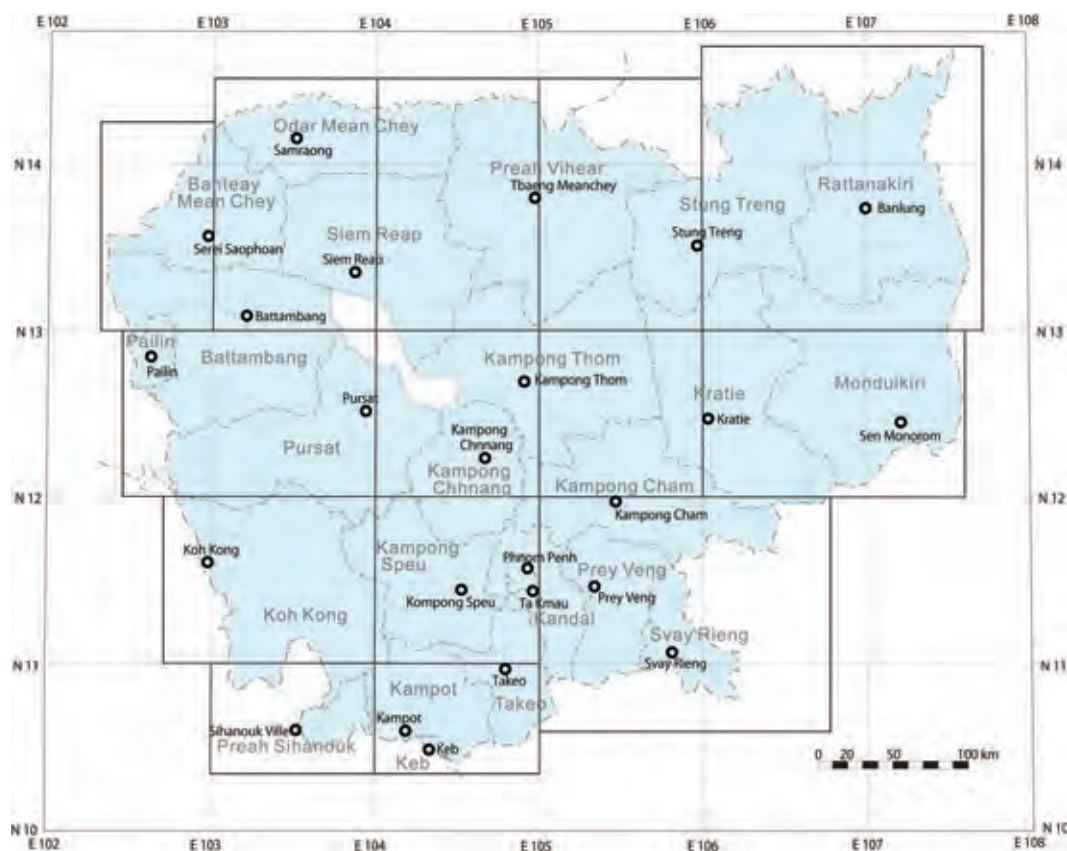


Fig.5.1 Index Map of Existing Geological Maps

Geological surveys and mineral exploration have been conducted by private sector companies, but their results are not disclosed. Information on mineral resources that has been published since the release of the ESCAP atlas include GDMR's 1:750,000 mineral resource map and the 1999 booklet, and the partly revised 1:200,000 geological maps mentioned above. Obtainable primary documents are listed in Table 5.1, and an index map of existing geological maps is shown in Fig. 5.1.

5.2 Geology and Mineral Resources of Cambodia

5.2.1 Geology and Tectonic Setting

Cambodia is divided into three geological regions. They are the Northeast (NE), the Middle and the Southwest (SW) regions. The NE and SW regions are comprised of metamorphic, sedimentary, volcanic and intrusive rocks dating from the Precambrian and Mesozoic as basement, plateau basalt and soft sediments of the Neogene and Quaternary. The Middle region is the Tonle Sap – Mekong Plain, widely covered with Quaternary sediments with isolated hills of basement rocks. Paleogene features are occasionally seen on the surface. A geological map of the country is shown in Fig.5.2. Information on stratigraphy and mineralization is compiled in Table 5.2.

5.2.2 Mineralization

Metallic mineral resources of Cambodia include antimony, chromium, iron, manganese, molybdenum, tungsten, aluminum, copper, lead, zinc, tin and gold. Rare earth elements have not been found. Mineralization of these minerals was accompanied by igneous activities (e.g. intrusion of granitoids and basalt extrusion). The Late Triassic – Jurassic mineralization in the NE region is the most dominant (Table 5.2). The Neogene – Quaternary erosion of primary deposits created small-scale placer gold or tin deposits. Intensive erosion and deposition occurred during the Indosinian era and the Cretaceous, but no placer deposits from this era have been discovered yet.

Bauxite deposits were formed by weathering of the Neogene – Quaternary basalt. Corundum, Zircon and Garnet crystals were blown out with basalt eruption, and deposited in tuff beds. The tuff beds are the source of placer gems. Distribution of mineral deposits and occurrences is shown in Fig.5.3.

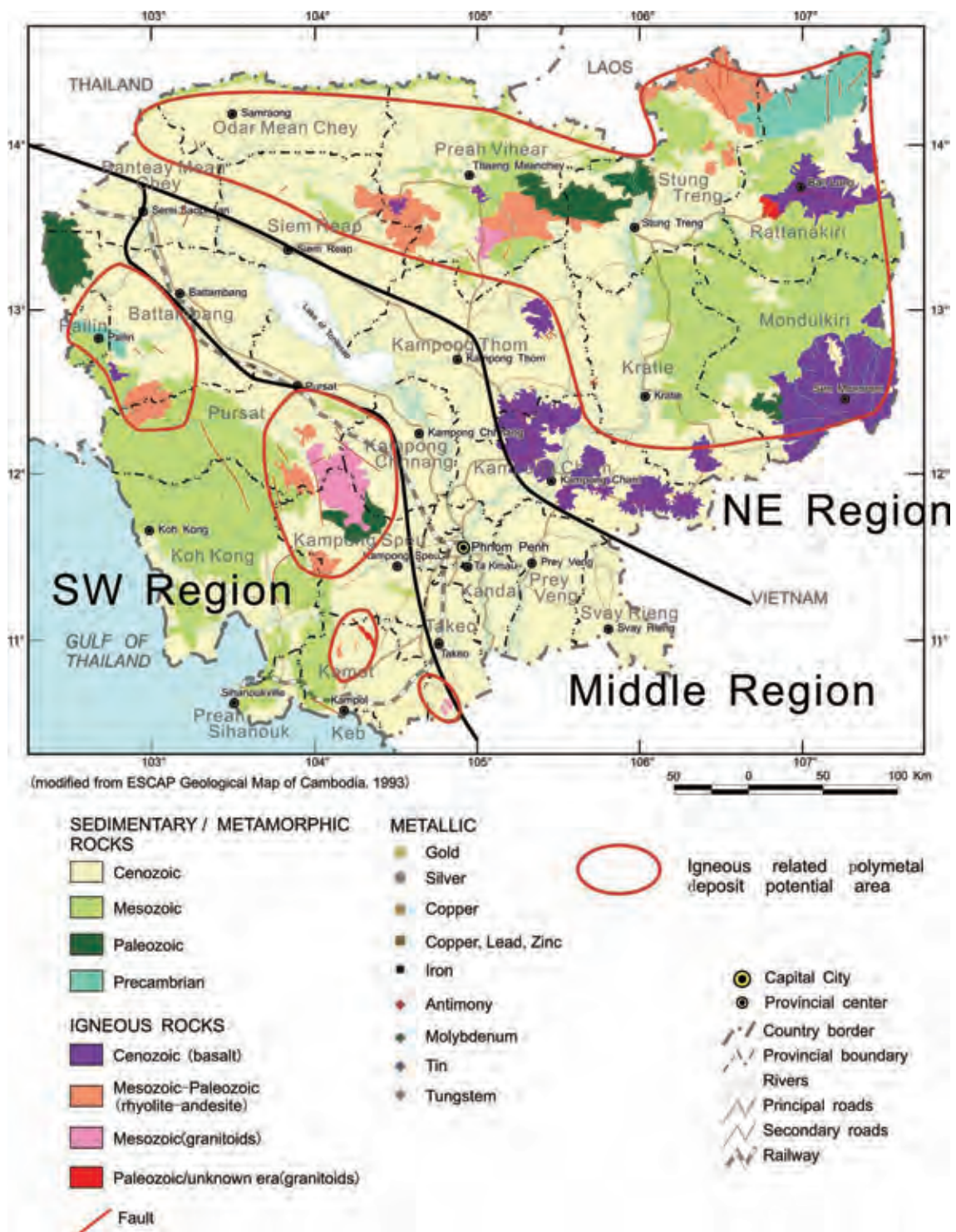


Fig.5.2 Geological Map of Cambodia

Table 5.2 Geology and Mineralization of Cambodia

Period	Age Ma	Sedimentary formation	Tectonic Event	Igneous Activity	Mineralization / Deposition	
Cenozoic	Holocene	Fluvial, lacustrine, shallow sea (silt, sand, clay)	Alpine	Basalt (0.7 Ma)	Placer, Residual	
	Pleistocene	Terrace (pebble, sand, clay) Fluvial, marine (sand, silt, claystone) -Basalt-		Plateau basalt (1.77 - 2.6 Ma) (Ratanakiri, Mondulakiri, Kampong Cham, Preah Vihear, Pailin, Pursat, Koh Kong)		
Mesozoic	Neogene	Coastal plain, "Old Alluvium", lateritized (claystone, siltstone, conglomerate) -Basalt-	Indosinian	High alumina granite (Ba Phnom), Granite (Phnom Bayang) Gabbro, diorite (Bamnak)	Contact metasomatic Hydrothermal Porphyry Paler, Residual	
	Pliocene	Continental, subhorizontal highlands, -volcanics- sandstone, siltstone, conglomerate, red sandstone, -andesite, rhyolite, dacite--)		Rhyolite (west & north region) Andesite (Kratie, Stung Treng) Diorite-granodiorite (172Ma) (Kchnol Khnong Ay, Phnom Lung, Klek Klak, Snouli, Kdol, O Ochhung)		
	Cretaceous	Continental, lagunal, near shore, "Red terrain" (red sandstone, siltstone, claystone, conglomerate, green sandstone, limestone, calcareous sandstone, rhyolite pebble)		Granite (Bokham 227 Ma, & NE region) Gabbro, diorite (Stung Treng, Ratanakiri) Rhyolite (Tani, Kep) Andesite (Preah Vihear)		
	Upper Jurassic	Subcontinental, paralic sandy shale, calcareous sandstone, marl, microbreccia, shale, -rhyolitic tuff--)		Caledonian		Granite, diorite (Preah massif, Pailin, Bokham) Rhyolite (Preah massif)
	Middle - Lower Jurassic	Epicontinental sandstone, shale, fossiliferous limestone, -andesite, trachyte--)				
Paleozoic	Triassic	Strongly folded sandstone, shale, jasper, radiolarite, marl, conglomerate, limestone)	Caledonian	Granite, diorite (Ratanakiri, Pailin, Preah massif)		
	Permian	Schists, metamorphosed quartzite, -rhyolite-				
	Carboniferous	Gneiss, pyroxenite, amphybolite, -gneissose plutonic rocks (granite, diorite, gabbro)-				
Paleozoic	Devonian		Caledonian	Granite, diorite (Ratanakiri, Pailin, Preah massif)		
	Silurian					
Paleozoic	Ordovician		Caledonian	Granite, diorite (Ratanakiri, Pailin, Preah massif)		
	Cambrian					
Precambrian	542					

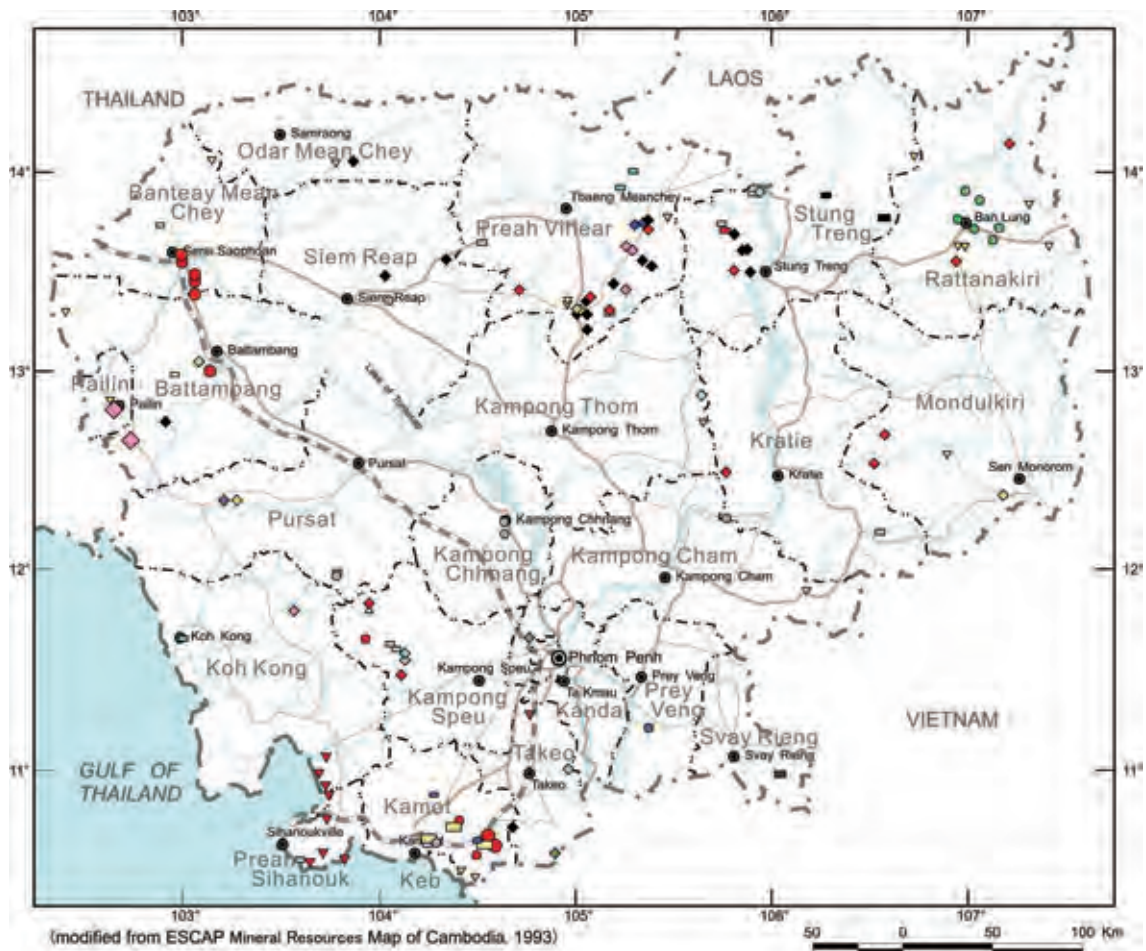


Fig.5.3 Mineral Deposits and Occurrences of Cambodia

5.3 Satellite Image Analysis

5.3.1 Utilized Data and Processing

Roughly 66% of Cambodia is covered by forest, and outcrops are limited. In addition, there is a rainy season, and it is difficult to get satellite images of the whole country because there are few relatively cloudless days. For the present analysis we attempted to acquire ASTER images for nearly the entire country that were obtained on days of 20% or less cloud cover.

An overview of the newly purchased satellite images is shown in Table 5.3. Scenes from ASTER109 and PALSAR28 were subjected to mosaic processing. ASTER false color images, DEM shaded relief maps, and PALSAR radar images are shown in Figs.5.4, 5.5 and 5.6, respectively.

Table 5.3 Overview of Satellite Images Purchased for This Project

Sensor name	No. of scenes	Product	No. of bands	Processing level	Resolution (m)	Notes
ASTER	109	VNIR,SWIR,TIR	14	3A01	15,30,90	EOS Advanced Spaceborne Thermal Emission and Reflection Radiometer format
ASTER	109	DEM	-	3A01	15	EOS Advanced Spaceborne Thermal Emission and Reflection Radiometer format
ALOS PALSAR	8	HH	1	1.5	5~50	Radarsat CEOS radar format
ALOS PALSAR	20	HH & HV	2	1.5	5~50	Radarsat CEOS radar format

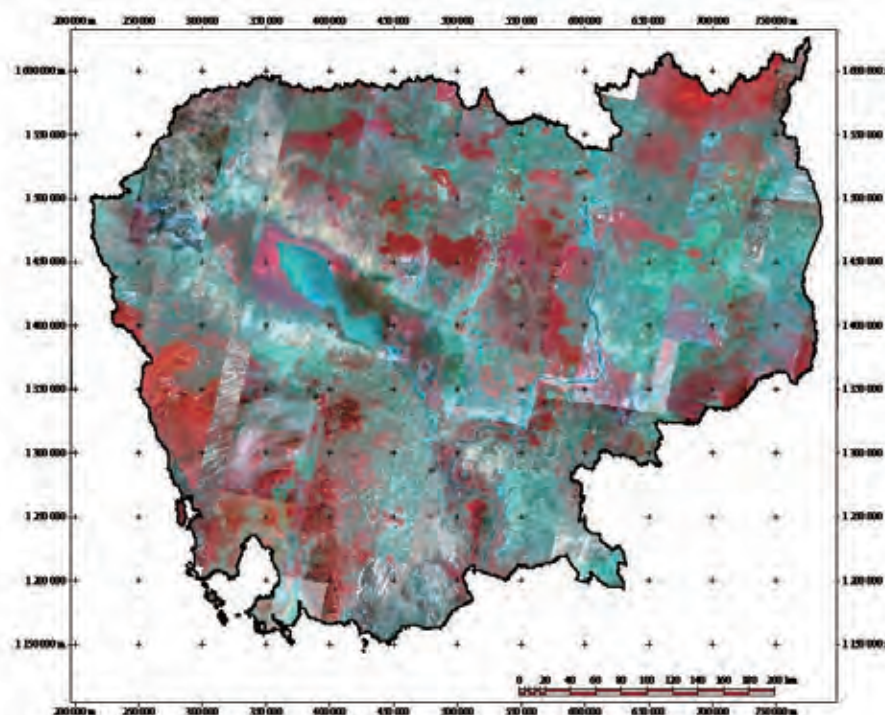


Fig.5.4 ASTER False Color Images (RGB=VNIR3,2,1)

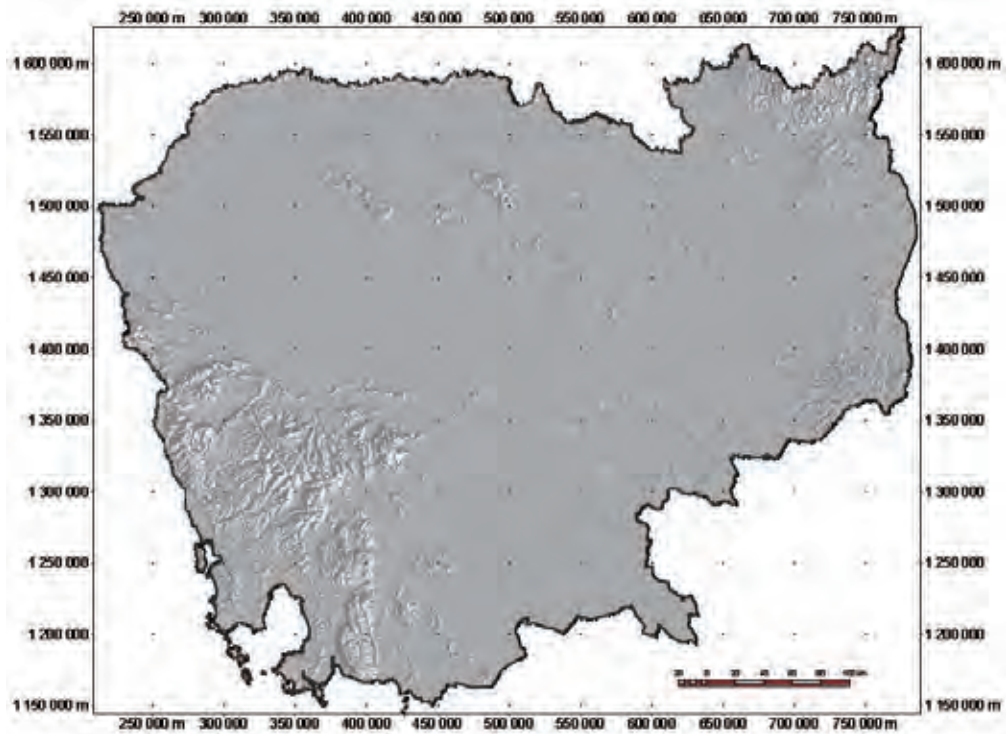


Fig.5.5 DEM Images Based on ASTER (grid size: 30m)

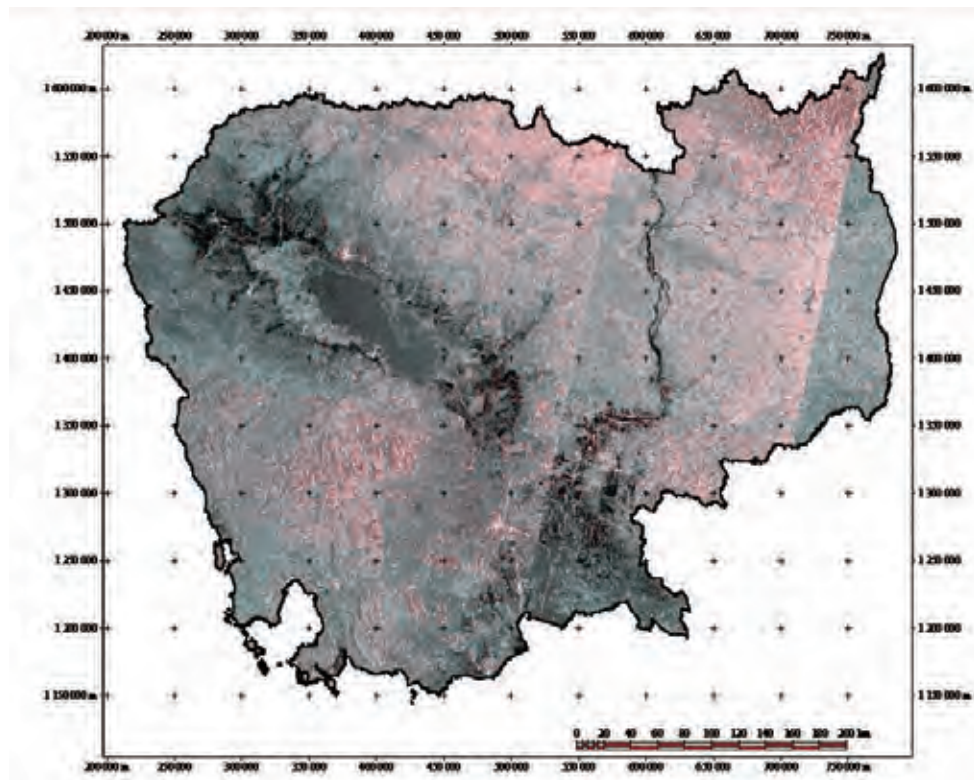


Fig.5.6 PALSAR Radar Image (HH polarization)

5.3.2 Image Analysis

Geological data indicate that deposits in Cambodia have often been formed by alteration processes that accompany rock intrusion. Therefore, we attempted to identify promising areas by analyzing the distribution of igneous, intrusive, and other types of rock from images.

In order to investigate deposits and tropical rainforest vegetation from satellite images, we selected the Sepon Mine in Laos as a training site, and analyzed images from the vicinity of the mine. The information that was obtained therefrom was applied to satellite image analysis of Cambodia.

(1) Method for identifying promising areas

An overview of the method for identifying promising areas is shown in Figure 5.7. The analysis was conducted in the following order:

- 1) Confirm the state of vegetation
- 2) In areas around deposits that were not heavily vegetated, promising areas were identified from spectral analysis using all ASTER bands.
- 3) In areas around deposits that were heavily vegetated, promising areas were narrowed down using a combination of ASTER TIR band analysis, topographical characteristic analysis, and geological interpretations of radar images.

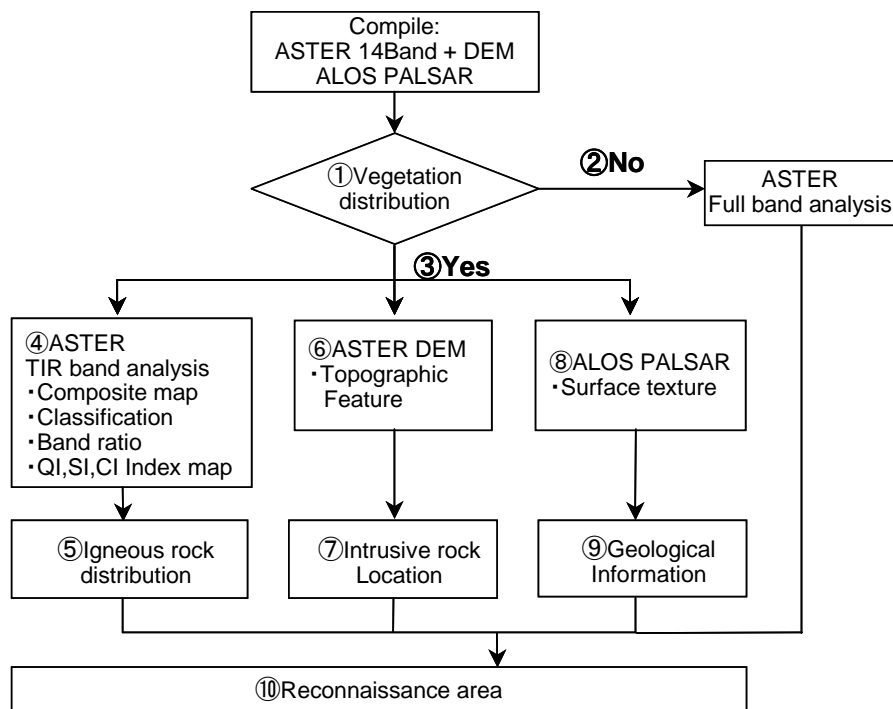


Fig.5.7 Flow Chart of the Method for Identifying Promising Areas

- 4) & 5) The distribution of igneous rocks was determined from composite images made using TIR band data, automatic class separation, and Ninomiya et al's (2002) Quartz Index (QI), Carbonate Index (CI), and SiO₂ content Index (SI).

- 6) & 7) Topographical characteristics were quantified and analyzed using DEM data to determine the locations of intrusive rock.
- 8) & 9) Textural changes in radar images were used as materials for geological interpretation.
- 10) Promising areas were identified using the results of 4) to 9).

(2) Verification of the area around the Sepon Mine in Laos

Fig.5.8 shows the location of the Sepon Mine in Laos. Gold and copper deposits in this mine were formed by association with intrusive rock (copper reserves of 14.8 million tons with 4.9% Cu, and gold reserves of 3.9 million tons with 1.6 g/t Au). In the ASTER color composite images (RGB=3,4,5), we can see that there is much vegetation cover, which is shown in red, around the mine. Therefore, starting with Step 3) in (1) above, an analysis was made of the Sepon Mine.



(Source: Oxiana's HP)

The results were as follows:

Fig.5.8 Location of the Sepon Mine, Laos

- a) We were able to learn much about the distribution of igneous rock using the composite map compiled with all three indexes (QI,CI,SI).b
- b) We could interpret areas of igneous rock based on topographic features of DEM.

Analyses in a) and b) led to the identification of intrusive rock. Areas where the SI index was high were selected as candidates for promising areas.

(3) Satellite image analysis of Cambodia

Following the procedure in (1), 109 ASTER images, and 28 ALOS PALSAR images were used. Results from image analysis were analyzed for the entire country of Cambodia, topographic feature analysis was conducted based on DEM, and ground conditions were determined based on ASTER images. Survey results were combined with previously existing materials and promising ore distributions centering on igneous rock distributions were estimated.

Existing geological images were combined with ASTER images, and a map of igneous rock distribution (Fig.5.9) was created. These images show that igneous rock is largely distributed in the geological protrusion areas of the DEM images, and the other areas are mostly sandstone. Since the DEM images even show terrain with penetrating rocks in places covered by quaternary formations, it's possible that there are also igneous rock distributions in places where the penetration can't be confirmed on the surface.

Also, to understand the actual conditions at places where it's difficult to judge by the images, areas for ground truth were determined. Ten of these areas were then reanalyzed using additional ground data. Fig.5.10 shows an example of analysis results for the province of Takeo on the Vietnamese border. The upper left shows a composite image of the oxidized iron index and the existing igneous rock distribution (in magenta), and the upper right shows a composite

image of the oxidized iron index and DEM. In the images indicating oxidized iron, the 4/3 band ratio is shown in green and white (circled in red). The on-site photos below show exposed granite and little vegetation. The results of the field survey and oxidized iron indicators give us a picture of the actual geological conditions at the site.

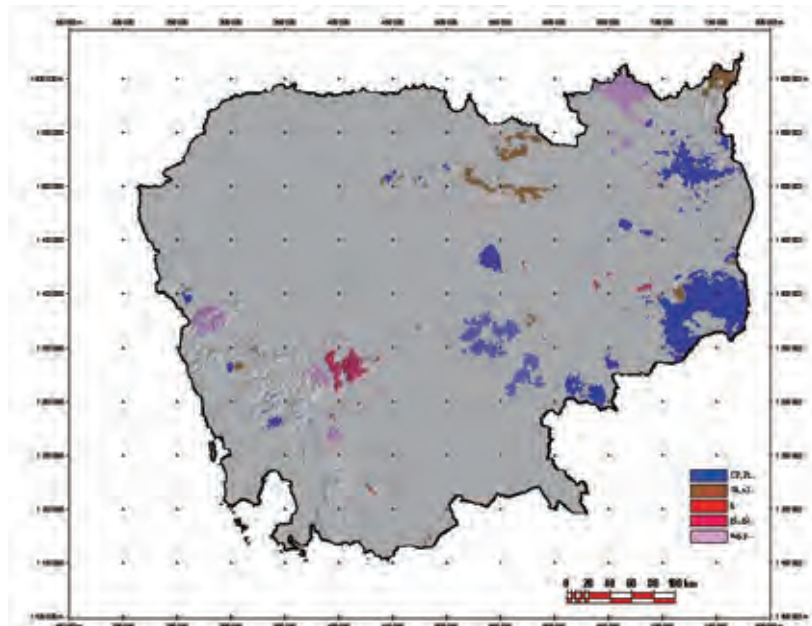


Fig.5.9 Distribution of Igneous Rocks
(This image shows igneous rock distribution juxtaposed on a DEM image.)

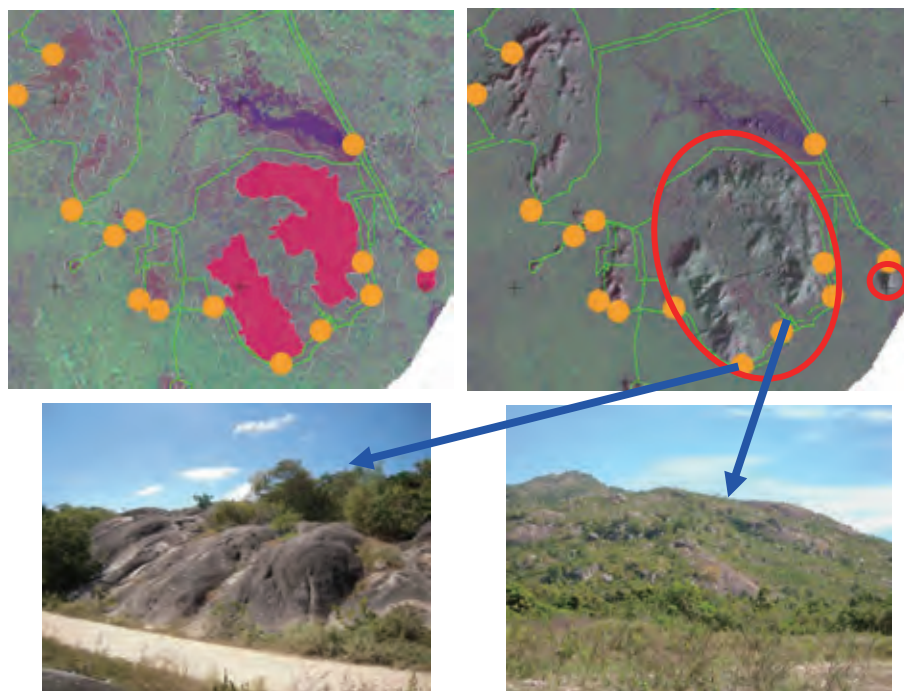


Fig.5.10 Composite Image of Oxidized Iron Distribution (RGB = 4/7 4/3 2/1)
 ● Sampling points — Ground truth routes

It is still necessary to choose the applicable imaging and analysis methods for each target area, taking geological features and vegetation into consideration, but by adding the ground truth results, we were able to conduct satellite image analysis that is more accurate for selecting mineral resources potential areas in Cambodia.

5.4 Potential for Mineral Resources

Despite the insufficient level of exploration, it is known that there are many mineral deposits and occurrences in Cambodia. They include antimony, chromium, iron, manganese, molybdenum, tungsten, aluminium, copper, lead, zinc, tin and gold as metallic minerals; limestone, sandstone, silica sand, phosphate and other rocks or sediments as industrial materials; and gemstones like ruby. The number of known metallic deposits and occurrences is 26 for iron and ferro-alloy metals, 15 for base metals, and 21 for gold.

Most deposits and occurrences have been covered with tenement holdings by private companies, and exploration projects are in progress. Private exploration work is still mostly at the drilling survey stage or surface survey including geochemical survey or trenching. Some examples are as follows.

- Trenching at the Phnom Khtong tenement holding of Southern Gold in Kratie province shows 32 meters in width at 2.4g/t or 4 meters in width at 15.8 g/t of gold.
(Southern Gold Limited's website;
http://www.southerngold.com.au/cambodia_projects.php)
- Trenching at the Okvau tenement of OZ Minerals in Mondulukiri province shows 14 m at 6.5 g/t of gold.
(OZ Minerals Limited's website;
<http://www.ozminerals.com/Operations/Exploration.html>)

Most metallic mineral deposits of Cambodia were formed by igneous activities, so mineral occurrences on the surface will extend underground and have the potential to be larger, deeper deposits.

5.4.1 Identification of Potential Mineralization Areas

The following are deposit types that likely exist in Cambodia.

- The NE region: mainly Mesozoic terrestrial sandstone, mudstone, limestone, many small Jurassic granodiorite stocks, Cenozoic plateau basalt, partly Precambrian and Paleozoic metamorphic rocks
 - > Igneous-related Au-poly metal veins / metasomatic / hydrothermal / porphyry, Mississippi valley type, U in terrestrial sandstone
- The Middle region: Quaternary cover
 - > Blind deposits (Igneous-related Au-poly metal veins / metasomatic / hydrothermal / porphyry), sedimentary industrial materials (e.g. clay)
- The SW region: mainly Mesozoic terrestrial sandstone, mudstone, Triassic or Post Triassic granodiorite batholiths and stocks, partly Precambrian and Paleozoic metamorphic rocks
 - > Igneous-related veins / hydrothermal /, U in terrestrial sandstone, sedimentary industrial materials (e.g. silica sand)

5.4.2 Geological Survey Plan

Potential areas for discovering igneous bodies are shown in Fig. 5.2. In many parts of these areas, the distribution of basement rocks and igneous rocks is still relatively unclear due to the cover of Neogene – Quaternary sediments. Basement rock structures under the cover sediment are seen as micro topographies on a newly processed Satellite DEM image. Site survey areas were selected by identifying possible areas of igneous rock distribution in the image.

5.5 Results of Geological Survey

The results of the geological survey can be summarized as follows and are listed in Table 5.4.

- In the potential areas identified based on existing documents and satellite image analysis, some occurrences that suggested possible mineralization were identified (see Table 5.4). Further field surveys around those occurrences are expected to confirm whether or not there is mineralization.

➤

Un-surveyed areas due to bad road conditions, etc., were as follows.

- (1) Cardamom Mountains
- (2) Virachey National Park
- (3) Boundary area between Rattanakiri province and Mondulakiri province
- (4) Boundary area between Kratie province and Kompong Thom province
- (5) Eastern slope of the Cardamom Mountains in Pursat province and Kompong Speu province

(1) and (2) have not been surveyed since the independence of Cambodia, no motorable road so far. Most of (2) has been registered as a private company's tenement. (3), (4) and (5) have also been identified as potential areas. These areas are future exploration targets.

Table 5.4 Results of Geological Survey

No.	Reconnaissance	Detailed survey	Accessibility
1	Andesite distribution has been known. A few sporadic metallic minerals have been observed in andesite or silicified sedimentary rock.	Three hills located in this area of 5km (E-W) by 2km (N-S). Small pyrites occur in all of those hills. Assay results of rocks show no anomalous values.	Comparatively good. 30 km N of Prey Moan on the N6 road between Serei Saophoan and Siem Reap.
2	This site is located at the western margin of known occurrences of gold, copper and iron accompanied by intrusives, andesite and basalt. Silicified and sericitic altered volcanic rock has been observed. This suggests the possibility of mineralization.	Small sphalerites and pyrites occur in silicified lapilli tuff. Assay results of those rocks show Au content of 0.038 ppm and S content of 0.36 %.	Comparatively good. 50 km NE of Dam Daek on the N6 road.
3	Isolated hills indicate hidden igneous rocks. Silicified rock with limonite gossan was observed at the foot of a hill.	(Detailed survey has not been done due to a lack of outcrops. Assay results of samples taken during the reconnaissance show no anomalous values.)	Comparatively good. 40 km NE of Yeay Tleng on the N71 road.
4	Peripheral area of antimonite occurrence related to rhyolite body. Serpentinite was observed in a company's exploration trench. There is a huge variety of igneous activity in this area.		Comparatively good. 80 km WSW of Pursat on the N5 road. The site area is a mine field.
5	Granite batholith is homogeneous and fresh, no mineralization was observed. The area has more granitic bodies, and they are future exploration targets.		Difficult. 45 km W of Ou Ruessei on the N5 road, which is in bad condition.
6	Small bodies of granites and rhyolites are located near a known Cu-Pb-Zn deposit. The deposit is a company's tenement. The surrounding area is future exploration target.		Comparatively good. 40 km WSW from Kompong Speu.
7	In a road side pit (5m x 45m), argillized rock with limonite gossan is observed. Granites distributions have been known in surrounding area.	No outcrop other than the pit. Argillized sandstone from the pit shows Cu content of 383 ppm. An igneous rock hill is located 2 km to the west.	Comparatively good. 20 km S of Traeng on the N4 road.
8	Phnum Angkor Borei in Takeo province is known as a tin occurrence. Another granite hill, called Phnom Dar, 3 km NE of Phnum Angkor Borei, has quartz vein nets. This suggests the possibility of mineralization in the area. River sand at Angkor Borei show Au content of 0.064 ppm.		Good up to Phnom Dar. 34 km SE of Chambak on the N2 road. A boat is needed to get to Phnom Angkor Borei in the rainy season.
9	Quartz veinlets with limonite have been observed in conglomerate. Igneous rocks have been found in the area.	(Detailed survey has not been done due to a lack of outcrops)	Good. 5.5 km S of Prey Thnang on the N3 road.
10	Known iron occurrences in low hills in the southern part of the Mekong lowland. Two types of occurrences have been observed. One is a low-grade Fe-Mn vein with quartz and the other is a nodule layer which is concordant with host shale bedding.	Iron occurrences are distributed in an area of 15 km in length in the NNW-SSE direction. Fe-Mn nodule layers are intercalated. Assay results are as follows. Fe: 28.4%, Mn: >5%, Ag: 5.4 ppm, Co: 364ppm, Cu: 350 ppm, P: 4660 ppm, Zn: 406 ppm.	Good. 15 - 20 km W of Kirivong on the N2 road.
11	Known molybdenum occurrence in an isolated granite hill. Large outcrop of ex-quarry is 70 m in width. Dissemination is 40 m in width, weak intensity, and composed of molybdenite, chalcopyrite and pyrite.		Good. South side on the N2 road. 2 km to Cambodia - Vietnam border.
12	Skarn with arsenopyrite has been observed in hornfels of shale in contact with granite batholith.	Skarn with arsenopyrite is distributed in hornfels along with granite in a 7 km-long area. Assay results are as follows. Cu: 412 ppm, As: 2780 ppm, S: 1.35%, W: 130 ppm.	Good. 6 - 10 km S of Kirivong on the N2 road.

Chapter 6 Compilation of Digital Spatial Datasets and Information Disclosure

6.1 Status of the Current GIS Database

(1) Geological and Mineral Resource GIS datasets

1:200,000 geological maps were digitized in 1996 and 1997 using ArcInfo, the world standard GIS application developed by ESRI (United States). Furthermore, the “Study on the Establishment of GIS Base Data for the Kingdom of Cambodia” undertaken for the MPWT and financed by JICA produced fundamental GIS datasets in 2003. Geological GIS datasets were compiled based on the BRGM’s geological maps and geographic datasets.

(2) Concession Management GIS Datasets

Concession datasets are comprised of three categories: mineral resources, rock, and sand for construction materials, which are stored as polygon data in GIS, and are managed in the DMR. The data is integrated with scanned topographic maps and related backdrops to enable visualization of proposed concession locations with topographic maps.

(3) Use of GIS Datasets in the Departments of the GDMR

GIS data sharing in the country is remarkably delayed and the GDMR is no exception. For instance, geological data is stored in the DoG and concession data in the DMR, without any data exchanges.

(4) Evaluation of GIS Datasets

Table 6.1 Evaluation of GIS Datasets and Databases

Item	Evaluation
Databases	<ul style="list-style-type: none"> • Though there is a text-based database of concession information for tax collection in the DGMR, there is no data exchange with spatial information and no relationship with the GIS database.
Data content	<ul style="list-style-type: none"> • There is no sharing of data such as geology, mineral resources, and concessions among DoG, DMR and DMRD.
• Sharing	
• Format	<ul style="list-style-type: none"> • No unified data format.
• Concessions	<ul style="list-style-type: none"> • Concession datasets, namely GIS shape files, are managed in different directories named for each license holder. <ul style="list-style-type: none"> – There are many disorganized files, which might cause human error in data management and data entry. – Non-standardized data entry. For instance, there may be several names for one company. – A lack of required attribute fields in GIS data to indentify each concession. – Concession map creation under special conditions, for instance, making a map just for MOU concessions requires additional labor, hours and steps. – Attribute structure is not standardized, and no data links to the list of title holders. – Because there in no standardized data management procedure, only the person currently in charge can understand and manage the contents.
• Geology	<ul style="list-style-type: none"> • Data is missing in some fields of the geological GIS shape files. • GIS datasets are divided by each province, and the attribute structures for geological GIS data are inconsistent. <ul style="list-style-type: none"> – This causes some redundancy in geological GIS datasets. – Standardized management of geological information is not possible, and compilation of shape files cannot be completed.
Technical level	<ul style="list-style-type: none"> • There is a lack of understanding of data management, and GIS has been used just for map creation. • Understanding of GIS and databases is at the beginner level, except for a few intermediate users. • There is a commonly seen need for GIS and databases in daily operations.

Given the clear need for concession and geology GIS datasets to resolve issues, for

database construction in this study, the procedures were carried out to compile and edit unified datasets to create a GIS shape file with the appropriate attribute structure.

(5) Evaluation of IT Usage

IT and database management issues facing the GDMR are as follows:

- There are only four GDMR PCs connected to the Internet and no LAN setting in the office.
- Almost no GIS datasets are shared.
- There is a lack of computer anti-virus measures.
- Although some newer staff members have a basic knowledge of database construction, there is a lack of staff IT training for sustainability.

(6) Information in Company Annual Reports

Corporate annual reports are stored in the DMR, and some are also stored in the DoG. The reports include exploration results, which are crucial to properly estimate the mineral potential in Cambodia. This information has barely been utilized thus far.

6.2 Construction of the GIS database

The GIS database mentioned in this section is that for GDMR internal use which includes spatial data, text, tables and some links to websites. The structure and contents of this database differ from those of the website database. Data collected for the database construction are listed in Table 6.2. The following projection system has been used for the integrated GIS datasets for the country, and the same system is used in this study.

- Projection: UTM, Zone 48
- Ellipsoid: Everest 1830
- Datum: Indian 1960

Table 6.2 Collected Datasets

Item	Data Source	Contents
GIS Database	JICA	Administrative boundaries, elevation contours, river networks, watershed areas, index maps, land-use, densely populated areas, road networks, rail lines, geology, historical heritage sites etc. JICA (2003)*
GIS revised database		Revised GIS datasets mentioned above; JICA report (2005)**
Topographic maps		JICA Report(1999)***
ALOS satellite imagery		SUM of EDC, AVNIR-2, PRISM, PanShapen data; some reading errors in 13 provided DVDs
SPOT5 satellite imagery		15 scenes (some reading errors) with GIS data, 2003-2006,
Geology, faults	MIME – GDMR DoG	Based on 1:200,000 geological maps Some revisions, especially for the northeastern part of Cambodia are required, Data are still being revised in the this study
Mineral deposits and occurrences		Based on ESCAP (1993), MIME (1999) and KIGAM (2001)
Concessions	MIME – GDMR DMR	Concession data as of 26 th November, 2008; integrated into one shape file, after revising attribute structure and contents.
Existing and planned dams	MIME, Hydroelectricity Department	Two existing dams and five under construction or planned.
Existing and planned power grids		GIS created based on a report by the Japan Electric Power Information Center Inc.
DEM (30m Interval)	MPWT	Covering all of Cambodia

Topographic maps		1:100,000 topographic maps covering the whole country, GeoTIFF files
Road Planning		Paper-base maps provided, then scanned
Environmental/ forest reserve areas	MoE	National parks, forests and landscape conservation areas, as of November, 2008
Monthly precipitation	MWRM, Meteorological Department	Average monthly precipitation for the past 10 years at 21 meteorological stations
Landmines and UXO	CMAC	Paper-based maps, digital scanned maps, and GIS datasets including level-one survey by CMAC, landmine and OUO contaminated areas
SEZ	CDC	Locations of economic zones, capital etc., downloaded from the website www.cambodiainvestment.gov.kh
Oil and gas concession areas	JOGMEC(offshore) JICA (onshore)	Consultants information titled “ Cambodia; Prospect as an oil producing country, issues with resource development due to unsettled maritime boundaries” (in Japanese), April, 2007 and JICA report titled “Cambodian Energy Situation”, June, 2008
Landsat satellite imagery	Geocomm	Covering the whole country, Downloaded from the website www.gisdatadepot.com

* : The Study on the Establishment of GIS Base Data for The Kingdom of Cambodia, March, 2003

** : The Reconnaissance Study Project for the Emergency Rehabilitation and Construction of the Kingdom of Cambodia, September, 2005

*** : The Reconnaissance Study Project for the Emergency Rehabilitation and Reconstruction of the Kingdom of Cambodia, March, 1999

6.2.1 Structure of the Database

The database has an entry window for two types of users, administrative and general users, in order to protect the contents (Fig.6.1). General users are able to search, make lists, and print out all of the contents. The administrators have a password, which authorizes them not only to manipulate the database like general users, but also to edit and add data.

While the mineral resource information is created based on the results of ESCAP and this study and is accessible to many possible users in the GDMR, the concession datasets contain confidential information and might be restricted to a few officers' use at the present time. Therefore, two types of databases, i.e., a mineral resource database and a concession database, have been constructed independently in this survey.

(1) Mineral Resources Database

The mineral resources database is comprised of a main table for mineral resources and some related tables such as company list, index map code list, area name list and so on (Fig. 6.2). The following is a list of the main characteristics of the database:

- Individual management for administrative and general users by password
- The main menu is divided into various processing operations

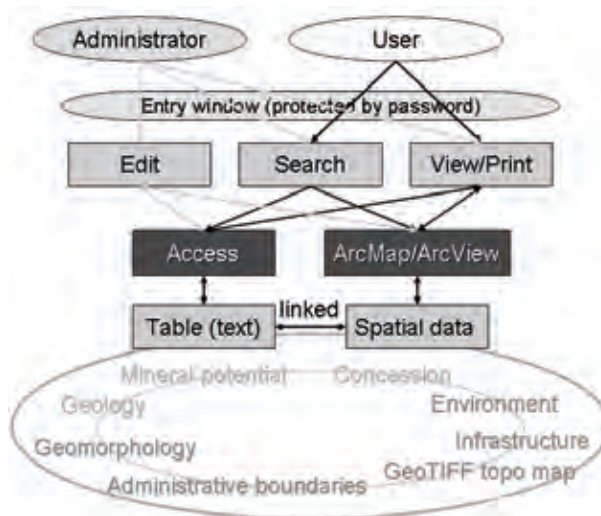


Fig. 6.1 General Structure of Databases for the GDMR Internal Usage

- Various functions such as individual mineral deposits or occurrences, searching and sorting, switch to GIS applications
- Original resources, ESCAP (1993) and JICA (2009)
- Editing spatial datasets for mineral deposits and occurrences are point features in GIS

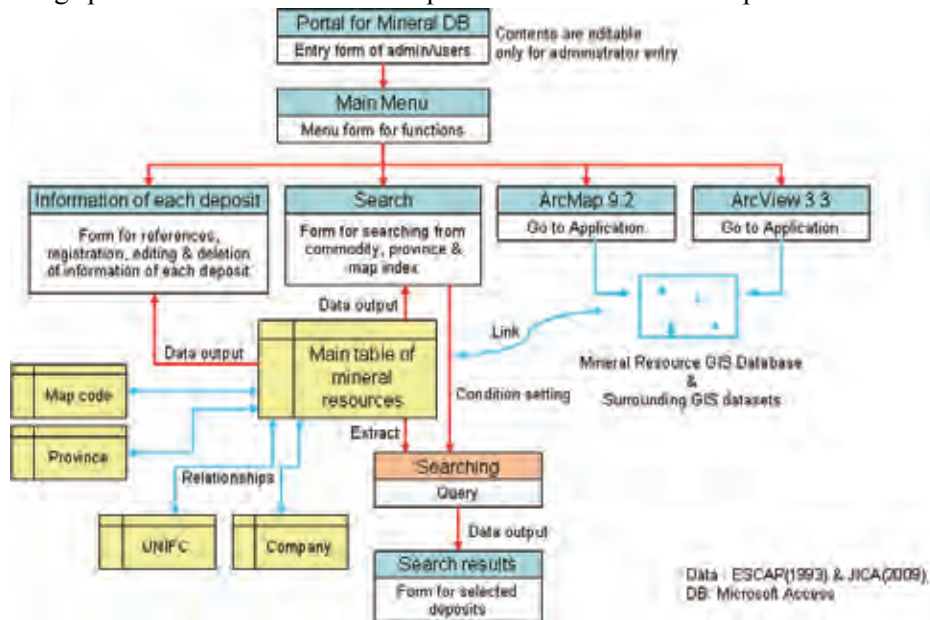


Fig. 6.2 Structure of the Mineral Resources Database

(2) Concession Database

The concession database is comprised of a main table for main concessions and some related tables such as company list, map code list, area name list, license category list, activity level and so on (Fig. 6.3). The following are the main characteristics of the database:

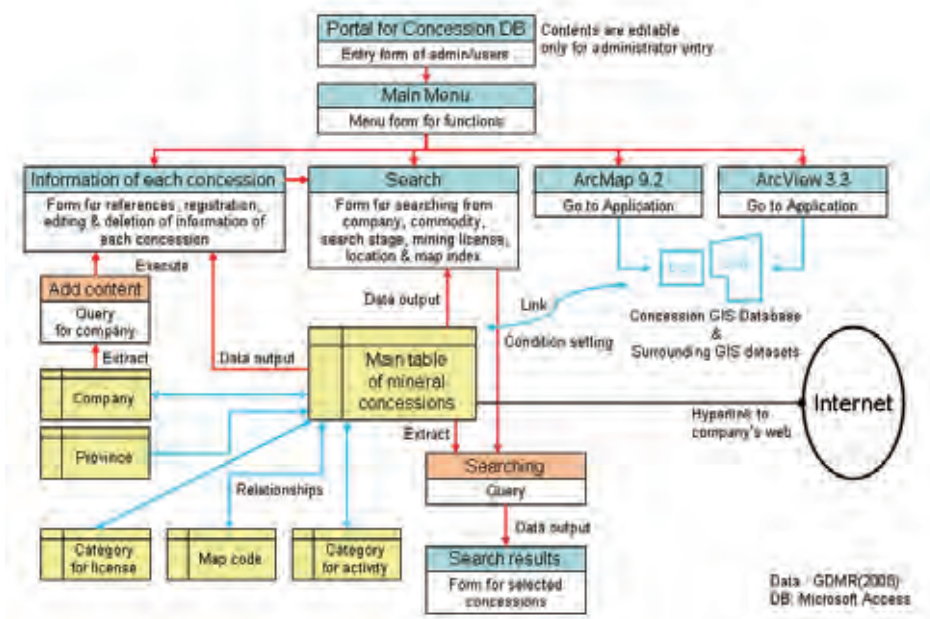


Fig. 6.3 Structure of the Concession Database

- Individual password-activated management for administrators and general users

- The main menu is divided into various processing operations
- Various functions such as individual mineral deposits or occurrences, searching and sorting, switch to GIS applications
- Individual concession table has a field for web URL, providing direct links to the web sites of companies which are disclosing exploration and mining activities
- Original resources: concession data provided by the DMR
- Editing spatial datasets for mineral concessions as polygon and line features in GIS

6.2.2 Some Outputs from the GIS Database

Based on collected and edited GIS datasets and numerical tables, the following maps have been created to show examples of useful applications for the GDMR and investors.

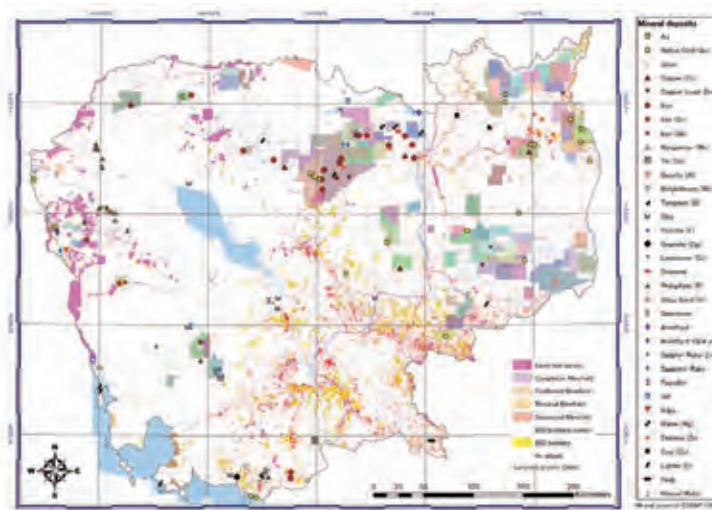


Fig. 6.4 Distributions of Mineral Resource Concession as of November, 2008, Mineral Potential Areas, and Landmine and UXO

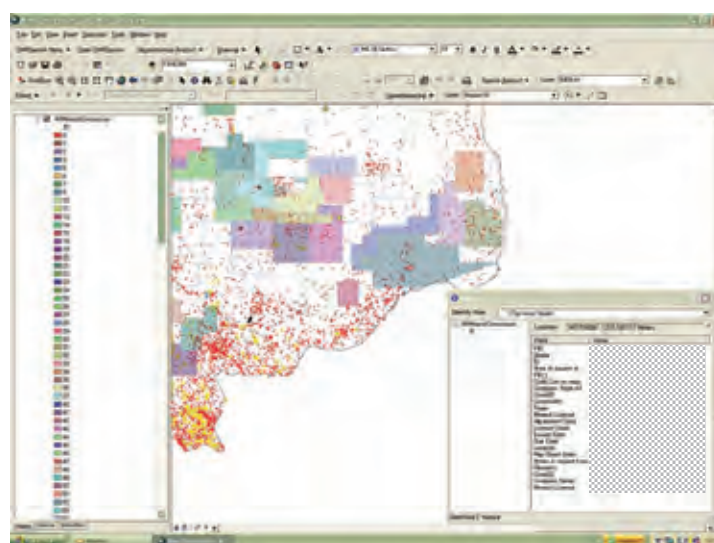


Fig. 6.5 Concession Spatial Data with Related Attribute Information

6.3 Website Construction

The use of websites in Cambodia is at the emerging stage, because of insufficient Internet connections at the present time. However, the importance of the Internet is well recognized by governmental organizations, and almost all major ministries and related organizations have their own website. While the MIME also discloses its institutional structure, some statistics, related laws and regulations, business directories and so on in English and Khmer, some of the most important items such as its vision, policy and strategy are still under construction at the website. The GDMR is permitted to create its own new website by the MIME.

6.3.1 General Concepts of the Website

Regarding web contents for the mining governmental organizations, there have already been several discussions by related organizations at ASEAN meetings. The GDMR had a basic framework for the website based on the ASEAN standard. In this study, we modified the framework as a starting point and constructed a new general structure by adding contents and designing new some functions, considering the special features of Cambodia. The final main specifications of the GDMR website are summarized in Table 6.3.

Table 6.3 Main Specifications of the GDMR Web Development

Item(s)	Description
Web design & construction	ASEAN standards, in English and Khmer
Development of mineral resources DB with searching tool	Based on ESCAP database, adding results obtained in this survey, which will be separately developed from internal DB
Dynamic map service	Dynamic web site development for spatial data distribution using web-GIS technique
Development of registration tool	Registration functions for exchanging information with clients
Design & development of administrative tool	Self-management tool for GDMR staff members
Development of retrieval tool	Tool for searching the whole web site for clients
Training	Several days of training for GDMR staff members so they will be able to maintain the web site on their own
Hosting of web server	Hosting of Web Server from 1 February 2009 to March 2011
Maintenance of web server	Keep security fixes updated and upgrade the system
Acceptance inspection	Final inspection will be made at the end of February, 2010
Opening of website	Internally: in mid November, 2009 Publicly: in end of Sep., 2010

6.3.2 General Structure of the Website

The GDMR website is comprised of the main site and the web-GIS site as shown in Fig. 6.6. The official domain address is <http://www.gdmr.gov.kh/>.

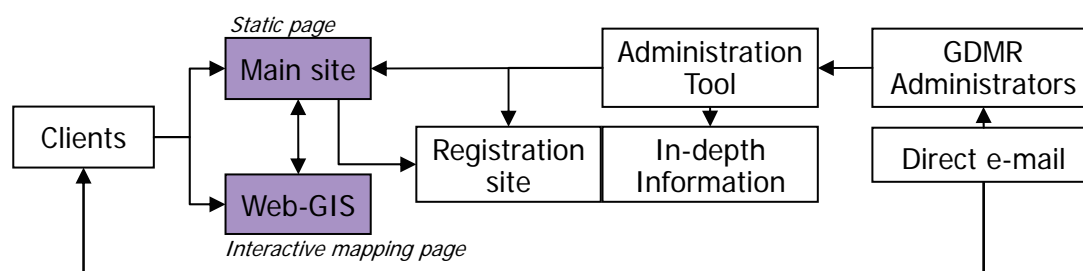


Fig. 6.6 General Structure of the GDMR Website

6.3.3 Main Site and Web-GIS

(1) Main Site

The GDMR main site is a static site which provides documents, tables and figures on mining policy, related laws and regulations, concession applications, statistics, news and announcements as information from a mining sector governmental site (Fig. 6.7).



Fig. 6.7 The GDMR Top Pages in English (left) and Khmer Versions (right)

(2) **Web-GIS Site** The web-GIS is a dynamic site which provides an interactive mapping service for spatial information such as geological and mineral resource distributions with surrounding mining-related data, including administrative, geographical, and infrastructural (road networks, ports, hydroelectric plants, etc.) information on demand (Fig. 6.8).

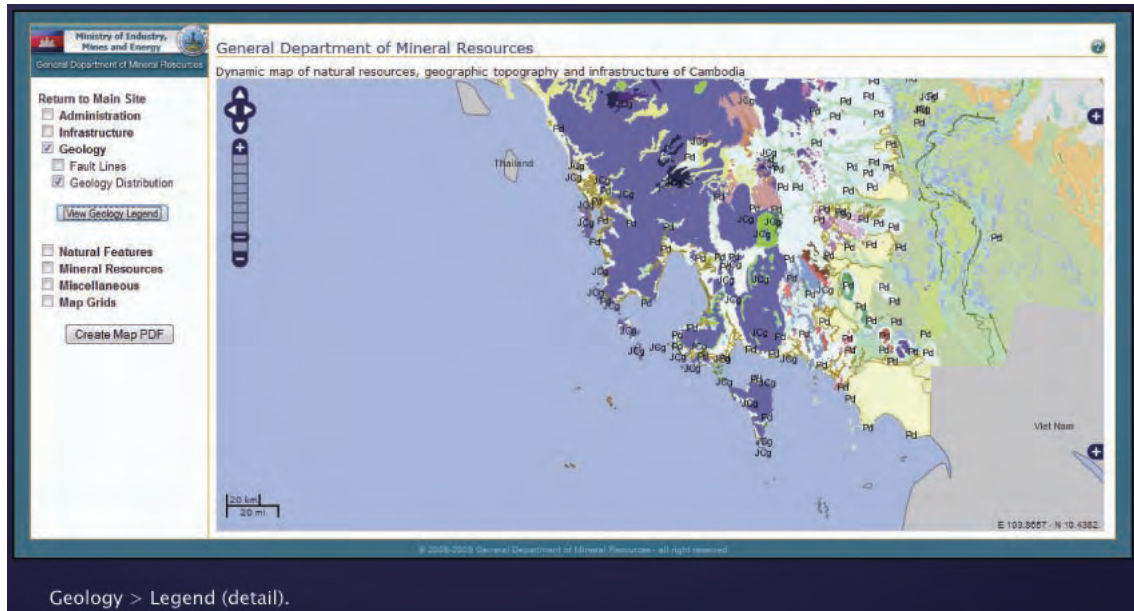


Fig. 6.8 Web-GIS Site (Geological Map)

(3) **Administration Tool for Web Maintenance**

An administrative tool was developed to help GDMR’s administrators maintain the system on their own (Fig. 6.9).

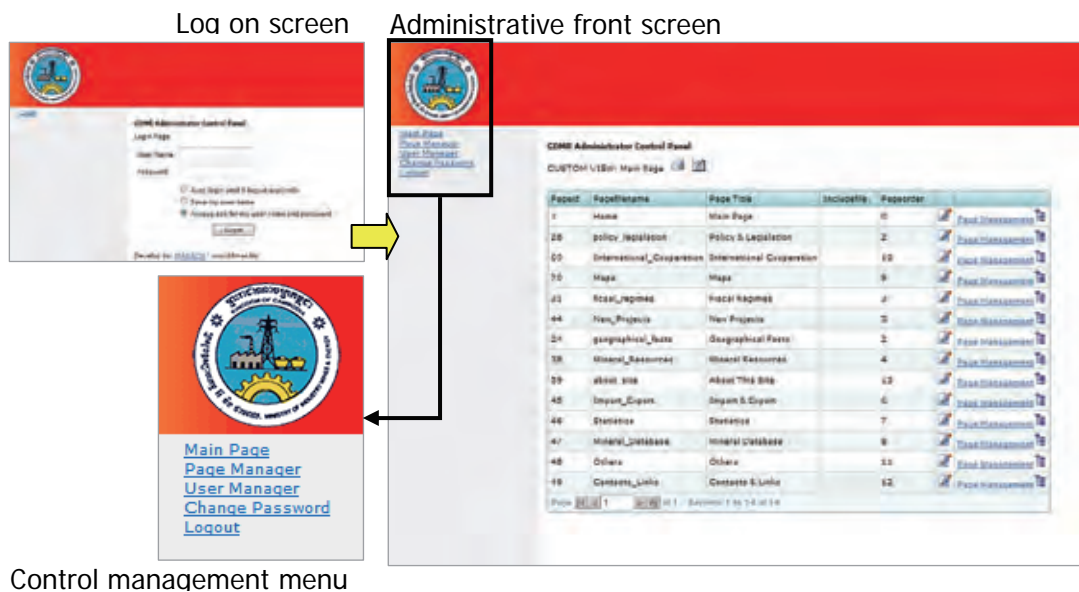


Fig. 6.9 Administration Tool

Chapter 7 Proposed Action Plan for Investment Promotion

7.1 Goal for the Master Plan

The main goal of the Master Plan for Promoting the Mining Industry is to increase the mining sector's share of GDP in the coming 10 years. According to recent IMF data, the mining sector accounted for 0.4% of Cambodia's GDP in 2007 (Table 7.1). The main aim of this study is to raise its GDP share to 3% by 2015, and to 10% by 2020. To reach the proposed GDP share targets, activities that will take 5-10 years to bridge the gap with the current state have been included as action plans in the present study. This chapter will introduce a proposed action plan for developing a sustainable mining sector in Cambodia that gives due consideration to the country's environment.

Table 7.1 Comparison of Economic Indices of the 3 Countries of Indochina

	Cambodia	Laos	Vietnam
Population (millions)	13.4 (2007)	6.3 (2008)	84.1 (2006)
GDP (billion US \$)	8.7 (2007)	5.4 (2008)	60.9 (2006)
GDP per capita (US \$)	649 (2007)	859 (2008)	723 (2006)
GDP growth rate (% , past 5 years)	9.9 (2002-2007)	7.1 (2003-2008)	7.8 (2002-2006)
Mining sector, share of GDP (%)	0.4 (2007)	25.8 (2008)	8.0 (2006)
Employment of Mining and quarrying sector (thousands)	22 (2007)	n.a.	n.a.

(Source: IMF Statistical Appendixes)

Cambodia

	2002	2003	2004	2005	2006	2007
GDP growth rate (%)	6.6	8.5	10.3	13.3	10.8	10.2
GDP of Mining sector (billion riels) (share of GDP, %)	48 (0.3)	58 (0.3)	74 (0.3)	97 (0.4)	115 (0.4)	133 (0.4)
GDP growth rate of Mining sector (%)	25.6	18.1	24.2	26.3	15.9	6.4
Employment of Mining and quarrying sector (thousands) (share of total, %)	15 (0.1)	16 (0.2)	17 (0.2)	19 (0.2)	20 (0.2)	22 (0.3)
GDP of Construction sector (billion riels) (share of GDP, %)	985 (5.9)	1,106 (6.0)	1,288 (6.0)	1,631 (6.3)	1,995 (6.7)	2,338 (6.7)
GDP growth rate of Construction sector (%)	27.1	11.1	13.2	22.1	20.0	6.7
Employment of Construction sector (thousands) (share of total, %)	120 (1.3)	153 (1.8)	195 (2.2)	234 (2.6)	260 (3.0)	299 (3.6)

(Source: IMF Cambodia Statistical Appendix)

High-priority action plans include 1) establishing a mining policy, 2) establishing a mining council, 3) amending laws and regulations related to mining, 4) establishing a legal framework for mine safety and mining environments, 5) improving basic information about mineral resources, 6) fostering small- and medium-scale mining, and 7) constructing an MIS.

7.2 Outline of the Action Plan for Mining Investment Promotion

7.2.1 Outline

The following items show investors' viewpoints about mining investment.

- Mineral Potential
- Political/National Economic Stability
- National Policy for Mining
- Infrastructure
- Land Use
- Local Communities
- Environmental Issues
- Mining Laws / Regulations
- Manpower
- Procurement of equipment, spare parts, consumables, energy, etc.
- Investment Laws / Regulations
- Taxation

The Study Team identified the items and associated actions to be carried out by the GDMR/MIME under the Action Plans for Mining Investment Promotion. Fig. 7.1 is a schematic depiction of the goals and associated actions to be carried out under the Action Plan for Mining Investment Promotion. Mining Promotion in Cambodia has the potential to become a key contributor to that country's socio-economic development.

To promote mining, the MIME must first clarify the significance of mining, and show the course of action in the 'Mining Policy'. With regard to the significance of mining promotion, the level of socio-economic contribution made by mining has to be examined (that is, mineral resources evaluation, calculations of resources and reserves within the context of 'Improvement of Basic Information about Mineral Resources', and 'Creation of a Mine Development Plan'). Then, based on the results of the evaluation, the course of action in the Mining Policy will be determined ('Establishment of Mining Policy'). In addition, a Mining Council should be established to reflect the opinions of the parties affected by mining activities and persons with knowledge of and experience with mining policy and mining laws and regulations ('Establishment of a Mining Council').

To accelerate the promotion of mining investment, the GDMR will require its organizations and staff to undertake the 'Organizational Reform and Capacity Development' project. To attract mining investors to Cambodia it is necessary to publicize the great potential for mineral resources in Cambodia. For that purpose, it is advisable to collect, analyze and

map/compile new and detailed geological information, and information on current mining activities in the country, as well as to establish a system to enable investors to access the information easily ('Improvement of Basic Information of Mineral Resources' and funding for activities in 'Institutional Reform').

Many countries that have succeeded in promoting mining investment have not only had rich mineral resources potential, but have also facilitated investors' access to mining rights by simplifying and clarifying the procedures for acquiring mining licenses ('Amendment of Laws and Regulations related to Mining' (hereafter 'Arrangement of Mining Laws and Regulations' and new procedures in 'Institutional Reform')). In addition, they provide 'Guarantees of Title' to facilitate mining activities. In Cambodia, it is important to clarify these items ('Arrangement of Mining Laws and Regulations') while implementing clear regulations that will prevent merely speculative investment in mining licenses where there is no intent to do any actual mining.

It is desirable for Cambodia to provide taxation and incentives that have stronger competitiveness in comparison with other countries ('Arrangement of Mining Laws and Regulations'). Moreover, based on market economic principles, Cambodia should deregulate mining product transactions, in order to encourage the creation of mine products which provide a higher economic value to the country ('Arrangement of Mining Laws and Regulations').

The conditions for developing mining infrastructure, especially of transportation and energy, severely affect mining viability. Except for the biggest high-grade deposits in the world, it is financially unfeasible for a mining company to develop a mine which requires the construction of more than 100 km of transportation infrastructure. For this reason, the Government should develop the infrastructure ('Preparation of Mining Infrastructure').

Based on the geological information of this region, there is a possibility that mineral resources exist in the border areas with Laos, Vietnam, and Thailand. It is therefore important not only for economic reasons but also for sustainable development considerations, to prepare a framework for the reasonable development of mineral resources in collaboration with neighboring countries ('Cooperation with neighboring countries').

In addition, Cambodia should eliminate illegal mining while providing support to nurture legal artisan miners; and in the future, implement measures to foster and enhance domestic mining companies that will stabilize and encourage mining investment and economic activities in Cambodia ('Fostering small- and medium-size mining').

From the sustainable development point of view, mining wealth should be distributed to promote national prosperity, that is, it should be earmarked for poverty reduction, community development in mining areas, and re-investment in mining activities ('Institutional Reform'). Naturally, it is important to undertake mining activities under Good Governance ('Arrangement of Mining Laws and Regulations'). Mine safety and environmental management, under the newly prepared mining environmental and mining health & safety laws and regulations, are necessary to promote favorable mining activities ('Mine Safety and Environmental Management').

Conflicts between government, mining companies, communities, and environmental organizations have taken place in various countries around the world. To avoid these situations while developing the mining sector, the Government must mediate the relationships between the stakeholders, such as miners, local residents, and so on, to create a cooperative atmosphere ('Cooperation with Stakeholders').

7.2.2 The Time Period for the Action Plan

The Time Period for the Action Plan is ten years, divided into two stages: the "Basic Foundation Stage" (2011-2015) and the "Mining Fostering Stage" (2016-2020).

- **Basic Foundation Stage:** To expand mining investment, the GDMR/MIME should carry out the activities to formulate the mining policy, complete the arrangement of mining laws and regulations, strengthen its institutional organization, and improve the information services.
- **Mining Fostering Stage:** The Government should specify the details of mine development plans carried out by the nation, then set the key goals, and create a mine development environment that facilitates full-scale development.

7.2.3 The Framework of the Action Plan for Investment Promotion

The Action Plan for Investment Promotion consists of following three parts:

- (1) Institutional Reform (the actions outlined by the black border in Fig.7.1)
- (2) Organizational Reform and Capacity Development (the actions outlined by the red border in Fig.7.1)
- (3) Mine Safety and Environmental Management (the actions outlined by the yellow border in Fig.7.1)

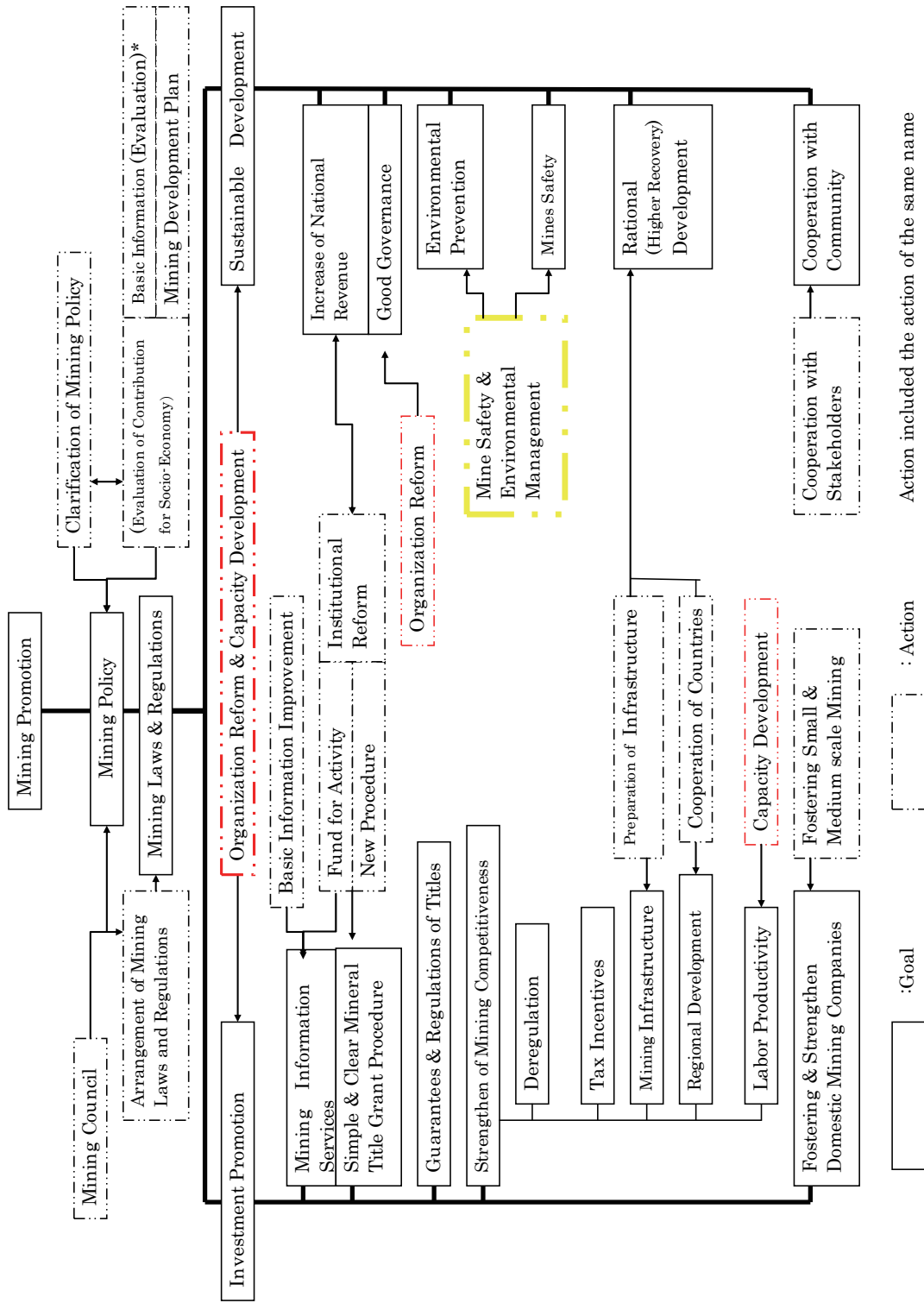


Fig.7.1 Outline of the Action Plan for Mining Investment Promotion

7.3 Institutional Reform

7.3.1 The Action Plan for Institutional Reform

(1) Improvement of basic information about mineral resources

The GDMR should update basic geological information, through field surveys and collection of data on current and historical exploration areas (Mapping and GIS Database). The information on mineral reserves and resources will be used to evaluate how much of a contribution is made through mining promotion (Mining Development Plan), which is the foundation of the Mining Policy. For these purposes, the GDMR carries out mineral evaluations (i.e., calculating mineral reserves & resources). The statistics are compiled and published by the GDMR in the Mining Yearbook.

Information prepared by the GDMR/MIME should be available on the Internet. Furthermore, the GDMR/MIME will establish an Information Service Center, where investors can freely and easily access information. It would be even more convenient for investors if they could apply for mining licenses at this center. After considering the demand for GDMR mineral testing and analysis, a mineral laboratory should be established, if it is economically feasible.

The following are actions that should be taken on this area.

1) Collection of Geological Information

- Collecting and analyzing historical data
- Providing detailed information for geological reports required by the MOU and the Mineral Agreement
- Collecting and analyzing the data from the above reports
- Installing a Database System

2) Field Surveys

- Mineral Exploration Training for the DoG staff
 - Training at domestic exploration sites
 - Study and Training at a foreign university or foreign geological survey
- Field Survey for geological mapping

3) Mapping

- Compilation of 1:500,000 geological tectonic maps of the entire territory of Cambodia
- Upgrading of 1:200,000 geological maps of eastern Cambodia (Rottanakiri and Mondulakiri)
- Compilation of 1:100,000 geological and geochemical maps for promising areas (4 sheets)

4) Updating the GIS Database

5) Evaluation of Resources & Reserves

6) Geological Information Center

- Study of other countries' geological information centers
- Establishment of a Geological Information Center (library and cadastre room) and Mineral Museum
- Maintenance and administration of Website

7) Compilation of a Mining Yearbook (annual mining statistics)

- Making questionnaires and associated guidebooks for mining companies
- Analyzing the collected data

8) Mineral Laboratory

- Survey on demand for Mineral Analysis for other ministries, institutes, and the private sector
- Installation of the following equipment
 - X-ray diffraction analyzer
 - X-ray fluorescence analyzer
 - Atomic absorption spectrometer
 - Polarizing microscope
- Full implementation of mineral analysis services

(2) Establishment of a Mining Council

A Mining Council, consisting of GDMR officials, officials from other ministries, companies, qualified persons with experience, and provincial government officials, should be established. The Council would discuss the key issues of mining administration, and would be divided into working groups to handle various themes with GDMR officials.

The actions to be carried out for this area are as follows:

1) Establishment of a Mining Council and Working Groups

2) Regular Meetings

- Mining Council – Semi-annual
- Working Group – Quarterly

(3) Establishment of Mining Policy

Mining policy must be clarified through documentation, and made easily accessible to Cambodians and foreign investors. Establishment and publication of a mining policy, and establishment of information services will be necessary to promote mining investment.

The actions to be carried out for this area are as follows:

1) Establishment of a Mining Policy

2) Review and/or Modification of the Mining Policy

3) Preparation of the Mining Policy for Inclusion in the NSDP.

(4) Preparation of a Mine Development Plan

The Mine Development Plan is given the task of proposing practical measures for the Government, based on the evaluation of the socio-economic contribution of mine development. Considering the financial situation of the Cambodian Government, a priority production system should be introduced that sets the key goals (priority areas and/or minerals) for providing the most effective use of Government funds and human resources.

The five actions to be carried out for this area are as follows:

1) Preparations

- Acquisition of methods for designing mines and conducting feasibility studies
- Establishment of planning methodologies
- Installation of planning equipment (computers, mine planning software, scanners, printers)

2) Establishment of the Council of Mining Infrastructure (CMI)

3) Creation of a draft Mine Development Plan

4) Establishment of the Working Groups of the CMI

5) Formulation of a detailed Mine Development Plan

(5) Amendment of Laws and Completion of Regulations Related to Mining

Today, mining regulations (as Decrees, Sub-decrees, and Prakas) have been formulated in line with the ‘Law on Management and Exploitation of Mineral Resources’ (hereafter ‘Mining Law’). Moreover, mining investment can be strengthened by amending and revising the mining law. However, from the perspective of sustainable development, there are some points that will have to be clarified through mining laws and regulations. Accordingly, the following items should be discussed and, where necessary, revised.

- Priority given to issuing mining licenses on a first-come, first-served basis
- Security of title
- Security of tenure
- Stability of investment parameters
- Reasonable royalties and fees
- Incentives and privileges at the exploration and development stages
- Export liberalization of raw mine products and/or concentrates
- Need for a mineral investment agreement
- Introduction of public hearings
- Good governance (transparency)
- Mining environment management
- Harmonization with local communities

As mentioned above, this consists of the following three actions.

1) Enhancement of Mining Law

2) Revision (Establishment) of Taxes, Royalties, and Fees

3) Formulation of Mining Regulations

(6) Institutional Reform

1) Establishment of a system for mineral licenses

- Introduce the first-come, first-served principle
- Make it possible to apply for a mining license through the GDMR Website
- Simplify the application documentation for exploration licenses
- Clarify the period needed to complete the procedure for acquiring a mining license, from

application to acquisition, and strictly adhere to the schedule

- Modify the mineral agreement to include incentives and stability of investment parameters. Or abolish the mine opening agreement system for all new projects.

2) Establish the financial basis for GDMR activities

- Guarantee the allocation of 8% of royalties for geological and mineral surveys
- Increase the allocation of royalties for geological and mineral surveys, and local infrastructure construction
- Allocate land rents and other fees related to mining to GDMR activities for mine development and for fostering small- and medium-scale mining
- Establish separate budget managing systems for each General Department within the MIME
- Generate funds through GDMR services. This involves:
 - Bidding for mining concessions for deposits that are discovered by GDMR surveys
 - Utilizing idle time of staff and equipment & tools for outside services (ex. mineral analysis, geological consulting)

(7) Fostering Small- and Medium-scale Mining (SMEM)

The government should eliminate illegal mining activities by strengthening the mine inspection system. The government should also train and organize illegal miners who wish to become legal miners.

1) Investigation & Study of illegal mining

- Establishment of Mining Regional Offices (4 offices) – Completed in 2010
- Strengthening of mine inspections
- On-the-Job Training for mine inspectors administered by a foreign expert

2) Holding of workshops for miners

- Workshops with lectures
- Hands-on Workshops

3) Organization of Artisanal and Small-Scale Mines

- Arrangement of the Legal Regulations for SMEM
- Management and Marketing Training for Mine Owners
- Organizing of a Joint Delivery and Marketing System

4) Financial Support

- Special Taxation for SMEM (Revision of the rates of Royalties, Fees, and Taxes)
- Establish a Loan System for SMEM (with Government guarantees)

(8) Preparation of Mining Infrastructure

In Cambodia, the mineral deposits that show the greatest potential are mostly located in remote areas where the infrastructure is not well developed. The Key Goal for the priority production system is established by the Mine Development Plan; the Government works on the development of mining infrastructure (mainly for transportation and energy) as a part of the

NSDP.

- 1) Information Exchange (One meeting of the ‘Parties of Mining Infrastructure’ per year)**
- 2) Preparation of the Construction Plan**

(9) Cooperation with Stakeholders

In many mining countries, there have often been conflicts between mining companies and other stakeholders. The causes of these conflicts are varied, and may include concerns about mining pollution, disturbance to the land, damage to heritage sites (especially those of aboriginal and local cultures), and money matters, among other things.

To mitigate these conflicts, especially those caused by misconceptions about mining activities, the mining companies and the Government should establish a good relationship with other stakeholders, such as residents of the mining areas, land owners, other areas affected by mining activities, etc., through activities that deepen mutual understanding.

- 1) Stakeholders Conference (approximately 10-15 members: twice a year)**
- 2) Open Seminars on Sustainable Development (2 places per year)**

(10) Cooperation with Neighboring Countries

It is desirable to develop the mineral resources around border areas cooperatively with the other country(s). The following actions should be carried out to prepare for future development with neighboring countries.

- 1) Exchanging information about mine development (One meeting of the relevant mining ministries per year)**
- 2) A Four-Nation Mine Development Committee (In the last period of the Action Plan: once a year)**

Member Countries: Cambodia, Laos, Vietnam and Thailand

7.3.2 Detailed Action Plan for Institutional Reform

Each action is divided into several steps, and designated a department in charge, manpower, and period of activity. This plan is called the ‘Detailed Action Plan for Institutional Reform’. It consists of following tables:

Table 7.3 Outline of the Detailed Action Plan for Institutional Reform

Table 7.4 Manpower Summary, including foreign experts

Table 7.5 Detailed Action Plan for Institutional Reform

Table 7.3 Outline of the Detailed Action Plan for Institutional Reform (1)

Item	Strategy/Action	Dept.	Manpower		IC	Expend. Thou. US\$	Basic Founding P.					Mining Fostering P.							
			GDMR	Outside			11	12	13	14	15	16	17	18	19	20			
1. Basic Information	1. Geological Information Collection	DoG	GA 3	-		60(T)													
	2. Field Survey	DoG	GB 8		⊙														
	3. Mapping	DoG	GA, GB		⊙	1200(T)													
	4. Update GIS Database	DoG	GA																
	5. Resources & Reserves Evaluation	DoG	GA, GB		(⊙)														
	6. Geological Information Center	DoG	GC 3			30(Y) 50(T)													
	7. Mining Yearbook	DMR, DCM	MA 6			20(Y) 50(T)													
	8. Mineral Laboratory	DoG	GD6		⊙	10(Y) 450(T)													
2. Mining Council (MCL, & WG)	Establishment & Regular Meeting	GDMR	TA 9	5		10(Y) 10(T)													
3. Mining Policy	1. Mining Policy Establishment	GDMR	TA		⊙														
	2. Review/Modification	GDMR	TA																
	3. Policy for NSDP	GDMR	TA																
4. Mining Development Plan	1. Preparations	DMRD	DA7 GA,GB		⊙	60(T)													
	2. Council of Mining Infrastructure (CMI)	DMRD	DA,GA,GB																
	3. Conceptual Plan	GDMR	DA(2)	10		30(T)													
	4. CMI Working Group	GDMR	DA	L&I		10(T)													
	5. Detailed Plan	GDMR	DA			60(T)													

..... Preparation ■ Establishment — Routine (Regular)

Dept: Department IC: Supported by International Corporation ○ : If possible ⊙ : Absolutely Expend. : Expenditure T—Required at once Y—Required each year
P: Period Manpower: ex. GA7--- G(department)A(name of the Group) 7(persons) G-DoG D-DMRD M-DMR & DCMR T—from each dept Co.—Company
MCL: Mining Council MCLWG: Working Group of MCL CMI: Mining Infrastructure Council CMIWG: Working Group of CMI MCL&WG : MCL and MCLWG
L&I : MCL and DCMR LIWG: MCLWG and DCMRIWG →: Action extending during the period

Table 7.3 Outline of the Detailed Action Plan for Institutional Reform (2)

Item	Strategy/Action	Dept.	Manpower		IC	Expend. Thou. US\$	Basic Founding P.					Mining Fostering P.						
			GDMR	Outside			11	12	13	14	15	16	17	18	19	20		
5. Laws & Regulations	1. Enhancement of the Mining Law	DMRD	DB 3			10(T)												
	2. Taxation	DMRD	DC 4															
	3. Mining Regulations	DMRD	DB			10(T)												
6. Institutional Reforms	1. New Procedure for Mining Licenses	DMR	MB 3		©	100(T)												
	2. Creation of Financial Basis	GDMR	GDMR															
7. SME Mining (SMEM)	1. Investigation & Study of Illegal Mining	GDMR	GDMR															
	2. Workshop	4 Depts	TC 4			10(Y) 20(T)												
	3. Organization of SMEM	DMR	MC 2			10(Y)												
	4. Financial Support	DMRD	TB															
8. Mining Infrastructure	1. Information Exchanges	GDMR	DA	CMIWG		5(Y)												
	2. Construction Planning	GDMR	DA	CMIWG		10(Y)												
9. Cooperation with Stakeholders	1. Stakeholders Conference	DMR	MC	10-15		10(Y)												
	2. Open Seminars	DMR	MC			10(Y)												
10. Cooperation with Neighboring Countries	1. Information Exchange	GDMR	GDMR	3 Co.		20(Y)												
	2. Mine Development Committee	GDMR	GDMR	3 Co.		20(Y)												

..... Preparation

█ Establishment

█ Routine (Regular)

Dept: Department IC: Supported by International Corporation ○ : If possible © : Absolutiel Expnd. : Expenditure T—Required at once Y—Required each year
P: Period Manpower: ex. GA7--- G(ddepartment)A(name of the Group) 7(persons) G-DoG D-DMRD M-DMR & DCMR T—from each dept Co.—Company
MCL: Mining Council MCLWG: Working Group of MCL CMI: Mining Infrastructure Council CMIWG: Working Group of CMI MCL&WG : MCL and MCLWG
L&I : MCL and CMRI LIWG: MCLWG and CMRIWG

Table 7.4 Manpower Summary

Number of staff in each department allocated for Institutional Reform in the Action Plan

1. Department of Geology

			Number of staff
Group A	(GA)	Information Collection, Mapping, Evaluation	3
Group B	(GB)	Field Survey, (Mapping), (Evaluation)	8
Group C	(GC)	Geological Information Center	3
Group D	(GD)	Mineral Laboratory	6
Others	(TA)	(Mining Policy, Mining Council)	(2)
	(TC)	(Workshop for SMEM)	(1)
<hr/>			
Total (Excluding TA and TC)			20

2. Department of Mineral Resource Development

Group A	(DA)	Mining Development Plan	7
Group B	(DB)	Laws and Regulations	3
Group C	(DC)	Taxation, Royalties, Fees	2
Others	(TA)	(Mining Policy, Mining Council)	(2)
	(TB)	(Taxation/Loans for SMEM)	(1)
	(TC)	(Workshop for SMEM)	(1)
<hr/>			
Total (Excluding TA, TB, and TC)			12

3. Department of Mineral Resources / Department of Construction Material Resources

Group A	(MA)	Mining Yearbook	6
Group B	(MB)	New Procedure for Mining Licenses	3
Group C	(MC)	Organization of SMEM, Cooperation with Stakeholders	2
Others	(TA)	(Mining Policy, Mining Council)	(2)
	(TB)	(Taxation / Loans for SMEM)	(1)
	(TC)	(Workshop for SMEM)	(1)
<hr/>			
Total (Excluding TA, TB, and TC)			11

4. Foreign Experts

Geologist	Field Surveys, Mapping, Mineral Evaluation	1 person x 4 years
Geophysicist	Mapping, GIS	1 person x 3 years
Mineral Analyst	Mineral Laboratory	1 person x 3 years
Mining Engineer	Mining Development Plan	1 person x 4 years
Mining Expert	Mining Laws and Regulations	1 person x 2 years
Short-term Experts	Mine development plans, Processing, Metallurgy, Economics (4 months per person)	3 persons x 2 years

Table 7.5 Detailed Action Plan for Institutional Reform (1)

1. Improvement of Basic Information about Mineral Resources

To evaluate the socio-economic effects of mine development in the country, and to increase the attractiveness to investors, the government should restructure the geological sector as the center of mineral resource surveys, mineral research, and related information services. This should be the highest priority.

Strategy/Action	Activities	Period		Department	Group	Budget*2 Thou. US\$
		BFP (end2010)	MFP			
1. Geological Information Collection	Team Organization	1Q2011	(1Q2016)	DoG	GA (3p)*1	
	Installation of Database Equipment (computer, GIS & Mine Planning Software, Plotter, Scanner, Printer)	2Q2011-4Q2011		DoG	GA	60 (T)
	Historical Data Collection and Analysis (R)*3	1Q2011-2Q2011		DoG, DMR (companies)	GA (DMR 1p)	
	Preparation of Technical Report Guidelines for Mineral Concessionaires	2Q2011-4Q2013▲ 4Q2020			
2. Field Survey	On-going Exploration Data Collection & Analysis (R)	1Q2011-4Q2014		DoG	GB (8)	
	Field Training in Domestic Exploration (Geophysical, Geochemical, Geology & Mineral Evaluation), Education and Training at a Foreign Institute (GS) and/or University (1-2 persons, period 2-4 years, total 8 persons) (R), Geological & Geochemical Survey (general Geology)	1Q2011-4Q2015	1Q2016 4Q2020	DoG	GB	
3. Mapping	Compile 1:500,000 geological tectonic map of the whole area of Cambodia (with 1 Foreign Expert)	2Q2011-4Q2015		DoG		(Included in Mapping Cost)
	Update the 1:200,000 geological map of eastern Cambodia (Rottanakiri & Mondulkiri) (with 1 Foreign Expert)	1Q2011-4Q2014		DoG	GA, GB	20 (T)
	Make 1:100,000 geological and geochemical maps of promising areas (4 sheets) (with 1 Foreign Expert)	1Q2012-4Q2015		DoG	GA, GB	470 (T)
				DoG	GB	700 (T)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (2)
1. Improvement of Basic Information about Mineral Resources (continued)

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
4. Update GIS Database	Update GIS database for geological information	3Q2012-4Q2015		DoG	GA	-
5. Evaluation of Resources & Reserves	(Training: Included in Training & Education for Field Surveys) Resources & Reserves Evaluation using GIS database and Resources & Reserve evaluation system	(1Q2011-3Q2013)		(DoG)	GA, GB)	-
6. Geological Information Center	Study other countries' geological information centers (mineral library, licenses application system, mineral museum)	4Q2013-4Q2014	1Q2016-4Q2016		GA, GB	
	(Construction of Building, 250m ² each) (Loan)	1Q 2012		GDMR, DoG	GC (3p)	
	Establish a Geological Information Center (library and cadastre), and a Mineral Museum	(2013)		(GDMR)		(750) (T)
	Services at the Geological Information Center (R)	1Q2014-4Q2015		GDMR, DoG	GC (3p)	50 (T)
7. Mining Yearbook (Statistics)	Management and maintenance of Website (R)	→	→	DoG	GC	30 (Y)
	Preparation of Contents of the Yearbook (Format, Analysis methods)	1Q2011-4Q2011		GDMR, DMR, DCMR, Companies		2 (Y)
	Installation of Tools (computer, local database system)	2Q2012			MA (6p: DMR 3p, DCMR3p)	50 (T)
	Publication (R)	3Q2013-4Q2015	→	DMR, DCMR	MA	20 (Y)
8. Mineral Laboratory	Survey of the Demand for Mineral Analyses from Other Ministries, Institutes and the Private Sector	1Q2011		DGMR, DoG, Stakeholders	DD(6p)	
	(Construction of Building, 200m ²) (Loan)	1Q2012-4Q2012		(GDMR)		(400)(T)
	Installation of equipment and training by foreign experts	1Q2013-4Q2015		DoG	DD	450 (T)
	X-ray Diffraction Analyzer X-ray Fluorescence Analyzer Atomic Absorption Spectrometer Polarization Microscope Full Implementation of Mineral Analysis Services (R)		1Q2019-4Q2020			10 (Y)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M-- DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (3)

2. Establishment of a Mining Council (MCL)

A Mining Council shall be established to resolve issues and to reflect the opinions and comments of experts and stakeholders in the mining policy, mining legislations, and key activities of the GDMR.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP (2010)	MFP			
1. Establishment	Study the participation of experts and stakeholders in governmental mining activities in other countries			GDMR	TA (9P: 1pGDMR, 2p each Dept)	10 (Y)
	Decide the functions of the Council and Working Group (MCWG)	1Q2011		GDMR Stakeholder(SH)	TA SH (5p)	
	Selection Councilors (MCLs) (10p)	2Q2011		GDMR, SH	TA, SH	
	Selection of Members of the Working Group (MCWGs)	3Q2011		GDMR MCLs	TA MCLs	
2.Regular Meetings	Semi-annual Mining Council Meeting (R)	2Q2011- 4Q2015	1Q2016- 4Q2020	MCLs	MCLs TA	5 (Y)
	Quarterly Working Group Meeting (R)	3Q2011- 4Q2015	1Q2016- 4Q2020	MCWGs	MCWGs TA	5 (Y)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (4)

3. Establishment of a Mining Policy

Through the establishment of mining policy, the Government clarifies the socio-economic importance of mining development for the country, and shows the process of sustainable development and how to create global competitiveness under Good Governance, for the Cambodian people and foreign investors.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. <Mining Policy> (1) Draft Preparation	Study the mining policy of other countries that enjoy widespread popularity among investors (by documents, interviews), with the support of foreign expert(s) ----- Prepare Draft with the support of foreign expert(s)	(2010)		GDMR	TA (9P: 1pGDMR, 2p each Dept)	
(2) Consultations	Polish up the policy through the Mining Council review	(2010)		GDMR	TA (MCWGs)	
(3) Review in MIME	Submit the draft to the MIME	1Q2011- 2Q2011		GDMR MCLs	TA MCWGs	
(4) Final Draft	Finalize the draft & send it to the Ministers Council	3Q2011		GDMR	TA	
2. <Review and/or Modification of Mining Policy> (1) Draft preparation	Study 1st stage Mining Development Plan ----- Evaluate the socio-economic contributions of mining development (If above evaluation is positive) Review the Mining Policy (If needed) Modify the policy through the Mining Council review	3Q2011		GDMR	TA	
(2) Consultation	Submit the modification to the MIME		1Q2017	GDMR	TA, MCWGs	
(3) Review in MIME	Finalize the Modification & Send to the Ministers Council		1Q2017	GDMR	TA MCWGs TA	
(4) Final Modification	Study the 2nd Stage Mining Development Plan ----- Draft of NSDP for mining sector preparation		2Q2017	GDMR	TA MCWGs	
3. <Mining Policy targeted for inclusion in NSDP> (1) Draft Preparation	Polish up the Draft through the Mining Council review		3Q2017	GDMR	(MGWGs)	
(2) Consultations	Submit the draft to the MIME		4Q2017	GDMR	TA	
(3) Review in MIME	Finalize the draft & send it to the Ministers Council		4Q2017	GDMR	TA	
(4) Final Draft	Finalize the draft & send it to the Ministers Council		1Q2019	GDMR	TA MCWGs	
(1) Draft Preparation	Polish up the Draft through the Mining Council review		2Q2019	GDMR	TA (MCWGs)	
(2) Consultations	Submit the draft to the MIME		3Q2019	GDMR MCLs	TA MCWGs	
(3) Review in MIME	Finalize the draft & send it to the Ministers Council		4Q2019	GDMR	TA	
(4) Final Draft	Finalize the draft & send it to the Ministers Council		4Q2019	GDMR	TA	

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (5)

4. Preparation of a Mining Development Plan

Based on the Mineral Evaluation prepared by the Geological sector, the GDMR carries out preparations for mine development for the purpose of estimating the socio-economic effects of Governmental support on mining activities, and clarifying the function of the Government with respect to mine development. And, if feasible, the Plan has to include scenarios for sustainable mine development.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. Preparations	Acquisition of methods for studying Mining Design and conducting feasibility studies (4 Mining Engineers, 2 Metallurgists, 1 Economist) at mining companies, and Foreign Institute ----- Establish Planning Methodology (Ex. Mine Modeling system and feasibility study using DCF method) ----- Installation of planning equipment (Computers, GIS & mine planning software, scanner, printer)	1Q2011-4Q2014		DMRD, DMR	DA (7R)	
		3Q2013-4Q2013		DMRD, DMR, (DoG)	DA, GA, GB	-
		4Q2013		DMRD, DMR	DA	60 (T)
2. Establishment of a Council of Mining Infrastructure (CMI)	Preparatory Meeting (GDMR, MPWT, Province, MoE, Companies, Institutes) ----- Establishment (2 members from each organization)	1Q2014-3Q2015		GDMR, DMR, DCMR	TB 2	
		4Q2015		do.	do.	
3. <Formulation of a Conceptual Mining Development Plan (CMDP)>	Data entry & Trial Case Study	1Q2014-4Q2014		DMRD, DMR, (DoG)	DA, GA, GB	
(1) Preparation of the Draft	Making mining Development Plan (selecting promising areas and/or minerals through economic analysis)	1Q2015-4Q2015		DMRD, DMR, (DoG)	DA, GA, GB	
(2) Consultation of the CMDP	CMDP evaluation by members of the MCLs & CMI (3 times)	2Q2015-4Q2015		GDMR, MCL, MCI	DA, MCI, MCLWGs	10 (T)
(3) Publication	Finalizing the CMDP	End2015		GDMR, DMRD	DA	20 (T)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2 :Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (6)

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
4. CMI Working Group	Establish CMI working Group (CMIWDs) (CMCLWG + MPWT 2p+ Province 5p)		1Q2016	GDMR, DMRD	DA	
5. Planning of Detailed Mining Development Plan (DMDP)	Clarification of the key issues of CMDP and reflecting the mineral evaluation activities		2Q2015- 3Q2016	GDMR, (DoG) DMR,	DA, GD, GB, CMI, & MCLWGs	
(1) Preparation of the Draft	Studying the methodology of DMDP (if needed) Additional data entry		3Q2017	do.	do.	
(2) Consultation of the DMDP	Making DMDP (Select one priority area and/or mineral, and determine the financial roles of the Government) DMDP evaluation by members of the MCL & CMI (3 times)		4Q2017	GDMR, DMR (DoG)	DA, GA, GB	
(3) Select Key Mineral and/or Development Area	Determination of the Key Mineral and/or Development Area that would make the greatest socio-economic contribution		1Q2018- 4Q2018	do.	do.	
(4) Publication	Finalizing the DMDP		2Q2018- 4Q2019	GDMR, MCL, MCI	DA, MCI, MCLWGs	10 (T)
			4Q2019	do.	do.	
			End2019	GDMR, DMRD	DA	50 (T)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (7)

5. Amendment of the Mining Law and associated Mining-related regulations

In order to foster mining as a key sector that contributes to the sustainable growth of the national economy, the government shall enact mining legislation that promotes mining development with fair and transparent procedures; effective, practical and high recovery technologies; sound health & safety measurement, and environmental measurement; rules for creating comfortable residential communities and improving residents lives without disturbance; and strong global competitiveness that attracts mining investors.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. <Enhancement of Mining Law> (1) Mining Law Survey	Preparation of 'Mining Law survey' for stakeholders (Mining and/or Exploration company, Provincial residents) Implementation of the Survey	1Q2011		DMRD, (DMR, DCMR)	DB (3p)	
	----- Identification of key issues reflected by the Survey	2Q2011- 3Q2011		do.	do.	
	----- Study of the laws of advanced mining countries, and model laws proposed by international organizations	4Q2011		do.	do.	
(2) Understanding the concepts of Advanced Mining Laws		1Q2012- 4Q2012		do.	do.	
(3) Draft Amended Mining Law	Preparation of Draft Amended Mining Law	1Q2013- 3Q2014		do.	do.	
(4) Consultation	Consultation with MCLs, relevant Ministries, International Organization (6 times with each Group, 2 times together)	2Q2013 3Q2014		GDMR, MCLs	DB, MCLWG	10 (Y)
(5) Review by MIIME	Submit to the MIIME	4Q2014		GDMR	DB	
(6) Publication		End 2014		DMRD	DB	
2. Taxation, Royalties, Fees	Establishment of Mining Taxation Study Team (GDMR2p, MEF2p)	3Q2011		DMRD	DC (4p)	
	Establishment of Methodology for Evaluating Global Competitiveness	3Q2011- 4Q2011		do.	do.	
	Data Collection (Taxation in Other Countries, Mining Expenditures & Revenue) & Evaluation	1Q2012- 4Q2012		do.	do.	
	----- Incorporation of the results into mining legislation	4Q2012		DMRD	DC, DB, MCLWG	

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M-- DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (8)
5. Amendment of the Mining Law and associated Mining-related regulations (continued)

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
3.<Mining Law Regulations> (1) Compile the Prakas, Decrees	Compilation of the Prakas, Decrees, in line with current Mining Law and Mining Agreement ----- Preparation of urgently required additional prakas and/or decrees.	1Q2011-		DMRD	DB	
(2) Preparation of Mining Laws and Regulations	Preparation of regulations in line with the Amended Mining Law	1Q2011-4Q2012		do.	do.	
(3) Publication	Send to the MIME for Publication This is discussed in 7.6.	1Q2013-3Q2014		do.	do.	
<Environmental Conservation Act For Mining>		End 2014		do.	do.	10 (T)
<Health & Safety Act for Mining>	This is discussed in 7.6.					

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M-- DMR&DCMR T--All Department *1: p—Person(s)
*2 :Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
*3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (9)

6. Institutional Reforms

To facilitate and strengthen the mineral development activities carried out by the GDMR, and to simplify the acquisition of mineral licenses for mining investors, some parts of the institutional system shall be reformed.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1.<New Procedure for obtaining Mineral Licenses> (1) Incorporate into the Mining Law	Investigation of systems in advanced mining countries	1Q2012- 4Q2012		DMR, DoG	MB (3p: DMR2p, DoG1p)	
	Preparation of a system for acquiring licenses under the Amended Mining Law	1Q2013- 4Q2013		do.	do.	
	Training by foreign experts (Ex.1 Canadian expert)	3Q2013- 3Q2015		do.	do.	
(2) Development of the system	Implement the system, establish procedures (Ex. utilization of Website)		1Q2016	do.	do.	100 (T)
	Data input and testing		2Q2016- 4Q2016	do.	do.	
(3) Deployment	Activation of New System		1Q2017	do.	do.	

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (10)

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
2. <Creation of Financial Basis> (1) Securing activity funding	Secure 8% of Royalties for GDMR activities, through discussions with the MIME and MEF	1Q2011-4Q2011		GDMR	GDMR	
	Allocation of royalties, mainly for collecting geological information	2Q2011-4Q2015	1Q2016-2Q2019	do.	do.	
(2) Establish principles for allocating royalties and mining fees	Review the allocation to the Nation (general and GDMR) and Provinces	1Q 2013-2Q2014		GDMR, MEF	DC	
	Incorporate into Mining Laws and Regulations	1Q2013-3Q2014		DMRD	DC	
(3) Ministry's Budget System Managed by General Department	Proposals to, and negotiations with the MIME, MEF	1Q20011-4Q2012		GDMR	GDMR	
(4) Generation of Revenue	Study of introduction of a tender system for some concessions (ex. mineral deposits discovered by the GDMR)		1Q2017 4Q2017	DMRD	DC	
	Implementation (R)		1Q2018			
	Study of utilization of workers and tools & equipment during idle time (ex. Mineral Analysis, Consulting)		1Q2019 4Q2019	DMRD	DC	
	Implementation (R)		1Q2020			

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (11)

7. Fostering Small and Medium (SME) scale mining

To eliminate illegal mining, implement sustainable mine development, and nurture Cambodian enterprises, the Government shall support artisanal and small- and medium-scale mines, introduce technology that increases operational efficiency, protect miners and residents in mining areas from accidents and adverse health effects caused by mining activities, prevent pollution, keep the environmental impact to a minimum, and foster partnerships with SME, and support their financing.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP (2010)	MFP			
1. Investigate & study illegal mining	Establishment of Regional Mining Offices (4)			GDMR	GDMR	
	Strengthen the investigation of illegal mining with frequent inspections (twice a month in suspicious areas) (regularly)	1Q2011-4Q2013		Regional Office	Inspector	
	On-the-job training for Mine Inspectors by 1 foreign expert about mining health and safety, and about preventing mine pollution at quarries	1Q2011-4Q2011		GDMR	GDMR	
2. Workshops for miners	Preparing training materials (for lectures)	1Q2014-4Q2015		Each Dept	TC (4p each Dept 1p)	
	Workshops (Mining, Processing, Environmental Technologies (Phnom Penh, Kratie, Stung Treng, Mondulkiri etc, 2-3 places/year)		1Q2016-4Q2018	do.	do.	10 (Y)
	Preparing practical training materials and tools		1Q2017-\$Q2018	do.	do.	20 (T)
	Hands-on workshop		1Q2019-4Q2019	do.	do.	
3. Organization of Artisanal and Small Mines	Revision of laws and/or regulations covering SMEEM. • Definitions of SMEEM • Cooperative Association for SMEEMs Management and Marketing Training for Mine Owners (2-3 places/year) Organization of a joint delivery and marketing system		1Q2016-4Q2016	DMR, DCMR	MC (2p)	
			1Q2017-4Q2020	do.	do.	10 (Y)
			4Q2020	do.	do.	

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (12)
7. Fostering Small and Medium-scale Mining (continued)

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
4. <Financial Support>						
(1) Special Taxation for SMEs	Review rates of royalties, fees, and taxation for SMEs ----- Implement special taxation for SMEs	1Q2013-4Q2015		DMRD, (MEF)	TB (2p)	
(2) Loan System	Study the loan system to provide Governmental support for SMEs ----- Implement the Loan System (ex. Two-step loans)	1Q2013-4Q2015	→ 1Q2016-4Q2017	GDMR, MEF GDMR, Bankers,	TB TB	
			1Q2018-	do.	do.	

Table 7.5 Detailed Action Plan for Institutional Reform (13)

8. Preparation of Mining Infrastructure

In order to enhance Cambodia's international mining competitiveness and rural development, the MIME/GDMR and Ministries related to transportation and energy infrastructure have to work together to construct the main arteries for mining infrastructure that will connect mines to manufacturing zones and export terminals.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. Information exchange	1. Annual meetings of the MIME, MPWT, Provincial Mining Development-related Offices, Companies	4Q2015		GMDR, DMR	DA CMIWGs	5 (Y)
2. Construction Planning	1. Detailed planning in line with DMDF		→ 1Q2020-4Q2020	GDMR, DMR	DA, CMIWGs	10 (T)

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
*2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
*3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

Table 7.5 Detailed Action Plan for Institutional Reform (14)

9. Cooperation with Stakeholders

Through the mutual understanding and cooperation among residents and mining communities, miners, the Government, and other stakeholders, the Government will promote sustainable mining and rural development.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. Stakeholders Conference	Selection of members (approx. 10-15 people) ----- Stakeholders Conference (2/yr)	1Q2015		DMR, DCMR	MC (2p)	
		4Q2015	→			
2. Open seminars on sustainable mining development	Implementation of open seminars for the residents of mining areas (2 places/yr)	1Q2014-	→	DMR, DCMR	MC (2p)	10 (Y)
		4Q2015	→			

Table 7.5 Detailed Action Plan for Institutional Reform (15)

10. Cooperation with neighboring Countries

Through cooperative agreements with neighboring countries, namely Laos, Viet Nam, and Thailand, Cambodia will be able to develop mineral resources located in border areas with maximum recovery; and through co-utilization of joint-use infrastructures for mining, both Cambodia and its neighbors will be able to strengthen their international mining competitiveness.

Strategy/Action	Activities	Period		Department	Group	Budget*1 Thou. US\$
		BFP	MFP			
1. Exchange information about mining development	Annual meetings of mining ministries	1Q2016-		GDMR	GDMR	20 (Y)
		4Q2018				
2. Four-Nation Mine Development Committee	Establishment of the Committee ----- Annual Committee meetings		4Q2018	GDMR.	GDMR	
			1Q2019-4Q2020			

Period: BFP—Basic Founding Period MFP: Mining Fostering Period
 Group Name GA: G(Department)/A(Group name) Department: G--DoG D--DMRD M--DMR&DCMR T--All Department *1: p—Person(s)
 *2: Budget --- T—Total(discontinued budget such as capital expenditure), Y—Yearly (annual budget that required regularly or several years)
 *3: R-- after the period the activities will be carried out as routine job →: Action extending during the period

7.4 Proposed Programs for Organizational Reform and Capacity Development

7.4.1 Basic frameworks for Action Programs

(1) Long-Term Perspectives for GDMR Activity

1) Environment changes caused by mine development

GDMR operations must devote their full attention to the following.

- Inspections to determine whether mining is being conducted according to relevant laws and regulations
- Acceleration of environment-friendly mine development
- Stringent monitoring of illegal activities
- Acceleration of quality investment
- Mining development based on dialogues with the parties concerned, i.e., Government, investors, and mining site residents
- Utilization of resources in a way that maximizes the benefits to the people of Cambodia

2) Expansion of the GDMR's operations

Exploration activities will continue to expand at an accelerating pace. Expansion in exploration activities will lead to an increase in applications for mining licenses. In turn, daily operations at the GDMR will increase. Further, as stated above, the GDMR must secure as much quality investment as possible.

(2) Need for Human Resources at the GDMR

1) Areas where the staffing requirements will grow

The GDMR has to accelerate its development of human resources in the following areas.

- Development of laws and regulations related to mining (Priority 1)
- Development, review, and assessment of the GDMR's strategy (Priority 1)
- Development of an MIS system that will make the GDMR's operations more efficient and effective (Priority 1)
- Improved personnel management (Priority 1)
- Reinforced geological training of GDMR staff (Priority 1)
- Increased publicity within Cambodia (Priority 2)
- Enhanced inspections of daily operations (Priority 2)
- Expanded development of new mining-related businesses (Priority 2)

2) Number of staff needed to achieve the above targets

Table 7.6 Projected GDMR Staffing Requirements

Year	2010 (Current)	2015	2020
Index of work volume (Y2010=100)	100	180	310
Productivity index (Y2010=100)	100	128	163
Required staff (actual number)	100	140	190
(Number of staff needing knowledge of geology and mining engineering)	(60)	(85)	(140)

Of the 190 staff who are projected to be working at the GDMR in the year 2020, it is estimated that 140 will be core members (Table 7.6). This is because customer service work at mining sites is expected to grow significantly. However, since there is no institution in Cambodia that provides technical instruction in geology, the GDMR will have to educate and train them itself.

7.4.2 Overview of Organizational Reform

(1) Strengthening of Organization to be tackled in the Coming Three Years

- Strengthen development of laws and regulations (3 in addition to current 1, total 4)
- Strengthen overall strategic planning (including specialists in industrial research) (3 in addition to current 1, total 4)
- Creation of a new Office for MIS Development (3)
- New assignment of a planning officer for personnel management (1)
- New assignment of a public relations officer (1)
- Strengthen Coordinating section with related Ministries (1)
- Creation of a new office for new business development (1)
- Strengthen Follow-up section (3)

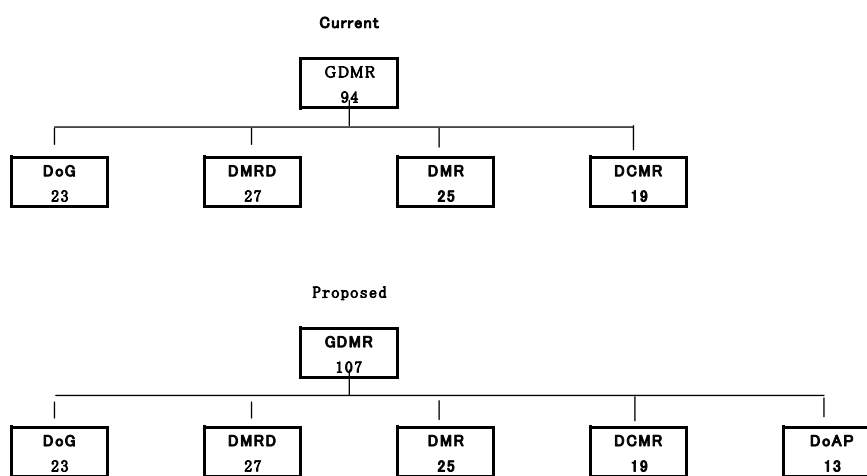
The staff increases by 16 people.

(2) Organizational Changes

To strengthen the above areas, there are two options. One is to keep the framework of the current organization but to modify its duties (Case A). The other is to create a new department or office (Case B).

- Modification of Duties of the Current Organization (Case A)
- Creation of a New Department (Case B)

A newly Department of Administration and Planning (hereafter referred to as DoAP) is proposed to be created (Fig.7.2).



Note: Number in parenthesis is staff size of June,2010

Fig.7.2 Proposed Organizational Reform

The following is an organizational outline including the above functions.

- The DMRD:
 - Development of laws and regulations (3 in addition to current 1, total 4)
 - New business development (1)
- The DoAP (a new department):
 - Overall strategic planning (incl. specialist in industrial research) (3 in addition to current 1, total 4)
 - MIS development (3)
 - New assignment of planning officer for personnel management (1)
 - New assignment of public relations officer (1)
 - Coordination with related Ministries (1)
 - Follow-up section (3)

7.4.3 Proposed Detailed Programs for Organizational Reform

(1) Strengthening of Overall Strategic Plan Formulation

The overall strategic plan is formulated to prioritize the operations and work to be done each year. A strategic plan formulated by each Department would be collected and integrated into the overall strategic plan of the GDMR. One senior officer and one research specialist would be newly assigned to this work.

The newly assigned research specialist would conduct surveys on the items listed below.

- Recent trends in the mining industry and mineral resources development in Cambodia
- Recent trends in the mining industry and mineral resources development in major countries
- Trends in investment in Cambodia
- Overview of major investors and their investment behavior
- Recent trends in mineral resources development in neighboring countries
- Recent trends in the market for construction materials in Cambodia
- The impact of mineral and construction materials development on local and national economies in Cambodia

The overall strategic plan at the GDMR is formulated based on each Department's strategic plan, which covers the following items:

- Prioritized business areas
- New business areas to be developed
- Quantitative targets for action
- Plans for human resources allocation
- Plans for procuring capital to develop newly prioritized businesses

(2) MIS Development

1) Purpose

MIS (Management Information System) development has the following effects.

- To streamline the GDMR's daily operations
- To make it possible to assure transparency and accountability in each operation
- To make job rotation for staff easy
- To make it possible for staff to obtain strategic information quickly

2) Stored Data

- Data indispensable for human resources and asset management
- Data created in daily operations, including customer information
- Data related to accounting, such as fees and royalties

3) Procedures for development

An analysis of operation flow is first conducted. Priority is given to the following operations.

- Registration of mining companies at the DMRD
- Issuing licenses for exploration of metallic mineral resources, at the DMR
- Issuing licenses for mining of construction materials, at the DCMR
- MOU-related information at the DoG
- Personnel management data in each Department

4) Process

- A development committee is set up. A detailed prototype of the MIS system is drawn-up by outside experts.

5) Prioritized areas

- Registration and issuance of licenses
- Statistics relating to registration and licenses
- Customer data files
- MOU-related data
- Personnel data
- Asset data
- Economic and industry information collected through contact with investors

6) Hardware and networking

The network will consist of one server, one computer for each staff member, and one printer for each ten staff member.

Strategic information, such as information on registered companies, would be accessible to only a limited number of staff.

7) Estimate of total investment cost

Total investment cost for MIS development is estimated to be US\$86,000. A breakdown of individual costs is shown below.

Table 7.7 Estimated Investment Costs for MIS

Investment item	Description	Unit price	Total cost
1. Software development	Consulting fee paid to software development company (One expert for 6 months)	US\$5,000 per month	US\$30,000
2. Server	One small type of server	US\$2,000 per unit	US\$2,000
3. Printer	Add 5 to current 10 units (3 printers for each Dept.)	US\$1,000 per unit	US\$5,000
4. Personal computer	One computer for each staff member, there are 70 new units	US\$700 per unit	US\$49,000
Total			US\$86,000

(3) Assignment of Planning Officer for Personnel Management

1) Responsibilities of the officer

With respect to personnel changes, the planning officer's task is only to make proposals; the final decisions are made by the Director General of the GDMR after discussions with relevant directors. One senior officer is assigned to this task.

- To place each staff member in the section where he or she can work at the best of their ability
- To promote talented and active staff for important work
- To make a training program for staff

(4) Enhancement of Public Relations Functions

Public relations activities are being enhanced to give the Cambodian people a better understanding of the importance and potential of the mining sector. A chief officer is assigned to this task.

- To make a list of organizations which have contact with the GDMR, including governmental offices, industrial associations and private companies
- To establish communications with the newly assigned public relations officers
- To hold regular meetings

(5) Enhancement of Coordination Functions

One senior officer will be assigned to coordinate work with related organizations.

(6) Enhancement of Follow-up Functions

Inspectors check whether staff are proceeding with their work in line with the internal regulations set forth in the operation manuals. Inspections will be conducted once a year. They will take around one month. Results of the inspection will be submitted to the Director General of the GDMR.

(7) Establishment of Three New Organizations

In addition to the functional enhancements to each of the above departments, three new organizations will be created under the Director General of the GDMR.

- Technology Center for Mineral Resources
- Mineral Laboratory
- Regional Mining Offices

7.4.4 Development of “Soft” Infrastructure for Successful Launch of Organizational Reform

(1) Development of Operations Manuals

The manuals have many potential merits, including the following:

- Operations are made efficient since they tell each officer how to proceed.
- They make the concepts and details of the operations easy to understand.
- They make it easy to identify areas where operations could be made more efficient.
- They enhance the transparency of operations.
- When an operating manual is available, it becomes easier to replace one worker with another worker.
- They can be used to train new officers.

(2) Development of Laws and Regulations

In order to attract high-quality investment, it is necessary to develop laws and regulations which will serve to protect Cambodia’s natural resources and the interests of the Cambodian people. In order to accelerate development, the organizational structure is being changed. This section of the DMRD is being strengthened through the assignment of two law school graduates.

7.4.5 Capacity Building for the Staff

Considering the importance of improving the abilities of staff in not only geological and mineral resources engineering areas, but also in the fields of mining economy and administration, it is recommended to set up a comprehensive school that trains them in all aspects of mining activities.

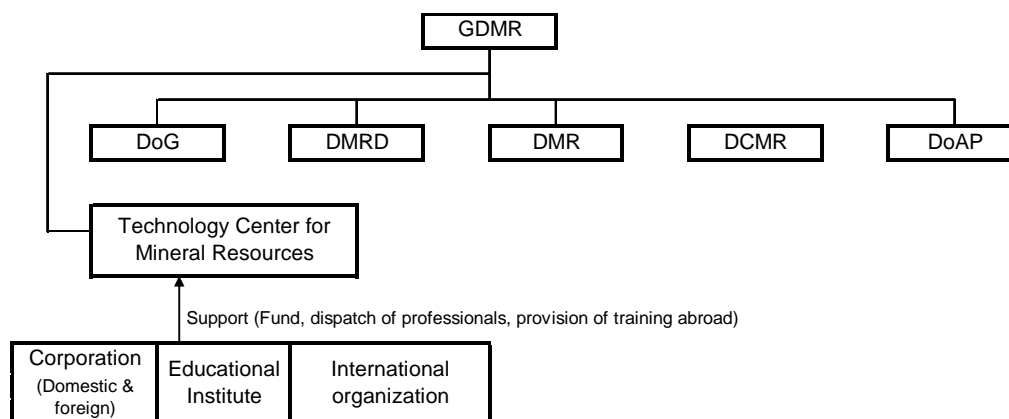


Fig. 7.3 Conceptual Diagram of the Proposed Technology Center for Mineral Resources

Fig.7.3 represents one concept. An institute would be established under the MIME, though the supervision would be entrusted to the GDMR. The center would be set up with support from educational organizations, business organizations, and donors. Daily operations of the center would be supervised by the DoG.

(1) Technology Center for Mineral Resources

The purpose and capacity building program for the Technology Center for Mineral Resources are as follows:

1. Purpose

- The first goal is strengthening the technological abilities of the GDMR staff.
- Fostering the primary- and medium-class engineers of the private mining sector

2. Characteristics

- Cooperation among the GDMR, business, and academia
- Both technology-oriented and management-oriented
- Provides overseas training

3. Courses

- Number of participants: 20 per year
- Course length: 1 year

1) Basic Course

- Mineral resources development policy in Cambodia
- Importance of mineral resources in the Cambodian economy
- Overview of mining in the world and recent developments
- History of mining and mineral resource development policies in the world
- Measures for supporting mineral resources development
- Overview of mineral resources by type of mineral: reservoir, resource development, and material flow
- Site visits for freshmen (exploration sites, mining sites, metal recycling plants)

2) Specialized Courses

- Geology
 - ✓ Ore genesis, metallogenetic stages, and mineral deposits & ore zones
 - ✓ Exploration (remote sensing, geological surveys, geophysical exploration)
 - ✓ Basic methods for calculating ore reserves and evaluating minerals
 - ✓ On-site Geological Studies
- Mining
 - ✓ Mining methods
 - ✓ Mining processes
 - ✓ Mining equipment & machinery
 - ✓ Rock mechanics
 - ✓ Mining planning
 - ✓ On-site training at mines (two weeks)

- Mineral Processing
 - ✓ Principles of mining processing
 - ✓ Processes
 - ✓ Planning for mineral processing
- Smelting and Refining
 - ✓ Principles and methods
 - ✓ Processes and planning
 - ✓ Technologies for mineral recycling
- Mining Health & Safety and Environmental Protection
 - ✓ Mining field: Explosives, electricity, and mechanics for mining equipment & machinery, spontaneous combustion, gas & dust explosion, rock bursts, rock failure, slope stability, measurements for health & safety at mining sites, drainage treatment, noise control, and dust control
 - ✓ Processing field: Electricity and mechanics for processing equipment & machinery, treatment of hazardous/deleterious/toxic materials, and measurements for health & safety at processing sites
 - ✓ Smelting field: Electricity and mechanics for processing equipment & machinery, treatment of hazardous/deleterious/toxic materials, and measurements for health & safety at smelting sites
 - ✓ General fields: Ecology, Environmental Impact Assessments, laws and regulations in advanced countries

3) Mine Management Course

- Contracts
 - ✓ Exploration and development
 - ✓ Employment contracts
 - ✓ Agreements with local residents
- Markets & Finance
- Project evaluation
 - ✓ Project evaluation and finance
 - ✓ Case studies on exploration, mining, and mine closure

4) Other Courses

- Training in presentation and debate skills, reading international agreements in English
- Overseas training

(2) Initial investment costs and ongoing costs for the Technology Center

The costs to open and operate the Technology Center are calculated based on certain assumptions (for example, six study sections, lecturers from overseas, etc.). The details are as follows:

- Technology Center building construction cost (offices, training rooms, and classrooms): US \$1,000,000
- Training machinery and equipment cost: US \$600,000

- Advanced courses are composed of the following six sections
 - ✓ Geology
 - ✓ Mining
 - ✓ Mineral Processing
 - ✓ Metallurgy
 - ✓ Environmental Protection
 - ✓ Mining Economics and Marketing
- Lecturers: Due to the scarcity of qualified lecturers in Cambodia, invite them from overseas.
One lecturer for each of the six fields listed above.
- Overseas lecturer cost: US \$200,000 per year, per lecturer (x 6 lecturers = US \$1,200,000)
- Annual facility operations cost: US \$100,000

Total initial investment and ongoing operating costs:

- Total investment cost: US \$1,600,000
- Annual operations cost: US \$1,300,000

(3) Establishment of geology and resource engineering courses at ITC

In contrast to the concept of the above Technology Center for Mineral Resources, the establishment of long-term higher education programs in geology and mineral resources engineering is being considered at the Institute of Technology of Cambodia (ITC) to offer degrees in geology and resources engineering, and also to supplement basic technical education. In short, it is recommended that it would involve the creation of a greatly enhanced educational and research facility utilizing ITC's current functions and facilities.

7.4.6 Overall Organization Chart after the Reform

The following chart shows the reorganized GDMR.

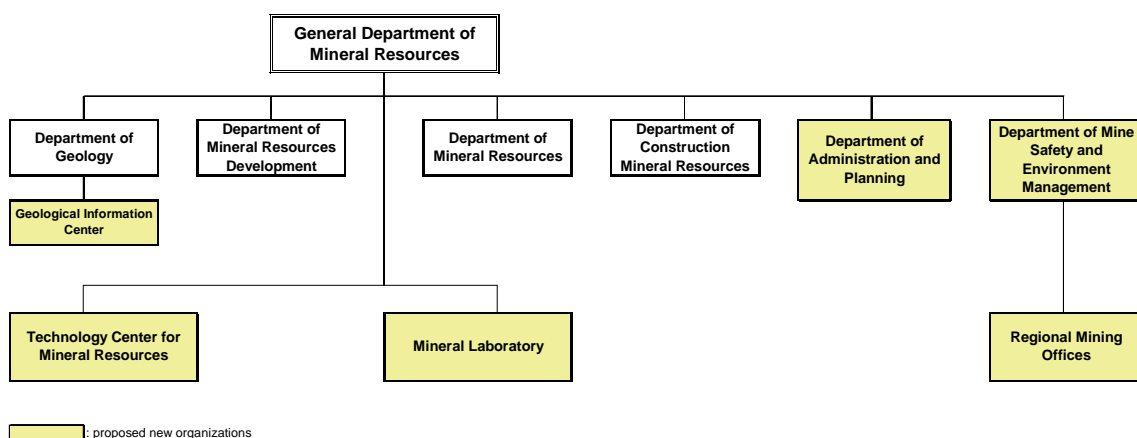


Fig. 7.4 Overall Structure of the Proposed GDMR Organization

The roles and functions of these new organizations are as follows:

Department of Administration and Planning: Comprehensive planning, general operations and management, and public relations.

Department of Mine Safety and Environment Management: Formulation of legal regulations related to mine safety and mining environments, and monitoring of mine safety (with a central mine supervisor stationed in the department)

Technology Center for Mineral Resources: Training for GDMR staff, and for private sector mining engineers and exploration engineers

Mineral Laboratory: National mineral analysis organization, provide analytical services to the private sector

Regional Mining Offices: Regional organizations of the GDMR which are under the jurisdiction of the Department of Mine Safety and Environment. Regional supervisors monitor exploration and exploitation (excavation) work.

7.4.7 Implementation of an Action Plan

Given their special features, it appears that organizational reform and capacity development will take a long time for full, successful implementation. It is recommended that the GDMR ask one or more international donors to dispatch experts to monitor the implementation of the action plan.

7.5 System for Managing and Utilizing Mineral Resource Information

There are two major types of mineral resource information at the GDMR. They are 1) geology, mineral deposits and occurrences, and 2) concession management information.

Information on geology, mineral deposits and occurrences, which can be used to estimate the mineral resource potential of Cambodia, must be managed from a geo-scientific point of view; thus, this information should be managed by the DoG. All mineral resource information such as geological and geochemical survey data and company reports after evaluation, should be stored in the GIS database. There are three categories for concessions, i.e., mineral resources, rock, and sand, which have been managed by the DMR. Because the concession datasets contain confidential information about investors, no related information has been disclosed under the present mining law. However, the GDMR should consider means of promoting the development of the Cambodian mining sector by, for instance, incorporating concepts of EITI, etc., into future revisions of the current mining law, and improve the transparency of information for related mining activities to gain the confidence of foreign investors.

The following five basic elements should be considered for these purposes:

- i. Main office for each type of information management
- ii. Improvement of information sharing
- iii. Preservation of confidentiality
- iv. Implementation of information disclosure

- v. Transition of information management from the current to the future legal framework

7.6 Action plan for Mine Safety/Mining Environmental Management

Appropriate management of mine safety and the mining environment is indispensable for enhanced Cambodian mining activities in the future, and necessary actions must be taken with a long-term perspective. The action plan for mine safety and mining environmental management is shown in the following table.

Table 7.8 Action Plan for Mine Safety and Mining Environmental Management

Action Plan Item	Base Foundation Period					Fostering Period				
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Legal Establishment for Mine Safety/ Mining Environment										
Establishment of Committee for Mine Safety and Mining Environment										
Intensive Training for GDMR Staff for Safety/ Mining Environment										
Establishment of Qualification System for Mining Operation										
Introduction of Environmental Assessment										
Implementation of Baseline Environmental Survey										
Preparation of Guidebook for Mine Safety/ Mining Environment										
Unionization of Artisanal Gold Miners										
Decontamination of Areas Polluted by Artisanal Gold Mining										

7.6.1 Legal Preparations for Mine Safety and Mining Environmental Management

Currently, there are no detailed regulations for mine safety in Cambodia. Therefore, a Mine Safety and Mining Environmental Law must be formulated. In particular, the following issues are strongly linked to mine safety and mining environmental management, and must be given a workable legal framework.

- 1) Required Protective Equipment for Mine Workers
- 2) Legal Establishment of Mine Inspectors in the GDMR
- 3) Preparing Safety Maps
- 4) Enhancing Self-Management of Safety
- 5) Required Accident Reporting
- 6) Accident Relief
- 7) Required Mining Environment Monitoring
- 8) Obligation to Submit a Mine Closure Plan

Implementing organization: the GDMR

Timing and period of implementation: From the early phase of the Basic Foundation Period (2011 to 2012), lasting 2 years.

Method of implementation: With the assistance of a mining consultant (4 months) and a legal expert (2 months), the relevant department at the GDMR will prepare a draft of the new law to submit to congress.

Expenditures: US\$73,000

7.6.2 Establishment of a Committee for Mine Safety and Mining Environment

The government will establish a committee for mine safety and mining environment, and develop a procedure under the guidance of this committee for observing all mining activities in Cambodia. The GDMR is responsible for daily management of mining activities,

but it could encounter some issues that overlap with the jurisdictions of other ministries. The object of the committee is to examine these issues from a wider variety of viewpoints to reach a consensus for solving them. Members of the committee will include representatives of the MIME, MoE, MAFF, academic experts, concessionaires, mine workers, and local stakeholders. The minister of the MIME will have the authority to appoint and remove members upon the recommendation of the GDMR.

Implementing organization: the GDMR

Timing and period of implementation: It would be done in 2013.

Method of implementation: The GDMR should take the initiative to establish this committee by approaching other ministries and organizations. The committee will have one regular meeting per year, but emergency committee meetings can be held if necessary.

Expenditures: US \$10,000

7.6.3 Mine Safety and Mining Environmental Training for the GDMR Staff

A department of mine safety and mining environment should be established in the GDMR to supervise all the mines in the country. The staff in charge of supervising mine safety and mining environment should undergo practical training at mining sites. Mining sites in advanced countries, such as the US, Australia, or Canada would be good locations for practical training.

Implementing organization: the GDMR

Timing and period of implementation: At the early phase of the Basic Foundation Period (2012 to 2013), lasting 2 years

Method of implementation: 3 staff members will be sent to an advanced mining country for 3 months of safety and environmental training.

Expenditures: US \$80,000

7.6.4 Qualifications related to Mining Operations

Several qualifications need to be established for appropriate mining supervision. A national examination system must be established that covers the qualifications. Mine accidents can be prevented by educating and training miners.

Implementing organization: the GDMR

Timing and period of implementation: Done in 2014

Method of implementation: With the assistance of a mining consultant (3 months), the relevant department at the GDMR will prepare a draft of a new sub-decree to submit to the minister.

Expenditures: US \$38,000

7.6.5 Introduction of Environmental Evaluations

Based on the national policy to conserve the beautiful nature of Cambodia, the

“Environmental Evaluation” (hereafter EE) system used in Peru should be introduced in Cambodia to regulate the impacts of exploration operations according to the scale and type of exploration (Fig.7.5). There is no need to implement a detailed survey, like an EIA, but each company should study the environmental aspects of their exploration areas and determine how they can reduce environmental impacts caused by their operations in advance.

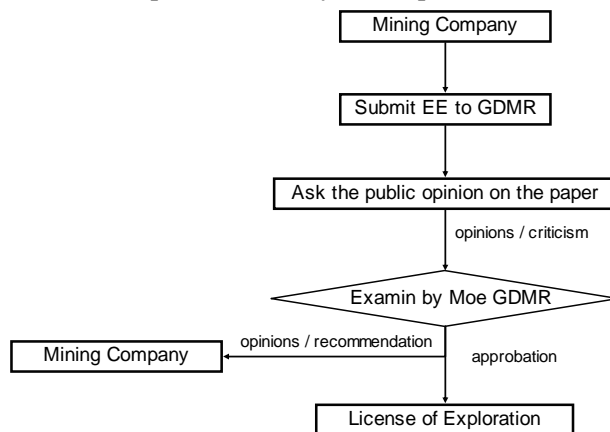


Fig.7.5 Flow-chart for Approval of Exploration Licenses

Implementing organizations: the MoE and GDMR

Timing and period of implementation: Done in 2014.

Method of implementation: With the assistance of a mining consultant (2 months) and an environmental expert (2 months), the relevant department at the GDMR will prepare a draft of the new Prakas to submit to the minister.

Expenditures: US \$50,000

7.6.6 Baseline Environmental Survey

In mining areas, baseline environmental surveys must be implemented at an early phase of the mining process to collect basic environmental data, including metal compound concentrations, local fauna and flora, etc. This data should be used as a parameter for measuring environmental changes in the long-term operations of the mines. If environmental changes occur after mining production has begun, the MoE and GDMR must give administrative guidance to the mine to reduce the environmental impacts to the level of the values derived from the baseline surveys.

Implementing organizations: the MoE and GDMR

Timing and period of implementation: At the end phase of the Basic Foundation Period and the beginning phase of the Fostering Period (2015 to 2020), it would be done in some mining areas every year.

Method of implementation: With the assistance of a geologist (5 months), geochemist (5 months) and an international environmental survey company, the relevant department (the DoG) at the GDMR will implement the baseline surveys for the first 2 years. After that, the DoG will conduct the baseline surveys on its own using its acquired skills.

Expenditures: US \$620,000 (for the first 2 years)

7.6.7 Preparation of a Guidebook for Mine Safety / Mining Environment

The environment-related laws and sub-decrees covering mining activities are: the Mining Law, the Environment Law, the Law on Forestry, the Protected Area Law, the Sub-decree on the EIA Process, the Sub-decree on Water Pollution Control, the Sub-decree on Solid Waste Management, and the Agreement on Metallic Mineral Exploration and Exploitation, as well as the Mine Safety and Mining Environment Law. A guidebook for mining operations that explains these legal regulations should be prepared to help mining companies understand them.

Implementing organization: the GDMR

Timing and period of implementation: When the legal preparations for mine safety and environmental management are completed in the Basic Foundation Period, done in 2013.

Method of implementation: With the assistance of a mining consultant (4 months), the relevant department at the GDMR will prepare this guidebook.

Expenditure: US\$50,000

7.6.8 Unionization of Artisanal Gold Miners

The artisanal gold miners in the country should be unionized at the provincial or local level. This union should have mining rights to manage its mines just as the private companies do. The GDMR will provide each union with instruction in exploration methods, mining methods, and processing methods, with assistance from mining experts. After that, these unions will be expanded to the national level to maintain a constant connection with the GDMR. This could be the starting point for the artisanal gold miners to commence legitimate mining operations that invigorate Cambodian mining.

Implementing organization: the GDMR

Timing and period of implementation: At the ending phase of the Basic Foundation Period (2014), lasting 3 years. It might last longer if necessary.

Method of implementation: With the assistance of a mining consultant (10 months) and a geological engineer (6 months), the relevant department at the GDMR will implement the project. For 3 years, the GDMR will survey the state of operations and ore reserves of the artisanal mining areas to determine whether or not operations can continue. Artisanal mining areas which are permitted to continue operating for a limited time might be targets for unionization. The GDMR should provide them with loans to buy the necessary machines when necessary.

Expenditures: US \$800,000

7.6.9 Decontamination of Areas Polluted by Artisanal Gold Mining

The areas where the artisanal gold miners operated in the past will be investigated. This project will investigate ways to restore the environments of areas contaminated by mercury, as well as the construction of a processing plant to recover un-recovered low-grade gold ore

with new technologies such as a closed carbon-in-pulp system (CIP system) and the construction of a tailings-dam to hold tailings from the plant. Profits gained from the recovery of un-mined gold could be used to fund this project.

Implementing organization: the GDMR

Timing and period of implementation: At the ending phase of the Basic Foundation Period (2014), lasting 3 years.

Method of implementation: With the assistance of an international mining consulting company, the relevant department at the GDMR will implement the project. For 3 years, the GDMR will collect information on contaminated areas, survey the state of the areas, and investigate the recovery of un-mined low-grade gold, as well as small amounts of unrecovered gold contained in the contaminated soil, to design and construct a gold-recovery plant with new technology such as the CIP system. At the same time, a new tailings dam should be designed and constructed to collect and seal tailings from the plant. The decontamination process for this project will be imparted through technology transfer to the GDMR, which will construct the second and third plants, and continue decontamination in the country in collaboration with the artisanal gold miners union.

Expenditures: US \$1,000,000 (for the first project)

End of Report

