

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 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 follows;

- 1) To carry out mineral operations duly and effectively using by the following techniques and financial plans, which shall be detailed in an exploration work program or in a mining feasibility study.
- 2) To protect the environment as detailed in the Environment Law such as the study of EIA, plan for environmental management, plan for restoration of mining sites, and financial guarantees.
- 3) To ensure the occupational health and safety of workers, which shall be detailed in a program for mining plans, including the protection against danger and procedures for reporting dangers.
- 4) To protect the public safety in and around mining sites, which shall be detailed in the mining plans.
- 5) To educate, train and employ Cambodians, which shall be detailed in a program for employment, education and training.
- 6) To procure goods and services obtainable within Cambodia, where and when it is appropriate.

As an additional duty, Article 25 (5) 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 without specific regulation. It should be noted that there is no Mine Safety/Environment Law that define safety and environment in mining activities apart from the Mining Law. Therefore, there is no sufficient and appropriate legal system to manage the mining industry in regards to nature.

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 prepared by the MoE from 1993 to 1995 and promulgated in December, 1996. This law consists of 11 chapters and 27 articles, and defines rules and regulations for

environmental protection and natural resource management. The main objectives of this law are as follows:

- (1) To protect the health of Cambodian citizens and increase environmental quality by means of protecting against and suppressing pollution.
- (2) To examine environmental impacts of proposed projects.
- (3) For mines to ensure maintenance, management, development and utilization of natural resources in the reasonable and sustainable manner.
- (4) To enable Cambodian citizens to participate in environmental protection and natural resource management.
- (5) To suppress actions leading to environmental destruction.

This law also shows the management principle for environmental and natural resources, defining the EIA for every project (Chapter 3). It also defines monitoring, record-keeping and inspections for factories, pollution sources, industrial sites, and sites of natural development activity (Chapter 6). However, there is no specific and detailed regulation for mining operations.

2.6.3 Law on Forestry

This law defines the framework for management, harvesting, use, development and conservation of the forests in 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 (Article 1). This law applies to all forests, whether natural or planted. The State ensures customary user rights of the forest products and byproducts for local communities and as further provided in the provision of this law or other relevant laws (Article 2).

Article 35 defines exploitation as follows; quarrying, soil and sand excavation, mining, and other natural resources extraction, conducted within the Permanent Forest Reserves, shall require a prior study-evaluation from the MAFF, authorization of the government, and be in compliance with Article 4 of this law. Such authorization shall state the protection and restoration measures for the site for quarrying, soil and sand excavation, mining and other natural resources extraction, whereby the holder of such rights shall be responsible to:

- 1) Avoid causing or aggravating soil erosion, damage to growing vegetation, damage to hydrologic systems and the quality of water,
- 2) After project completion, to restore the site of quarrying, soil and sand excavation, mining or other natural resources extraction, to the original state within the time frame set by the permit.

This also shows the basic conditions for mining activities within the 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 consists of 11 chapters and 66 articles. The most influential article governing mining activities is probably Article 11 of Chapter IV. This article 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. Access to these zones is prohibited except by the Nature Conservation and Protection Administration officials and researchers who, with prior permission from the MoE, conduct nature and scientific studies for the purpose of preservation and protection of biological resources and the natural environment with the exception of national security and defense sectors.
2. **Conservation zone:** management areas of high conservation value containing natural resources, ecosystems, watershed areas, and natural landscape located adjacent to the core zone. Access to these zones is allowed only with the prior consent of the Nature Conservation and Protection Administration at the area with the exception of national security and defense sectors. Small-scale community uses of non-timber forest products (NTFPs) to support local ethnic minorities' livelihood may be allowed under strict control, provided that they do not present serious adverse impacts on biodiversity within the zone.
3. **Sustainable use zone:** management areas of high economic value for national economic development and management, and conservation of the protected areas itself thus contributing to the local community, and indigenous ethnic minorities' livelihood improvement. After consulting with relevant ministries and institutions, local authorities, and local communities in accordance with relevant laws and procedures, 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 and may contain existing residential lands, paddy fields, garden, and slash-and-burn fields (Chakar).

Issuing land title or permission to use lands in this zone shall have prior agreement from the MoE in accordance with the Land Law.

Namely, in the Core zone and Conservation zone, even access to the zones is severely limited. In the Sustainable zone and Community zone, development is possible only when the government permits it. Plans call for a subdecree to be issued showing a zoning map of protected areas, but it is not ready yet.

However, if a project is located in a Core zone or Conservation zone, no mining development, construction of infrastructure, eco-tours, etc, is 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) environment impacts caused by project activities, and b) environmental protection measures to stop or minimize each impact. The MoE examines and evaluates EIA reports. Compliance of each project is determined based on the Environmental Law and EIA Subdecree by the MoE.

The three major benefits of EIAs are as follows:

- 1) To protect valuable and irreplaceable natural resource (forests, swamps, wildlife, endangered fauna, water, soil and air).
- 2) To contribute to the health and welfare of Cambodian citizens.
- 3) To enable project owners to understand environmental value and the costs that are necessary for environmental protection.

Submission of EIAs is regulated according to kind and scale of project, but all mining projects must submit an EIA regardless of their scale of operation.

A flowchart of EIA related to the mining sector is shown in Fig.2.6.1.

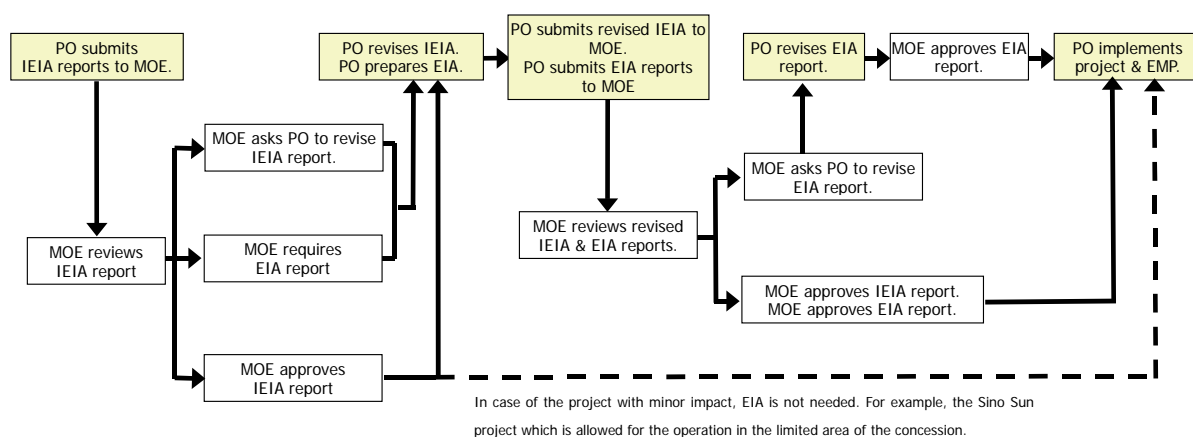


Fig.2.6.1 The EIA Procedure for Mining Projects

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 ensure the protection of human health and the conservation of biodiversity (Article 1). This subdecree applies to all sources of pollution of public water areas (Article 2).

The types of hazardous substances are listed in Annex 1 of 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. In addition, effluent standards for pollution sources discharging wastewater into public water areas or sewers are listed in Annex 2. Here, 18 metals are regulated. Wastewater from the tailings dams should comply with this standard. Types of pollution sources requiring permission from the MoE before discharging or transporting their wastewater are listed in Annex 3. In this list,

mining and coal washing (45) are named as category II, so discharging tailings requires permission from the MoE. The water quality standards for public water areas for biodiversity conservation, listed in Annex 4, are the same as the Japanese standards. The water quality standards for public water areas for public health protection, listed in Annex 5, are stricter than the Japanese ones.

The problem is whether or not these various regulations can be maintained. In particular, it will be different 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 regulate solid waste management in a proper technical manner and safe way in order to ensure the protection of human health and the conservation of biodiversity (Article 1). This subdecree applies to all activities related to disposal, storage, collection, transport, recycling, dumping of garbage and hazardous waste (Article 2).

Hazardous waste refers to radioactive substances, explosive substances, toxic substances, inflammable substances, pathogenic substances, irritating substances, corrosive substances, oxidizing substances, or other chemical substances which may cause a danger or damage to humans, animals, plants, public property, or the environment. The hazardous waste may be generated from residential dwellings, industries, agricultural activities, business and service activities, mining, etc (Article 3).

The storage, transportation, and disposal of hazardous waste shall be performed separately from household waste, which will be stipulated by Prakas of the MoE (Article 15). Further, the transportation or construction of storage places or landfills for hazardous waste from factories and manufacturing sites shall be subject to permit from the MoE (Article 17). The owner or person in charge of the storage or landfill of hazardous waste shall make quarterly reports on hazardous waste which is transported for disposal or storage, and forward these reports to the MoE (Article 18).

In addition, the monitoring of packing, storage, transport, recycling, incineration, treatment, and disposal of hazardous waste is the responsibility of the MoE (Article 22). Samples of hazardous waste taken during monitoring and inspection shall be analyzed in the Laboratory of the MoE (Article 24).

Here, it should be noted that there is no description of mines in the Annex for types of hazardous waste. The mining industry may produce a great deal more hazardous waste during mining (as stripped waste or dump for drifting) and processing (as tailings) operations 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

As stated in 2.3.2, when the mineral potential is estimated, the company will sign an Agreement on Mineral Exploration and Exploitation with the MIME. This agreement includes detailed regulations on environmental management, such as the “Works Obligation” in Chapter 5 and the “Environmental Protection” in Chapter 10, which are as follows.

The contractor shall open a bank account for restoration fund within 60 days after the industrial mining license is granted to the contractor, at a bank authorized to do business in Cambodia in the name of the contractor and the bank account for this fund shall be jointly administrated by the ministry and the contractor (Article 14.1). The contractor shall pay into the bank account for the restoration fund for site-specific restorations to the mined lands in the contract area through the following procedures: (a) An initial deposit for an amount equivalent to 20% of the estimated cost of restoration for each term of an industrial mining license issued to contractor. The estimated cost of restoration shall be mutually agreed upon by both parties before mining operations commences; (b) The remainder of the estimated cost of restoration, split into equal and consecutive annual amounts based on the duration of validity of the industrial mining license (Article 14.2).

After the permanent shutdown of mineral operations or of any mined area, the contractor shall be responsible for restoring the area where reasonable, preventing soil erosion, and ensuring the safety of the area in accordance with accepted mining practices and the agreed restoration plan (Article 29). The contractor, its subcontractors and agents and their employees shall respect the customs of the local populations settled within the contract area, and shall not unduly disturb or interfere with the living conditions of such local population (Article 30.1). For resettlement of the local population in the contract area, the contractor shall respect and implement the provisions of the Mining Law and Land Law (Article 30.2). The contractor shall make reasonable efforts to minimize the negative impact of its operations on the natural environment in the area, and take reasonable restorative steps from time to time before relinquishing the areas, as may be necessary for the prevention of soil, water, and air pollution, and the conservation of vegetation and wildlife. In particular, the contractor shall conduct its mineral operations so as not to unlawfully pollute any surface or subsurface fresh water supply, hold soil erosion and flood damages to a minimum, and terrace and landscape, the waste disposal areas in a reasonable manner. In addition to undertaking the above the contractor shall carry out the agreed restoration plan and abide by the provisions of the law on environment (Article 31). The contractor shall be absolutely prohibited from conducting mineral operations in the perimeter of archeological, patrimonial, and historical properties, burial places, railway, public roads, ponds, and lands reserved for other special public purposes, even if those areas are located in the contract area, except when the contractor has the special written approval of the ministry granting the current mineral exploration/mining license (Article 32). The contractor shall make provisions to ensure that all water used in connection with mineral operations shall, before it leaves the land affected by the mineral exploration or mining, not have materially diminished water quality standards. The contractor shall not be entitled to materially diminish

the quality or quantity of any existing source of water being used for domestic, farming or livestock purposes without making reasonable effort to provide the users of such water with a comparable supply and source or adequately compensating said users (Article 35).

These are not specific to a certain company, but rather are general and common to all companies. Therefore, this content should stand as an independent Mine Safety/Environment Law, including the more specific items, and other legal regulations mentioned above. This new law could be clear and simplify management of the mining sector. The responsible authority to this new law should be the GDMR of the MIME which governs the mining sector.

2.7 Environmental Administration

2.7.1 Assignment of the MoE

The Ministry of Environment (hereafter, MoE) oversees environmental conservation, and prevents and minimizes pollution. When issuing an industrial mining license, the investors must obtain approval for the exploitation rights applied by the CDC upon submission of the final feasibility study and EIA approved by the MoE, after they have obtained an exploration right through an agreement on mineral exploration and exploitation from the GDMR. The purpose of the MoE is to ensure sustainable development in Cambodia, with specific assignments as follows,

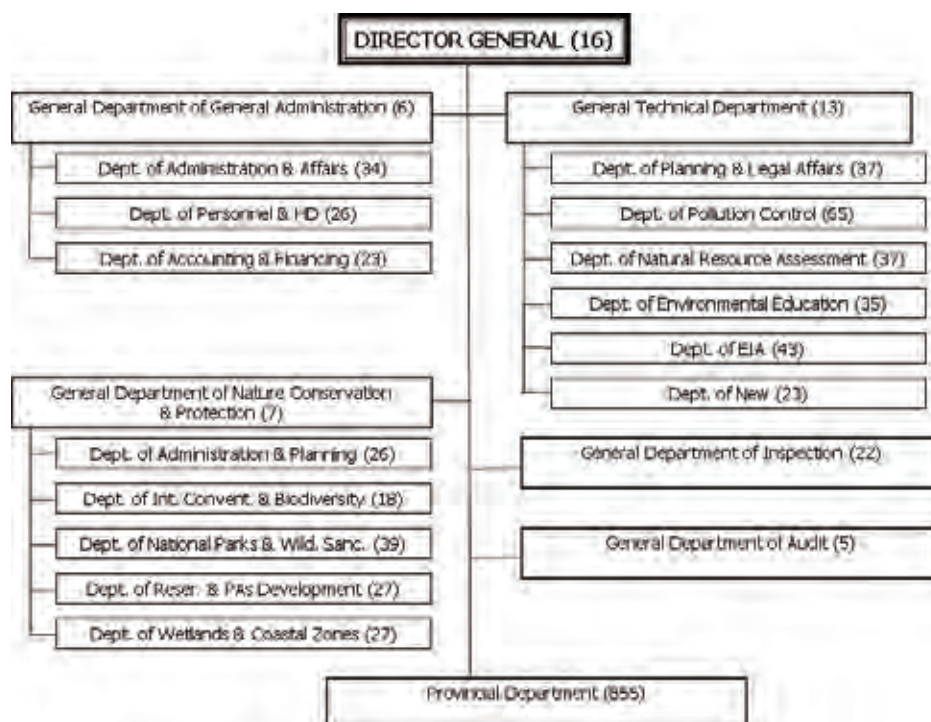
- 1) To implement environmental administration, and to formulate national and provincial action plans for the environment.
- 2) To draft and enforce environmental laws.
- 3) To examine the EIA for business projects and activities, and to suggest recommendations and EIA examination procedures.
- 4) To provide guidelines to the relevant ministries for reasonable and sustainable maintenance, development, and management of Cambodia's natural resources.
- 5) To advance management of protected areas and create new protected areas in cooperation with the government agency for the protected areas.
- 6) To formulate a waste list and to suggest measures for prevention, mitigation and regulation of environmental pollution.
- 7) To suggest procedures for inspection of pollution sources and reporting of violations, and to inspect areas and report violations.
- 8) To collect, analyze, and manage environmental data, make reports, and provide environmental information. To encourage public participation in environmental preservation and management.
- 9) To formulate and implement a program for environmental training.
- 10) To make drafts for international agreements, conventions, and protocols for environmental conservation, and to carry out the technical operations necessary to fulfill these.
- 11) To foster investment in environmental conservation and maintenance of natural resources,

and to create and manage environmental funds.

- 12) To foster international and domestic, NGO and community cooperation to enhance environmental conservation.

2.7.2 Organization of the MoE

The organization of MoE is shown in Fig. 2.7.1. The staff of the Moe numbers 1,384, including 529 in the head office in Phnom Penh, and 855 in provincial offices.



(source: MoE, staff size are indicated in ())

Fig.2.7.1 Organization of the MoE

2.7.3 Monitoring Implemented by the MoE

The MoE currently monitors air and water quality in Cambodia. Air samples were analyzed once a year in the Central Market from 2000 to 2003, at Ankor Watt in Siem Reap in 2004, and at 3 locations, Toul Kork, Olympic Stadium and Kbal Thnol in Phnom Penh from 2005 to 2008. The items of analysis are CO, NO₂, SO₂, O₃ and TSP. All measured values were within the national environmental standards. Water quality samples have been analyzed once a month in 11 sampling points in Phnom Penh since 1999. The items of analysis are pH, DO, conductivity, NO₂, NO₃, PO₄, COD, BOD, and coli form count. However, these items are not enough to meet the standards for assessing their quality of water in public water areas for public health protection. The sampling points are shown in Table 2.7.1. 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.

Table 2.7.1 Water Quality Sampling Points in Phnom Penh (source: MoE)

No.	Sampling point	Note
1	Kean Svay	Mekong downstream
2	Takmoa	Mekong downstream (Bassac River)
3	Chroy Changva	Mekong upstream
4	Phnom Penh Port	Tonle Sap River
5	Svay Rolum	Mekong downstream (Bassac River)
6	Prasmonivong Bridge	Mekong downstream (Bassac River)
7	Prek Kdam	Tonle Sap River
8	Stoeng Chrov	Outlet of Boeng Tumpun Reservoir Lake
9	Boeng Trabek	Inlet of sewage channel from Phnom Penh City
10	Boeng Tumpun	Inlet of sewage channel from Phnom Penh City
11	Prek Phnove	Outlet of sewage channel from Phnom Penh City into Tonle Sap River

Table 2.7.2 shows industrial wastewater data that the study team obtained from the MoE. According to this data, industrial wastewater volume continues to increase. Fortunately, the data also shows increasing treatment of wastewater, now nearly 100%. However, post-treatment water quality must be checked.

Table 2.7.2 Trend of Industrial Wastewater in Phnom Penh (source: MoE)

Year	kind	2004	2005	2006	2007	2008
Industrial water	treated	1,823,330	1,927,061	2,484,347	2,370,077	2,615,400
M3/y	Untreated	149,430	101,378	101,378	52,740	36,000
	Total	1,972,760	2,028,439	2,585,725	2,422,817	2,651,400
	Rate (%)	92.4	95.0	96.1	97.8	98.6

2.8 Infrastructure

In this clause, the present situation and the problem of energy infrastructure (electric power) and transportation infrastructure (roads, railways, rivers, ports) which generally have big influence on investment for mining development and mining operation costs are described.

In Cambodia, the civil war had continued for a long time from 1970s to the conclusion of Paris Peace Agreements in 1991, the entire infrastructure suffered from enormous damage. Since the end of the civil war, Cambodia is promoting rehabilitation and construction of infrastructure by cooperation of international institutes including Japan as a main member.

2.8.1 Roads

The road network of Cambodia is comprised of arterial roads administered by Ministry of Public Works and Transportation (MPWT), and rural roads administered by Ministry of Rural Development. The total road extension of Cambodia as of 2006 is shown in Table 2.8.1. Fig. 2.8.1 shows the comparison of road density and paved road density against the neighboring countries and Japan. The road density of Cambodia is 0.218 km/km² for the total roads, 0.063 km/km² for national roads and province roads, and which are the lowest among these countries. The present situation of the road network in Cambodia is shown in Fig. 2.8.2.

Table 2.8.1 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

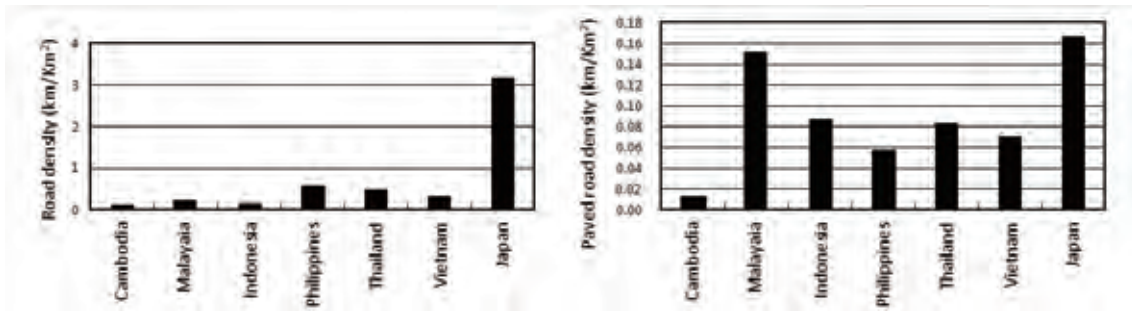


Fig. 2.8.1 Road Density (left) and Paved Road Density (right)



Fig. 2.8.2 Existing Road Network

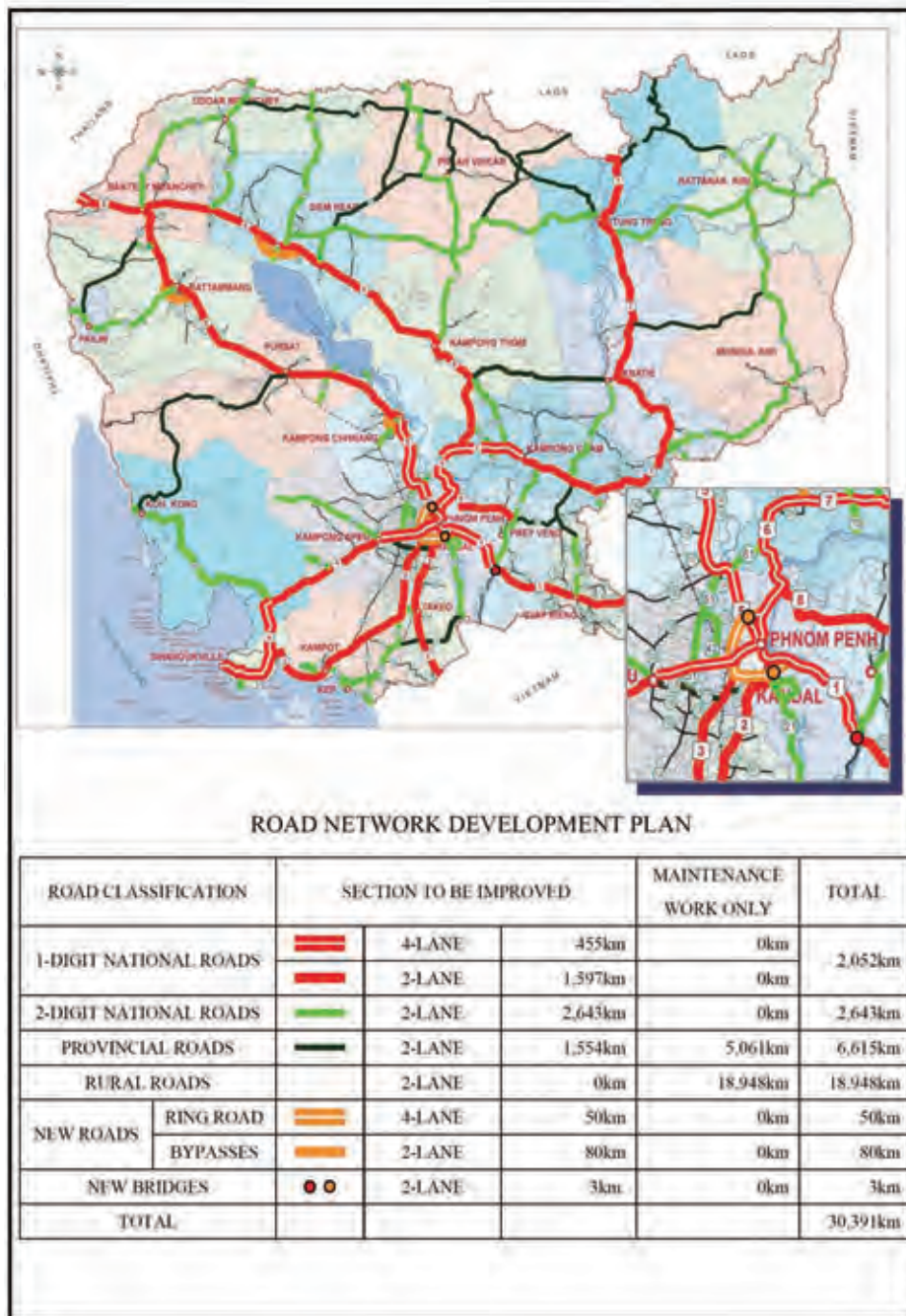


Fig. 2.8.3 Road Network Development Plan

The road development shown in Fig. 2.8.3 is promoted by grant aid and loan of foreign countries and international organizations, other than the construction works which are performed by Cambodia itself. As of 2008, pavement construction of single-digit roads has been completed, and pavement construction and rehabilitation of double-digits roads are performed.

Fig. 2.8.3 shows the drawing of development plan in the road development master plan that JICA drew up in response to the request of Cambodian government, and it includes

development of single-digit roads, double-digits roads, and provincial roads by 2020. Regarding the single-digit roads, the plan is to improve the road level to be all weather conditions with sufficient capacity and standards for international corridor. Regarding the double-digits roads, the plan is to improve the road to be highway class function under all weather conditions by the asphalt concrete pavement or DBST (Double Bituminous Surface Treatment). Regarding the province roads, they are designed to maintain the road function level to be trafficable in accordance with traffic demand by strengthening the road maintenance system. This master plan is adopted in the long-term plan of MPWT.

2.8.2 Railways

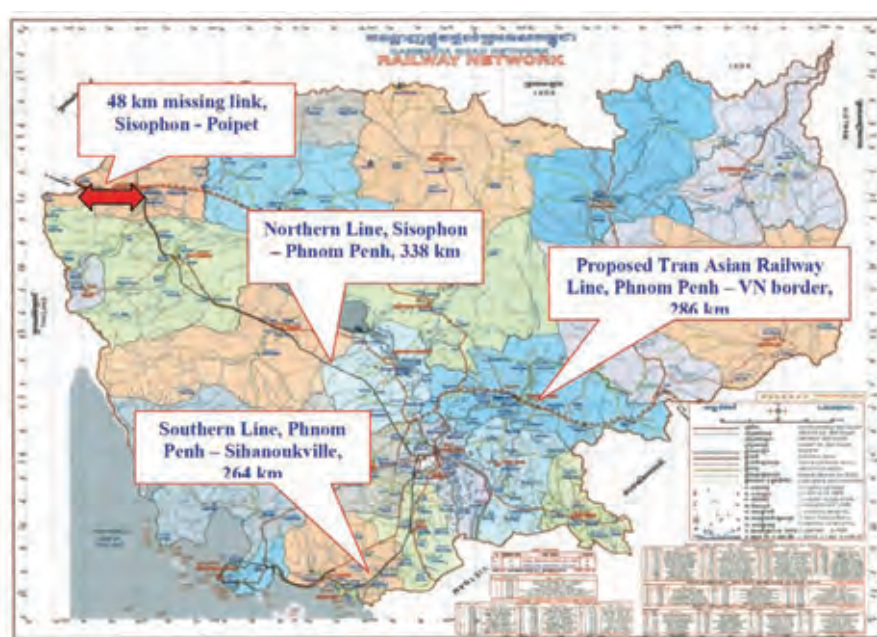
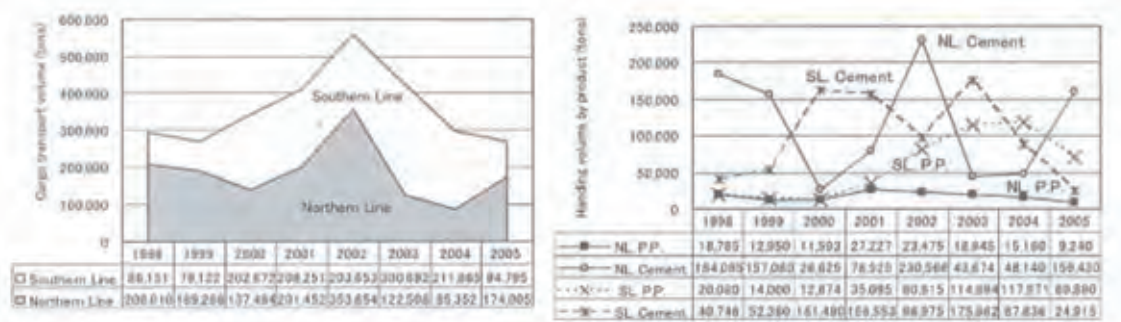


Fig.2.8.4 Railway Lines in Cambodia (after ADB Study)

As shown in Fig. 2.8.4, there are two lines which are comprised of the Northern Line which connects Siphon – Phnom Penh, and the Southern Line which connects Phnom Penh – Sihanoukville. However, the Southern Line stopped operation in 2004. As for the Northern Line, it has only one train which consists of a composite train of freight cars and passenger cars, and operation of a round trip train is only once a week, at present.

Fig. 2.8.5 shows the amount of freight transport, and the transportation amount of cement and petroleum products (P.P.) which are the main cargo, from 1998 to 2005.

Regarding the reparation of railways, a ground-breaking ceremony of railway's construction work for reparation was held in February 2008. This is the construction work of 652 km and the total construction cost of 73 million dollars (42 million-dollars is a support by ADB) which connects Phnom Penh and Sihanoukville to the Thailand boundary. The construction work is performed by companies of France and Thailand, and subsequent management is under consideration towards assigning the concession to a private company in Australia. (By the article of a newspaper on February 18, 2008)



Source: Prepared based on Restructuring of the Railway in Cambodia, Strategy Report and Action Plan, ADB and GMS Rehabilitation of the Railway in Cambodia, Final Report (Volume II), November 2006, ADB.

Fig. 2-2 Trends in rail cargo transport volume

Fig. 2-3 Trends in transport volume by product

Fig. 2.8.5 Railway Cargo Transportation

Regarding new construction of the railway, according to the Vietnam railway public corporation, Cambodian Ministry of Public Works and Transportation pronounced the construction of railway which connects Phnom Penh to Lok Ninh district, Binh Phuoc Province, Vietnam. This railway has a total distance of 257 km, and its gross investment amount is 550 million dollars (about 63,800 million yen). (By the article of a newspaper on December 19, 2007)

2.8.3 Inland Waterways

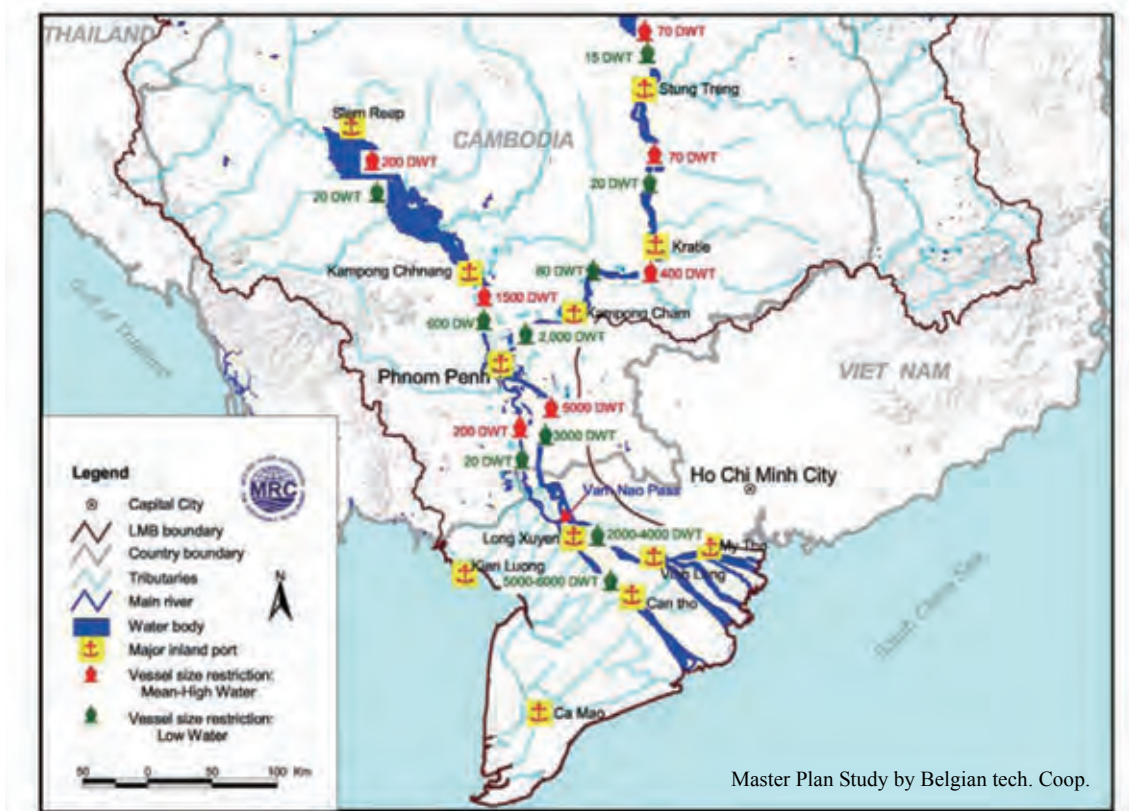


Fig. 2.8.6 Maximum Navigable Vessel Size in the Mekong River Basin

Cambodia has inland waterways which amount to 1,700 km and that is navigable. Among those, a ratio of the main stream of the Mekong River is 30%, the Tonle Sap River is 15%, and Bassac River is 5%.

The maximum navigable types of ships (red: at the time of high water level, black: at the time of low water level), and the main river ports are described in Fig. 2.8.6. Regarding the maximum types of vessels in the Phnom Penh Port classified by cargo are the barges of 1,000DWT/4.0m draught for petroleum, 1,900DWT/3.8m draught for containers, and 1,500DWT/4.0m draught for general cargo.

Since roads have been improved, the transportation amount of cargo is decreasing every year for each port. (It is estimated that the amount of freight handling at the Phnom Penh Port in 2005 was 5,700 tons.)

2.8.4 Port

The sea port in Cambodia which handles international cargo is only the Sihanoukville Port. (As for the river port, only the Phnom Penh Port is an international container port.)

Although the Sihanoukville Port is under control of the government, Sihanoukville Autonomous Port (PAS) is actually managing, that performs financially independent autonomous control.



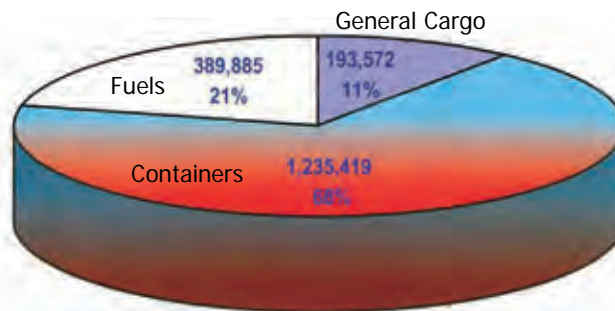
Fig.2.8.7 Outline of Sihanoukville Port

Table 2.8.2 Specification of Terminals (source: PAS brochure)

TERMINAL	LENGTH (m)	DEPTH (m)	BERTHS
Container Terminal	750	-10.00	05
General Cargo	290	-8.00	02
Passenger Terminal	290	-9.00	02
Sokimex	200	-9.20	01
Pontoon		-6.50	01
Stone Wharf	53	-4.20	01

Table 2.8.3 Cargo Handling Equipment (source: PAS brochure)

TYPE	CAPACITY	QUANTITY (Unit)
Moboke Harbor Crane	64t	02
Transtainer crane	40.6t	02
Super Stacker	45t	08
Empty Stacker	7.5t	02
Trailers	20'-40'	26
Shore cranes	10-50t	04
Forklifts	3-25t	21
Trucks for General Cargo	10-20t	10



(source: PAS brochure)

Fig. 2.8.8 Cargo Ratio 2007(tonnage)

Table 2.8.2 shows the specification of each terminal, and Table 2.8.3 shows the cargo handling facility/equipment. As shown in Fig. 2.8.8, the Sihanoukville Port is mainly handling containers, and it is crowded with container ships during weekends.

The General Cargo Terminal (also known as New Quay) can receive the ore vessels.. However, since PAS has not permitted the stationary type conveyers, loading equipment, etc., those which are of movable type shall be used. Further, vessels should be handy type. A ship of 15,000DWT class will be able to come alongside the pier. Handling of minerals in PAS is only unloading of coal at present. It is said that gypsum has also been unloaded. However, it is not experienced in loading. Regarding storage of minerals, a stockyard or a site for mineral storage buildings can be acquired in the port and around the port. In addition, five warehouses (about 6,000 m²/building) are available for storage of minerals.

August 21,2009, the Royal Government signed an agreement with the JICA to be provided a Japanese ODA loan for the Sihanoukville Port Multipurpose Terminal Development

Project. The bulk terminal for wood chips (Fig. 2.8.9) is a part of the Project.

This bulk terminal is designed as water depth of 13.5m, draught of 12m, quay length of 260m, and it will be completed in 2014.

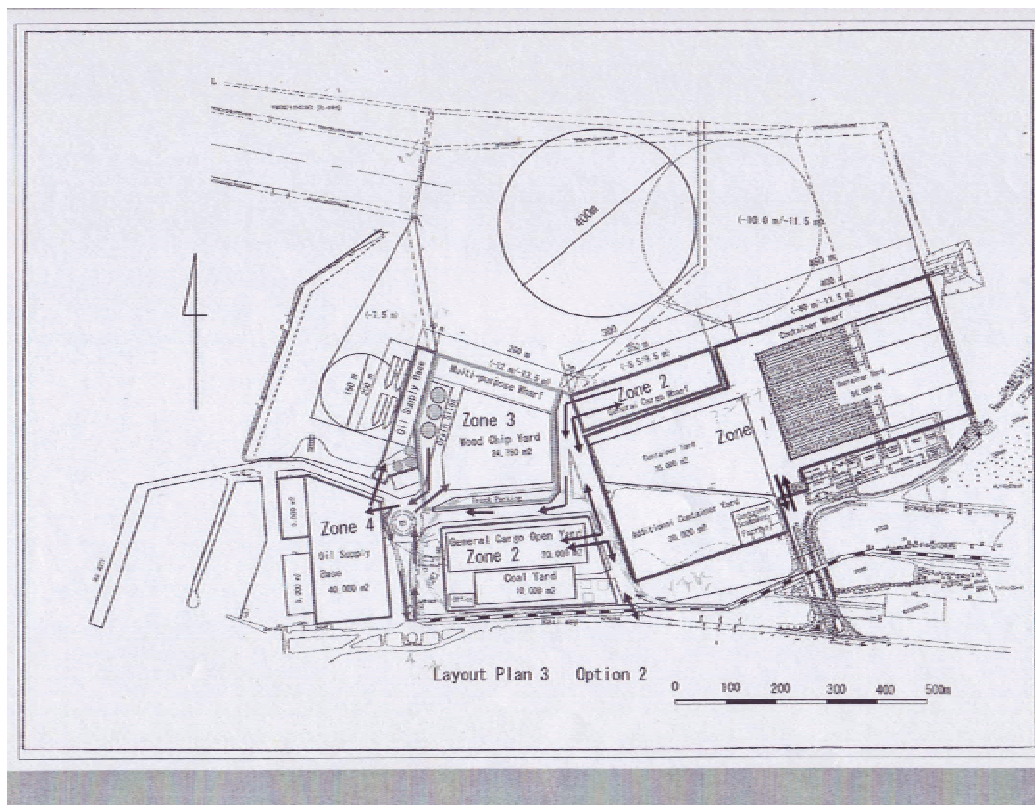


Fig. 2.8.9 Layout of New Bulk Terminal (source: PAS)

Since an initial annual handling amount of wood chips is estimated as 500,000 tons/year (type of ships is of a 50,000 ton class), it has a sufficient margin in terminal capacity, and it is also applicable to the shipment of ore. Handy type vessels for ores of a 30,000 ton class will be able to come alongside the quay.

As for the railway, a siding track has been entered into the port, and the main line has been repaired by ADB. The railway is due to be completed in four years.

2.8.5 Electric Power

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

- The amount of annual electric power used per capita: 60kWh
- An electrification rate is about 20% for the national average, 60% for city homes, and 10% for farm village areas.
- Electric power rates: US \$ 9-25 for the electric power system of EDC (government-managed firm: Électricité du Cambodge), and US \$ 40-80 for the electric power system of DEE (district electric power supplier: Rural Electricity Enterprises) in farm village areas
- Total electric power capacity: 300MW (200MW in Phnom Penh)
- Electricity generated in 2006: 1,200GWh

- Power generation system: Diesel power generation is 90% or more.
 - Intermittent electric power system: Only the power transmission line of 115kV from the Kirirom 1 power station to Phnom Penh, and the line of 115kV from the Thailand boundary to Meanchey, Siem Reap, and Battambang are continuing (Fig. 2.7.10).
 - Crude electric power quality (high rate of loss, fluctuation of voltage and frequency)
- Further, the following matters are reported as problems of the electric power system.
- There is no national high tension cable network.
 - It is not an economical scale. (Population of farm village areas is small, and profit cannot be obtained even if construction is made.)
 - Diversification of fuel is not made.
 - The import duty of petroleum is high.
 - Production costs are high.
 - Growth of demand is low.
 - Investment is dull.

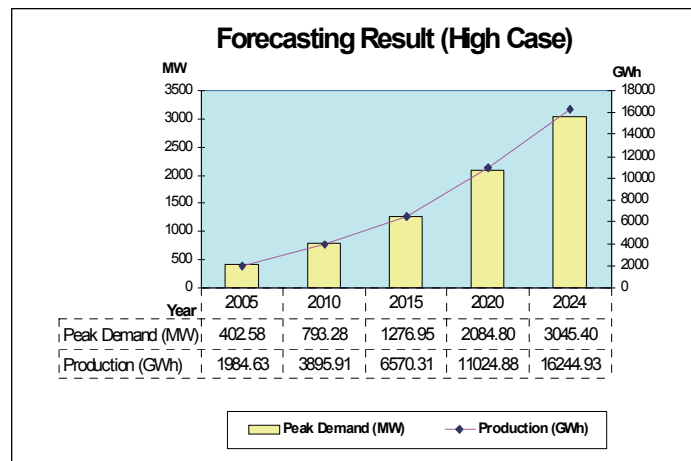


Fig.2.8.10 Existing Electricity Supply Area by the Enterprises Approved by ECA

In Cambodia, the electric power supply plan and the power transmission line building plan (2008 to 2020) has been drawn up. Fig. 2.8.10 shows the electricity demand and the prediction of electric power generation, Table 2.8.4 shows the electric power supply plan and the power transmission line improvement plan, Fig. 2.8.11 shows the present situation of the power transmission line, and Fig. 2.8.12 & Fig. 2.8.13 show the extending situation of the power transmission line in 2012 and 2020, respectively.

Table 2.8.4 Electric Supply and Transmission Line Expansion Plan

No.	Electricity Importation / Generation Project	Type	Nation	MW	Year	Stage	No.	Electrical Transmission Line Project	Year
1.	Trunk in Ranby Mueangy Sten sup. Battambang	import	Thailand	20	2008	Stage I (08 - 10) (MIM)	1	Transmission line 115kV Thailand to Ranby Mueangy Battambang and Sam Teap by DFTL (Cambodia)	2008
2	Vietnam to Phnom Penh	import	Vietnam	200	2009		2	Transmission line 220kV from Vietnam to Takeo and Phnom Penh by WB/ADB/NDP Loan	2009
3	Mekong II hydro power	hydro	China	18	2010		3	Transmission line 110kV in Phnom Penh	2008
4	Kanchai hydro power	hydro	China	165	2010		4	Transmission line 220kV from Takeo to Kampong Chhnang by R2W Grant	2010
5	Loas to Stung Treng	import	Vietnam	20	2010		5	Transmission line 110kV from Laos to Stung Treng by WQ Grant	2010
6	Vietnam to Phnom Penh (Long Klonging Chien)	import	Vietnam	30	2010	6	Transmission line 110kV from Vietnam to Kampong Chhnang by WB Loan	2010	
7	First stage of first coal-fired power plant in Sihanoukville (total capacity 2000MW)	thermal	Malaysia	100	2011	Stage II (11 - 12) (MIM)	7	Transmission line 220kV from Kampong Chhnang to Sihanoukville by ADB/ASE Loan	2011
8	Stung Apsa hydro power	hydro	China	150	2012		8	Transmission line 220kV from Phnom Penh to Kampong Chhnang Royal and Battambang by CVD	2012
9	Second stage of first coal-fired power plant in Sihanoukville	thermal	Malaysia	100	2012	Stage III (13 - 14) (MIM)	9	Transmission line 220kV from Kampong Chhnang to Phnom Penh by CVD (China)	2012
10	First stage of second coal-fired power plant (total capacity 3000MW)	thermal	China	100	2013		10	Transmission line 220kV from Phnom Penh to Kampong Chhnang by Private Company	2012
11	Second stage of second coal-fired power plant	thermal	China	100	2014	Stage IV (15 - 16) (MIM)	11	Transmission line 220kV from Phnom Penh to Sihanoukville (new National Grid No.4)	2013
12	Stung Treng hydro power	hydro	China	240	2014		12	Substation in North of Phnom Penh (MPP) and East of Phnom Penh (EPP)	2014
13	Third stage of second coal-fired power plant	thermal	China	100	2015	Stage V (17 - 18) (MIM)	13	Transmission line 110kV from EPP to Neak Leung and Svay Rieng	2014
14	Lower Stung Treng hydro power	hydro	China	338	2015		14	Transmission line 220kV from Treng hydro power to Di Sore substation	2015
15	Fourth stage of second coal-fired power plant	thermal	China	100	2016	Stage VI (19 - 20) (MIM)	15	Transmission line 115kV from WPP to ZPP	2015
16	Lower Sesan II combined with Lower Sesan II hydro power	hydro	Vietnam	420	2016		16	Transmission line 220kV from Kratie to Kampong Chhnang substation	2016
17	Stung Chhnay Aeng hydro power	hydro	China	260	2017	Stage VII (21 - 22) (MIM)	17	Transmission line 220kV from Phnom Penh to Kampong Chhnang and Lower Sesan II and Lower Sesan II	2016
18	Fifth stage of second coal-fired power plant	thermal	China	100	2017		18	Transmission line 220kV from Stung Chhnay Aeng hydro power to Ou Sore substation	2017
19	Six stage of second coal-fired power plant	thermal	China	200	2018	Stage VIII (23 - 24) (MIM)	19	Transmission line 220kV from Kampong Chhnang to Kampong Chhnang and Sam Rong	2018
20	Santien hydro power	hydro	China	480	2019		20		
21	Third coal-fired power or CCGT	thermal	China	400	2020				
	Total			3585					



(source: MIM)

Fig. 2.8.11 Future Trend on Power and Energy Demand

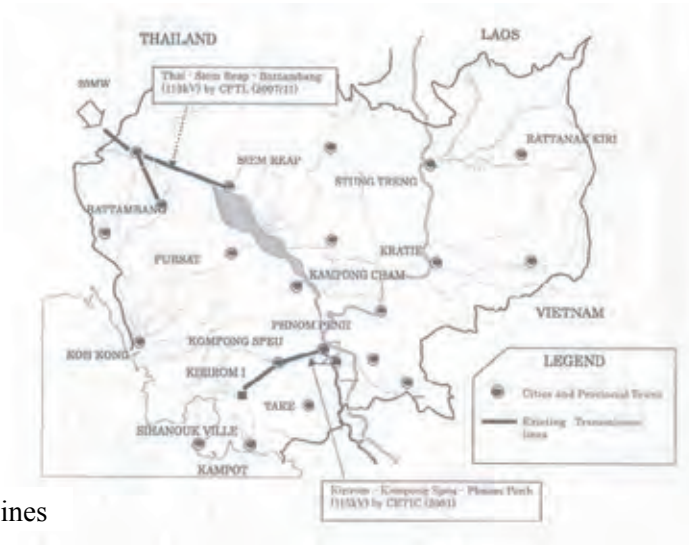


Fig.2.8.12 Existing Transmission Lines

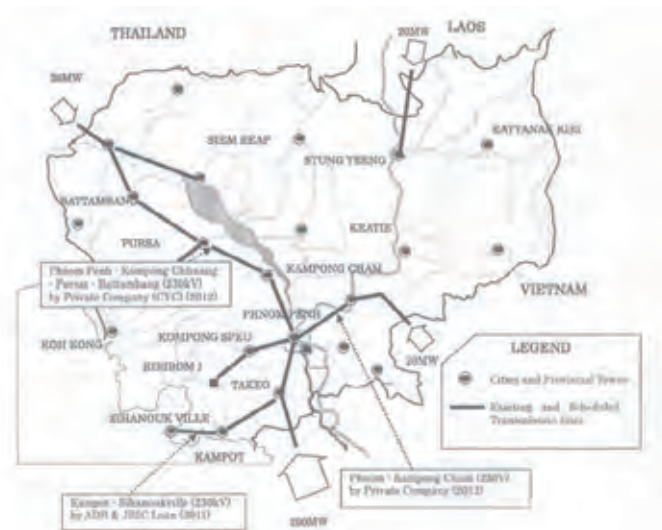


Fig.2.8.13 Transmission Expansion Plan (2011-2012)

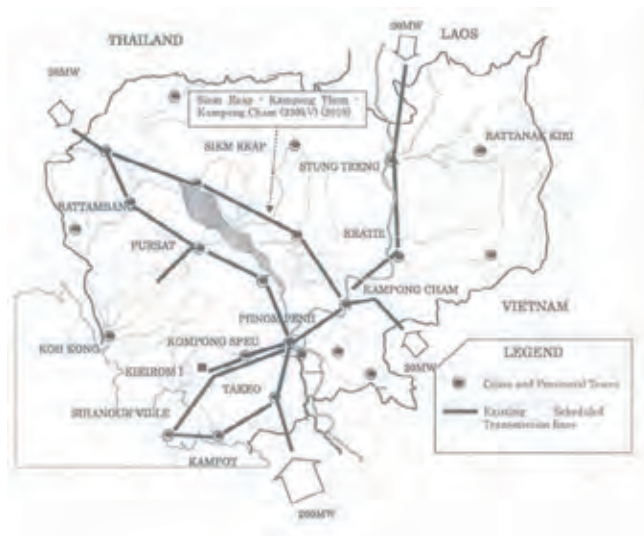


Fig.2.8.14 Transmission Expansion Plan (2017-2020)

2.9 Mining Development and Infrastructure

<Comment>

As stated in the beginning, infrastructure has a big influence on mining investment for development and the operation cost. Especially, the transportation cost has a big influence on relatively cheap minerals (limestone, bauxite, coal, and iron ore). The transportation cost is influenced by transportation means, status of infrastructure, and transportation distance. It is known well that the standard physical unit of electric power cost for aluminum refining considerably exceeds 10,000kWh/T. Even if it is not as much as aluminum, zinc also consumes a large amount of electric power of 4,000kWh/T for refining, and thus the electric power unit price as well as the amount of supply are the matters of big concern for mining investors.

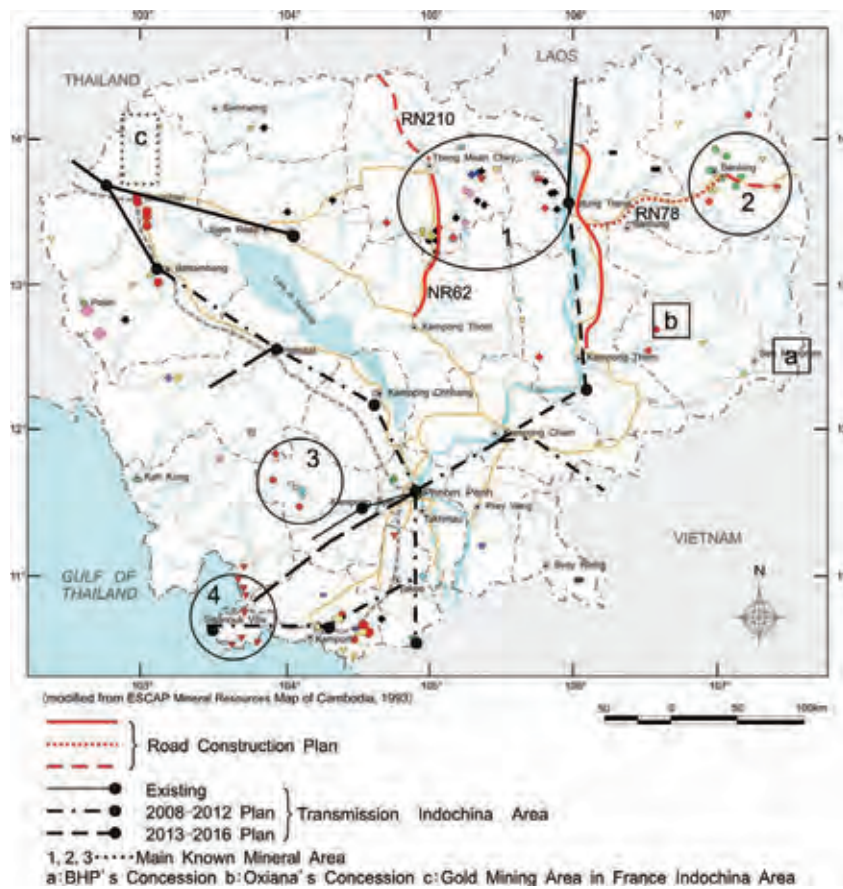


Fig. 2.9.1 Mineral Potential Areas and Infrastructure

Fig. 2.9.1 shows the mineral potential areas, the roads of their circumference, and the construction plan of the power transmission lines. If construction of roads and electric power proceeds smoothly, mining development may gain momentum by these constructions around 2015 in the regions No. 1 and 2, i.e. Rottanakiri province and Stung Treng province in the northeast, and a part of mineral concession of Preah Vihear province in the central north. In addition, there is also a silica sand mineral deposit area near Sihanoukville, which is blessed in respect of infrastructure equipment even today. On the other hand, most of the mineral

concession cannot enjoy the benefits of the main line's infrastructure construction, such as most of the area No.2, the bauxite mineral deposit explored by the BHP-Billiton, and the mineral concession in Kampong Speu province of No.3. There are also mineral concessions which have provincial roads in the neighborhood. However, some of the provincial roads in the intermountain areas are not in a good condition. For example, in order to enter into the Kratie South mineral concession, we went into the province road from the route No.7 and arrived at the mineral concession at a distance of approx. 35 km. However, the provincial road is merely nominal, and actual condition was such that some tracks came out on the weedy areas. The required time was about two hours and more by a pickup truck and the average speed was 17 km/h. If a track is in a loaded condition, it is evident that the speed further decreases. Construction of the transportation infrastructure which amounts to several dozens of kilometers is beyond the control of only one mine, unless it is a large-scale iron mine which has a production amount of 50 million ton/year and over, or a mine with the equivalent profit scale.

Moreover, majority of metal mineral deposit exists in the intermountain areas in Cambodia, and it is not possible to invest the 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:

First, mineral resources should be evaluated, and it should be clarified that which region has a higher metal content, and has a plenty of mineral amount, and has a kind of mineral that is expected for increase of demand in the future, and contributes to socioeconomics by mining the mineral. If considerable contribution can be expected, mining infrastructure development should be undertaken as a national development strategy toward that region; (when there are two or more, then toward the most highly contributing region). Subsequently, infrastructure development of the second highly contributing region should be undertaken by utilizing a part of the increased annual revenue (if any), by the mining development.

Of course, if there is any region that has sufficient infrastructure and has a kind of mineral which considerably contributes to socioeconomics, or there is a high grade deposit of metallic mineral that does not require infrastructure (for example, gold), then development of that region should have priority and necessary measures for that should be taken. It will be more effective to utilize a part of the increased annual revenue obtained by the above, onto the infrastructure development for the other promising mineral(s).

In order to realize such a policy, the cooperation among each ministry & agency, mining companies, and local communities is necessary, and it is also important to establish an organization (conference) 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, but there are illegal artisanal gold miners in some parts of the country. At the same time, only 85% of companies extracting construction materials are registered, and the remaining 15% are illegally operating without authorized licenses. The enforcement power of the GDMR is thus insufficient.

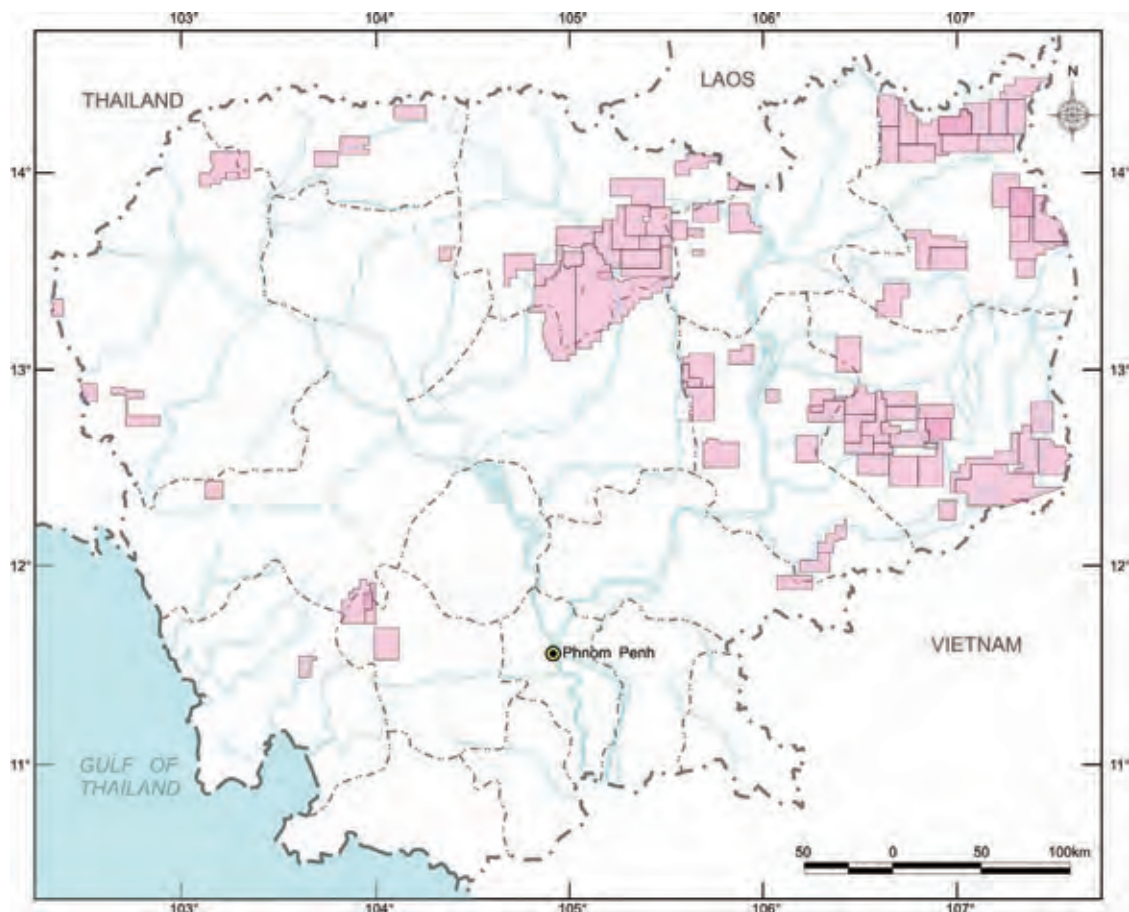
The current states of metal mineral concessions, illegal artisanal gold miners, and construction material mining are described here.

3.1.1 Activities in Metal Mineral Concessions

Sixteen iron deposits composed of magnetite and hematite 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. The Phnom Deck iron deposit is estimated to contain about 5 to 6 million tons of iron ore. Three lateritic-type manganese occurrences with 11 to 26% Mn are found in the Chhep district of Preah Vihear. Two bauxite deposits are known, in Battambang and Monduliri. The more important deposit is that of Monduliri, where lateritic bauxite with alumina grade varying from 25 to 35% covers large areas on the basaltic plateau of the Sen Monorom and O Reang districts. Base metals containing zinc, lead, copper and other accessory 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. Some of the deposits were actively mined in the past by artisanal miners who caused environmental damage. Silver has been found along with gold in some of the gold deposits located in Odder Mean Chey and Kampong Speu. Other metallic minerals of high economic value are found in Cambodia, including molybdenum, tin, chromium, antimony, and tungsten.

There are various exploration activities in Cambodia, based on these mineral occurrences. Table 3.1.1 shows a list for metal mineral concessions. As of January 2010, there were a total of about 100 concessions, which were owned by 50 companies. Fig.3.1.1 shows a map of metal concessions in the country.



(source: GDMR)

Fig.3.1.1 Map of Metal Concessions in Cambodia (A)

This figure shows that concessions are concentrated in the northern half of the country. Formerly, concession areas were restricted to no more than 200km² according to the minister's directive, but it was not codified. In fact, there are some agreements which were signed for areas of more than 200k m², and so the 200km² restriction is not absolute.

Exploration agreements are signed between the private companies and MIME. Agreement conditions are not same, and their criteria are not clarified. Nationalities of private companies include Cambodian, Chinese, Korean, Australian, Thai, and Japanese (participating in joint venture). Targets are gold, iron, and base metals. Most of these concessions are under exploration, and some companies (Angkor Wat Cement and Shino Sun Mineral Resources) have already grasped ore reserves and will begin production in the near future.

To assess the state of Cambodian mining, the JICA study team visited 32 domestic and foreign private concession holding companies to interview them about their exploration activities. By analyzing these interviews, the study team divided the companies holding concessions into the following three groups:

- Group 1: Large and small mining companies which are actively implementing exploration, and intend to open mines if they find good deposits (the BHP, Sino Sun, Steung Treng Mineral JV, and others).

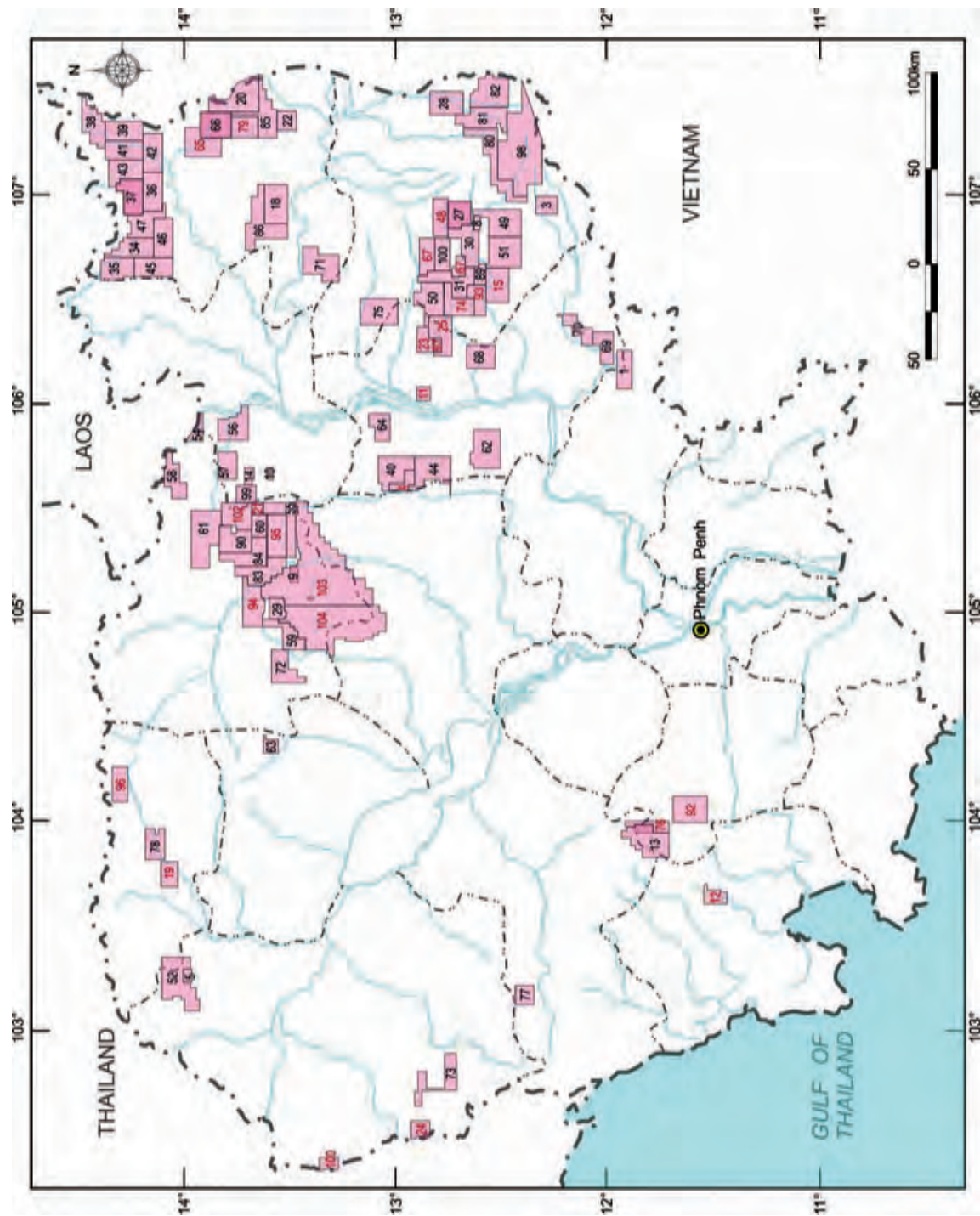
Group 2: Mainly junior companies (such as the Kingdom Resources, etc.) which are actively engaged in exploration, but do not intend to open mines even if they find good deposits, because opening a mine requires a lot of investment.

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

The first and second groups are systematically implementing exploration with a comparatively large investment. They 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 impermeable with conditions differing from company to company. Procedures for the MOU and agreements are variable.
- 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 company 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.

These issues should be solved to promote investment.



(source: GDMR)

Fig.3.1.1 Map of Metal Concessions in Cambodia (B)

Table 3.1.1 Concession List for Metal Mineral Resources (1)

No.	Company	metal	nationality	capital	License	Due Date	Location	Areas	workers	(as of October, 2008)	current state (as of Oct., 2008)
15	ANGING (Cambodia) Invest Company Co. Ltd.	Metal	ND	ND	ND	2008/3/17	Phnom Kous Keo Sema, Mondululiri	216	80	ND	
5	Angkor Wat Cement Limited	Au	Thailand	\$1m	EL/EEL	21-05-10	Arduong Ba, Banteay Ampil, Odar Mean Chey	31.5	10	ND	Mining Right has 2km ² , and mine opening is planned in Nov. 2008. Geologists are under study. Geological survey is strengthened in Dec. 2008.
29	Angkor Wat Minerals Limited	Au,etc.	Australia	\$10m	EL	29-01-09	Tbaeng Meanchey, Preah Vihear	90	10	ND	
62	Asia Pacific Gold and Copper Co. Ltd.	Metal	ND	ND	ND	2009/12/4	Sok Santuk, Kampong Thom and Prek Prasap District, Kratie	292	126	ND	exploration started in 2007. Surface survey, sampling and drilling are conducting.
98	BHP Billiton World Exploration Inc.	Al	Australia	No	EL	14-06-08	Mondululiri Province	996	31	ND	2 Vietnamese geologists completed 30% survey with 13 trenches.
48	Cambo Cana Kiri Development, Ltd	Au	Cambodia	\$1m	EL	21-07-09	Phnom Gnot, Pect Da District, Mondululiri	160	31	ND	2 Vietnamese geologists completed 30% survey with 17 trenches.
63	Cambodia Hai Lan Mineral Co. Ltd.	Fe	Au	\$8m	EL	28-01-10	Ta Lav, Arduong Meas, Rottanakiri	230	31	ND	40 large face(4m X 4m) shafts(length 10m). 12 trenches were finished.
3	Cambodia Hua Yi Mining, Co. Ltd.	Metal	ND	ND	ND	31-12-05	Pouchouly, Mondululiri	80	27	ND	
94	Cambodia International Mining Group	Metal	ND	ND	ND	2010/6/20	Chhmar, Ou Svey, Sen Chey District, Preah Vihear	220	ND	ND	
95	Cambodia Metal Work Co. Ltd.	Au,etc.	France	\$5m	EL	2010/6/20	Chamkar Samouy, Chey Sen District, Preah Vihear	285	18	ND	Surface survey are conducting, and samples are analyzed in China.
64	Cambodia Mineral Resources Development	Fe	Thai/China	ND	ND	20-03-10	Meanchey Commune, Santal District and Treng Commune, Ratanak Mondul District, Battambang	133	28	ND	Surface survey, sampling, trenching are conducted, and drilling will be done in near future.
73	Cambodia Tonle Sap International Investment	Metal	ND	ND	ND	2008/3/3	Phnom Kambut, Chung Kal, Odar Mean Chey	117	14	ND	2 buildings for office and lodgement. Access road improved. Not surveyed yet.
19	Chhong Kor Chhlean Pean	Gold	ND	ND	ND	2007/5/17	Koh Khgnae, Kratie	49	ND	ND	
16	China Forwin Internation Investment Phnom Penh Mining	Metal	ND	ND	ND	2010/3/17	Phnom Rahav, Keo Sema, Mondululiri	88	ND	ND	
2	Delcom Cambodia pte.Ltd	Metal	ND	ND	ND	2006/12/31	Phnom Daek, Preah Vihear	46,800	ND	ND	
76	Ding Xin Mining (Cambodia) Co. Ltd.	Metal	ND	ND	ND	2010/5/28	Phnom Samrong Village, Trapeang Chor Commune, Oral district, Kampong Speu	123	30	ND	
13	Future Environment	Au,etc.	Cambodia	\$1.5m	EL	28-12-07	Phnom Prak, Kampong Speu	282	37	ND	After surface survey were finished, currently drilling are conducting (30-80m long).
27	Gold Metal Group Co. Ltd.	Au	Cambodia	\$5m	EL	28-11-08	Phnom Gnot, Pect Da District, Mondululiri	158	37	ND	Joint exploration with Bateman Co. Surface survey and drilling (200 holes finished).
34						06-07-09	Ou Play, Pect Da District, Mondululiri	204	?	ND	
35						06-07-09	Bueng Gningkang, Siem Pang District, Stung Treng	200			
36						06-07-09	Ka Chhuk, Siem Pang District, Stung Treng	200			
37						06-07-09	Stung Pak, Ta Veng District, Rottanakiri	200			
38						06-07-09	Veang Kam, Veurn Sai District, Rottanakiri	200			
39						06-07-09	Kham Daraeng, Rottanakiri	200			
40	Indochine Resources Ltd.	Au,etc.	Australia	\$50k	EL	06-07-09	Stung Pak, Ta Veng District, Rottanakiri	200			First stage geological survey is being conducted. Geological map are being prepared. It is located in the National Park.
41						06-07-09	Phnom Pros, Sandan District, Kampong Thom	200			
42						06-07-09	Prek Lang, Ta Veng District, Rottanakiri	200			
43						06-07-09	Koh Pang, Veurn District, Rottanakiri	200			
44						06-07-09	Stung Krampha, Taveng District, Rottanakiri	200			
45						06-07-09	Ou Chous, Sambor District, Kratie	200			
46						06-07-09	Pang Peay, Siem Pang, Stung Treng	200			
47						06-07-09	Bar Kham, Veurn Sai District, Rottanakiri	200			
54						06-07-09	Batak, Veurn Sai, Rottanakiri	200			
55						15-11-09	Phnom Kour-H, Chhaeb District, Preah Vihear Province and Thlabarvet, Stung Treng	55	20		Geological reconnaissance and surveys
56						15-11-09	Phnom Thnot, Sangkom Thmei District, Preah Vihear	160	20		
57	Kenertec Co. Ltd.	Fe	Korea	\$3m	EL/EEL	15-11-09	Ou Talas, Thlabarvat district, Stung Treng	214	20		untouched
58						15-11-09	Ou Kong kang, Thlabarvat district, Stung Treng	92/75	20		
59						15-11-09	Phnom Chare, Chhaeb District, Preah Vihear	168	20		
60						15-11-09	Phnom Natong, Chey Sen District, Preah Vihear	212	20		
61						15-11-09	Chrac, Chhaeb District and Chey Sen District, Preah Vihear	96	20		Geological reconnaissance and surveys
72	Kingdom Resources Co. Ltd.	Fe, Cu	Sin. Cam.	\$500k	EL	13-03-2010	Ou Klong, Chhaeb District, Preah Vihear	398	20		untouched
79	Lian Heng Investment Co. Ltd.	Fe	Cambodia	\$1m	EL	05-08-10	Phnom Ta Bus and Phnom Sdao, Sangkom Thmei District, Preah Vihear	200	14		Surface survey, sampling and trenching are being conducted. Drilling will be started in near future.
							Lam Chor, Ba Keo and Ou Ya Dav District, Rottanakiri	154	11		Pre-surveyed with the Vietnamese steel company, and completed pre-FS.

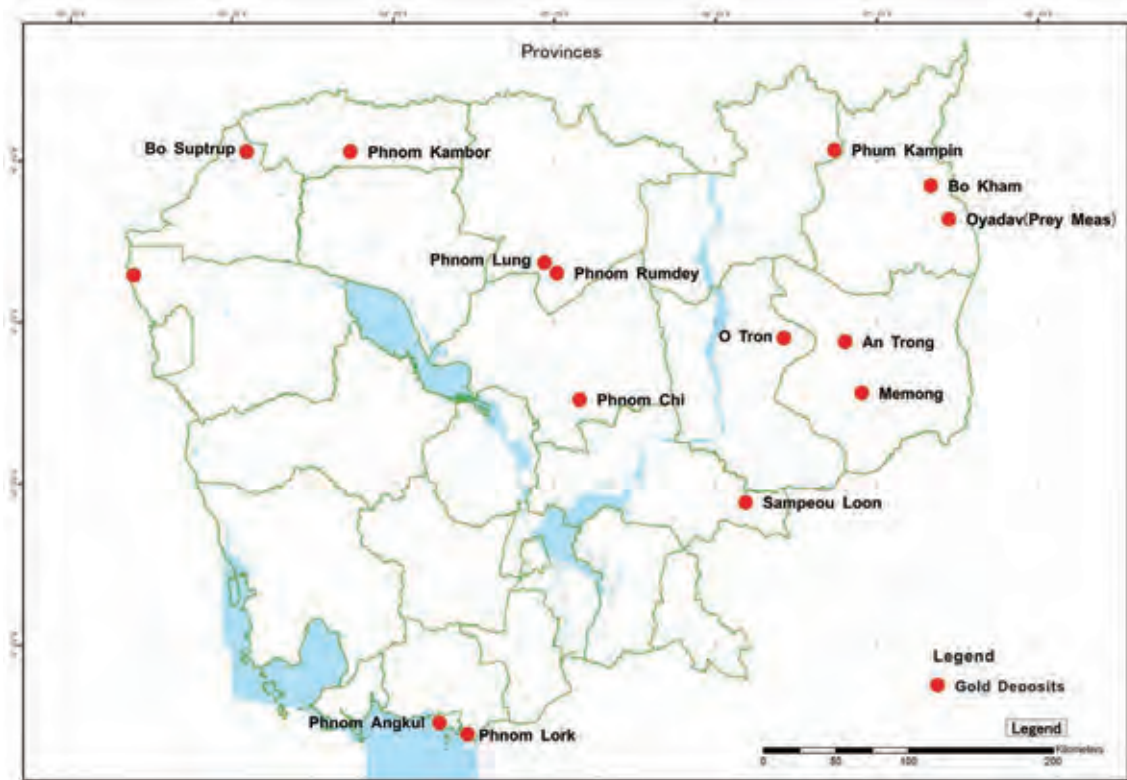
Table 3.1.1 Concession List for Metal Mineral Resources (2)

No	Company	metal	rationality	capital	License	Due Date	Location	Areas (hectares)	current state (as of Oct. 2008)
20						12-06-08	Ou Yadav, Leur/Krom, Rottanakiri	300	Aerial survey, sampling, trenching and drilling (150m) are being conducted.
84						12-06-10	Chey Sen, Chey Sen and Chhaeb District, Preah Vihear	215	Geological reconnaissance
18						17-03-08	Ban Jang, Rottanakiri	240	Aerial survey, sampling and trenching are being conducted.
52	Liberty Mining International Pty. Ltd.	Au, etc.	Australia	A\$5min	EL	14-08-09	Thmor Pkay and Phnom Sra, District, Banleay and Banleay Anor District, Cheung Kri District, Odey Mean Chey	303.5	Satellite images are being analyzed, basic geological survey.
83						12-06-10	Peuk, Chey Sen District and Chhaeb District, Preah Vihear	227.4	Geological reconnaissance and surveys
86						20-06-10	Banlung District, Lamphat District, Koun Mom District, Rottanakiri	328	Aerial survey, sampling and trenching are being conducted.
88						20-06-10	Prek Te, Keo Seima District, Monduliri	82	Geological mapping
90						20-06-10	Chey Chok, Chhaeb District, Preah Vihear	210	Geological reconnaissance
53	Lohak Sammor (Cambodia) Co. Ltd	Metal	ND	ND	ND	2009/9/14	Ou Khle Khlok, Sambor District, Kratie	197	ND
80						12-06-10	Phnom Raey, Keo Seima District, Sen Monorom and Preat Da District, Monduliri	295.3	Liberty
81	Maxum Metals Pty Ltd	Al	Australia	A\$200k	EL	12-06-10	Bou Sra, Pectr Da and Ou Rarang District Monduliri	253	Satellite images are being analyzed, basic geological survey.
82						12-06-10	Bou Sra, Pectr Da and Ou Rarang District Monduliri	274.6	"
75	Oxiana & DZ	Au	Australia	?	EL	22-04-10	Phnom Chi	78	Geological reconnaissance
30	Oxiana (Cambodia) Limited and Shin Ha Mining Co.	Au	Australia	A\$8k	EL	12-02-09	Ou Khvay, Keo Seima District, Monduliri	217	Drilling are being conducted.(4,000m)
31						12-02-09	Ou Chhoung, Keo Seima District, Monduliri	226	Geological reconnaissance
24	Phu Yang (Cambodia) Co. Ltd.	Metal	ND	ND	ND	2008/9/14	Ou Khle Khlok, Sambor District, Kratie	197	ND
25	Ratanak Kenertec Resources Co. Ltd.	Fe	Korea	\$200k	E,LEEL	2008/9/19	Bor Huy Khmer, Pailin	84	ND
9	Ratanak Stone Cambodia Development Co. Ltd.	Metal	Korea	ND	ND	2008/7/5	Phnom Thmar, Raveang, Preah Vihear	35.75	Drilling are being conducted.(1,700m)
86						2010/8/15	Thmea commune, Sen Chey District, Preah Vihear	36	ND
87	Rottanakiri Consistency PTE LTD	Metal	ND	ND	ND	2010/6/12	Phchev Village, Anlung Veng and Trapanng Prasad District, Odar Mean Chey	144	ND
88						2010/6/12	Ou Smanng, Siem Pang District, Stung Treng	252	ND
11	Samsang Rea Thong Thmor	Ilmenit	ND	ND	ND	2007/11/19	Prek Kou Reseah, Siem Pang District, Stung Treng Province and Veun Sai District, Rottanakiri	248	ND
12	Shino Sun Mineral Resources Co.Ltd	Au	China	\$2min.	E,LEEL	06-06-09	Memot, Kampong Cham	120	ND
74	Sinh Yi Co. Ltd.	Au	Cambodia	unknown	EL	20-03-10	Tangyoy, Chung Plas Commune, Keo Seima District, Monduliri	112	130
63	Sophorn Theary Peanich Co. Ltd.	Au	Cambodia	\$2min.	EL	09-01-10	Svay Leu Commune, Svay Leu District, Siem Reap	176	14
78	Sorn Yatanak Co. Ltd.	Fe, Pb	Au, Cam.	\$1min.	EL	05-06-10	Tuol Svay, Anglong Vaang District, Odar Mean Chey	58.53	5
51						07-09-09	Ou Khung, Sambor, Kratie	164	2
68						13-03-10	Phnom Ramdul, Thmei Commune, Kratie District, Kratie	274	Trenching (4700m) and soil analyzing (1000samples) will be conducted in this year.
69						13-03-10	Phnom Khnac, Chhlong District and Snuol District, Kratie	180	Trenching (700m) and soil analyzing (1250samples) will be conducted in this year.
70	Southern Gold (Cambodia) Ltd.	Metal	Australia	\$10k	EL	13-03-10	Snuol Commune, Snuol District, Kratie	218	Soil will be analyzed in this year.
49						13-03-10	Snuol Commune, Snuol District, Kratie	199	Drilling (1200m), trenching(500m) and soil analyzing will be conducted in this year.
50						14-08-09	Snuol Commune, Snuol District, Monduliri	259	Survey of UXBs and soil analyzing (1250 samples) will be done in this year.
77	Southern Mining Co. Ltd.	Cr	Vietnam	\$4min	E,LEEL	14-08-09	Phnom Khtung, Keo Seima District, Monduliri	273	Under survey with No. 51.
22	Summer Gold Investment	Au	Australia	\$1min	EL	17-03-10	Phnom Khtung, Sambor District, Kratie	235	Trenching (2000m), drilling (1600m) and soil analyzing are being conducted.
67	Sun International Investment Co. Ltd.	Pb	China	\$2min.	EL	05-07-08	Phnom Takri, Premsay Commune, Pursat	100	A Vietnamese contractor is conducting surface survey.
92	T.S.S.M Group Co. Ltd.	Pb	Cambodia	\$5,000	EL	04-08-10	Phnom Kaeng and Antrang, Pectr District, Monduliri	133	20
91	Titan Mineral Group Co. Ltd.	Fe, Cu	Cambodia	\$12,500	EL	04-08-10	Phnom Bangkaeb, Oral District, Kampong Speu	215.5	56
85	Transol Mining And Exploration Co. Pty. Ltd.	Au	Australia	A\$200k	EL	04-03-10	Angkeng Phs, Chhaeb Chey Sen District, Preah Vihear Province, Thlaebhet District, Stung Treng	252	20
4	Vannymex Co. Ltd & Oxiana	Metal	ND	ND	ND	12-06-10	Bakham, Ou Yadav District, Rottanakiri	204	2
14	Stung Treng Mineral Joint Venture Co.(VINACOMIN)	Fe	Vietnam	\$5min	EL	07-02-09	Phnom Ohy, Sandann, Kampong Thom	208	Liberty
97	Xing Yuan Kang Yeak Co. Ltd.	Au	China	\$1.9min.	EL	18-08-10	Phnom Ohy, Sandann, Kampong Thom	170	ND
23	Yunan Nonferrous Geology and Mining Co. Ltd.	Metal	China	\$10min	EL	24-12-09	Phnom Ohy, Sandann, Kampong Thom	300	100
8	Zhongxin Industrial Investment (Cambodia) Co. Ltd	Metal	China	\$10min	EL	24-12-09	Phnom Ohy, Sandann, Kampong Thom	90	300

(ND: Data is not available.)

3.1.2 Illegal Artisanal Gold Mining

Much farmland was lost due to many UXBs and landmines from the Vietnam War and long period of internal conflict, and farming became very hard. In the late 1980s, more than 10 gold occurrences were found, and many farmers engaged in gold mining to earn cash instead of trying to cultivate rundown farmland. As a result, gold rushes occurred in several districts of Cambodia. However, mining and processing skills were still primitive. Fig.3.1.2 shows principal illegal gold mining districts.



(source: DoG)

Fig.3.1.2 Main Illegal Gold Mining Districts in Cambodia

However, the gold grade of the placer deposits gradually decreased, and placer mining became unprofitable due to lower gold recovery through traditional panning. Around this time, 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, and their technical level is far below that of modern mass production. Table 3.1.2 shows a list of artisanal gold mine studied by the GDMR in September to October 2003 with financial support from the NGO called Oxfam.

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. Furthermore,

residents of the broader local communities as well as mine workers were affected by these illegal mining activities.

Formerly there used to be many illegal artisanal gold miners working in these districts, but since international investors began systematic exploration after the introduction of the mineral concession system, the area of artisanal mining operations has decreased. There are currently an estimated 3500 illegal artisanal gold miners in the country.

Table 3.1.2 Survey Results for Artisanal Gold Mining

Item	Sampoeu Deposit	O Tron Deposit	Phnom Chi Deposit	Prey Meas Deposit
Province	Kampong Cham	Kratie	Kampong Thom	Rottanakiri
Mining sites	Sampoeu Lon, Bos Ta Em	Thmor Ro and other 5 sites	Snanq An, Phnom Chi	Prey Meas and other 6 sites
Mining method	Shaft mining (shallow 60shafts)	Trenching mining 5m(W) * 40m(L) * 20m(H)	Shaft mining (8-15m deep)	Shaft mining (30-40m deep) & horizontal drifts at the bottom
Mining tools	Plow, shovel, pickax, blasting for hard rock	Wooden rail, wooden mine car (0.6t), Blasting for hard rock	Mechanical winch Blasting	Hand tools No blasting
Processing method	Launder, panning → heap leaching (later stopped)	Launder, panning → Processed by acid → Heap leaching temporarily	Launder, panning → Heap leaching	Mercury amalgamation
Tailings dam	None	None	None	None
Environmental issues	Contaminated river Dead fish & cattle Non-usable rice fields, deforestation	deforestation abandoned trenches	Contaminated river deforestation	Contaminated soil, vegetation and water. Deforestation
Health issues	Use contaminated water, skin disease	No protection, bad management of explosives, malaria	No protection, damaged by cyanide, malaria	No protection, gastrointestinal disease and malaria
concession	SUN Trading (Korea) attained the concession (1993), but mined during the exploration period and so lost it in 2001. Currently attained by Shino Sun Mineral Resources.	A local company attained MOU, but expired 6 months later.	Attained by Cambodia Evergreen (2001).	BNRD attained the exploration license, but lost it due to financial reason. Later, Teah Boh attained MOU, but expired 6 months later.
Number of miners	2000 miners by 2002	330 miners	923 miners in Snanq An.	150 miners

(source: Oxfam's report)

3.1.3 Other Mining Activities

Concessions of construction materials and non-metal minerals (gems, coal, etc.) are listed in Table 3.1.3. There are a total of 21 companies which are engaged in mining and exploration activities.

Table 3.1.3 List for Concessions for Coal, Gem, Limestone, White Sand and Phosphate

Company	Commodity	Province
An Mady Group Co. Ltd.	coal	Stung Treng
An Mady Group Co. Ltd.	coal	Kratie
Cambodia Mining Development Co. Ltd.	gem	Battambang
Chakrey Ting Cement	limestone	Kampot
Han Seng Land Coal Mine Co. Ltd.	coal	Oddar Mean Chey
Kampot Cement (JV with Siam Cement)	limestone	Kampot
KD Power Group Co. Ltd.	coal	Oddar Mean Chey
Khmer Aggregate Co. Ltd.	limestone	Kampot
Malaysia Royal Phosphate Ltd.	phosphate	Battambang
Mong Ritthy Group Co.	white sand	Koh Kong
Pheapimex Group	limestone	Kampot
Phosphate & Chemical (Cambodia) Co. Ltd.	phosphate	Banteay Mean Chey
Phu Mady Investment Group	coal	Svay Rieng
Ratanak Stone Cambodia Development Co. Ltd.	coal	Oddar Mean Chey
Seoul Digem	gem	Rottanakiri
Sonuba Cham Industries Co. Ltd.	gem	Pailin
Thai Boon Roang Cement Co. Ltd.	limestone	Kampot
TKS International Co. Ltd.	white sand	Koh Kong
Ultra Marine Kiri	gem	Battambang
Ultra Marine Kiri	gem	Rottanakiri

(source: GDMR)

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.3.1.3.

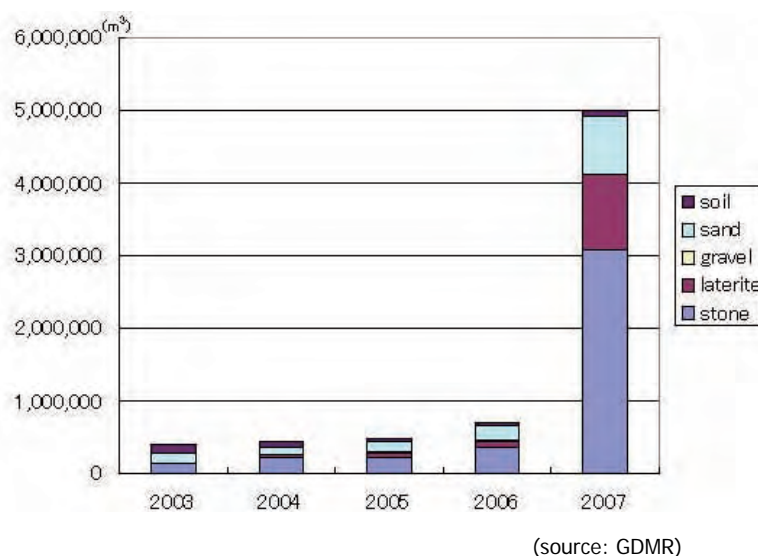


Fig.3.1.3 Production of Construction Materials in Cambodia

Production of construction materials has increased year after year due to large domestic demand accompanying the favorable economic growth of Cambodia. Particularly, noteworthy is that production in 2007 was about 7 times that of 2006, which is an incredible jump.

But these data are different from figures published by the USGS which were obtained through the GDMR. The USGS's data were collected by provincial authorities, and the GDMR obtained its data by itself. However, they provide basic and important information for the mining sector, so the GDMR must make efforts to release official, reliable data.

3.1.4 Inspection of the Concessions

To understand the state of concessions, observations were made of metal exploration concessions and 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 have been implemented. The Sino Sun concession has entered the late exploration stage and there were large-scale mining machines and inclined shafts there; however, detailed information could not be obtained at the site. 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 agriculture concessions, and the lack of mining experts (Table 3.1.4). Comments on each concession are as follows:

Table 3.1.4 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	2007
	Start year of exploration	2008	2007	2007	2007
	Area	56km ²	1,638km ²	112km ²	142km ²
	Remarks	70m length drillings	Soil analysis, trench, drillings	Scheduled produced ore in recent years	Electric exploration, trench
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

(1) Sophorn Theary Peanich

Currently, it is not possible to determine the feasibility of mining development. The exact shape, reserve, and grade of the ore bodies need to be assessed through detailed exploration in order to conduct a feasibility study for mining development. One serious problem is obtaining water, because there is no river nearby. Another problem is that constructing a tailing dam will not be easy. However, one positive point is that access to the site is very good. Also, there are no villages near the site, which reduces environmental issues. The Beong Mealea Temple is in a national park in the area, but it is 23km away. So, there seems to be no direct impact.

It should be noted that major deforestation was carried out for the rubber plantation in this area. This mineral concession is located inside the plantation area, and so it will be necessary to negotiate the mine development conditions with MIME and MAFF.

(2) Southern Gold

(a) Snoul Concession

Exploration work is impressively carried out with deep consideration given to local villagers. The villagers also benefit through, for example, the removal of UXBs, and receiving payment for exploration work. This is a key to good relations with them. If they develop a mine, a major point will be maintaining this good relationship.

(b) Kratie South Concession

The access road (provincial road) to the concession is very bad, and it takes a long time to get to the site even in the dry season. During the rainy season, this road is cut off and the exploration work is shut down. The site is basically densely wooded, and so major deforestation would be necessary to create an open pit mine and build a processing plant and tailings dam. However, getting permissions from the MAFF seems to be very difficult, because of a logging ban currently in effect. In addition, environmental impacts might be major, because there are many fauna and flora in the area jungle, including endangered species. Further, social impacts

would not be insignificant, because there are villagers whose livelihood depends on the jungle. Therefore, many difficulties can be anticipated. Accordingly, sufficient environmental impact assessment (EIA) for the mining operation must be prepared in order to give a scientific assessment.

(c) Kratie North Concession

This concession is partially overlaps with an economic land concession (ELC) of Green Island of Hong Kong, which obtained their concession earlier than Southern Gold. Exploration work is not always smooth under the Green Island's restrictions. Green Island was granted an agricultural concession from MAFF, and Southern Gold was granted a mineral concession by MIME. However, as they partially overlap, some conflicts have occurred between these public licenses. MIME probably should have had obtained the agreement of MAFF before it issued the exploration license. Aside from Green Island's private road, the access roads are in very bad condition and it takes a long time to reach to the concession. Also, exploration is currently not progressing smoothly under the agreement with Green Island. Even if the company found a good ore body in the concession, it is easy to see that negotiation for mining development with Green Island might be very difficult. Also, operations in this area come to a halt during the rainy season due to the possibility of malaria. Further, deforestation for mining development would require the permission of Green Island and MAFF, which might be very difficult to obtain. In addition, environmental impacts might be major, because there are many fauna and flora in the local jungle, including endangered species. Further, social impacts would not be insignificant, because there are villagers whose livelihood depends on the jungle. There are thus many difficulties can be expected in mining development.

(3) Sino Sun

Although the company was granted an exploitation license in September 2008, it had been recalling workers back to China since July 2008. The concession has remained untouched and inactive. An official from the GDMR explained to the study team that the company is monitoring global economic trends, due to dropping metal prices. But, gold prices have not dropped as much as other metals, so the team doesn't know the real reason why they haven't started preparing for production, especially since they've already bought heavy mining machines. Perhaps they have had trouble raising capital for development.

An investor who obtains an exploitation license must commence operations within 6 months. But the company has no problem legally, since it already bought heavy mining machines, which constitutes exploration activity. This situation is permissible for up to 2 years. As the exploration and exploitation experts have already returned to China, no detailed information was available. For example, if a JICA team member were interested in the construction of the tailings dam, since this area was contaminated by previous mining operations.

(4) Steung Treng Mineral Joint Venture Co. (Vinacomin)

The team could visit the exploration site of Sloutoung by motorbike to see trenches, but the team couldn't visit the site of Veal Thai due to increased water level of the creek caused by

heavy rain in the previous day. The branch director of Vinacom in Cambodia said that they will construct an iron smelter at the site if they discover good ore deposits. This company manages iron mines in Vietnam with the basic techniques for necessary mining, processing and smelting operations. Therefore, there is no technical problem with constructing an iron smelter in Cambodia.

However, it is necessary to obtain a sufficient ore reserve and ore grade. There is some question about whether it is possible for them to obtain sufficient ore reserve and ore grade for stable mining operations, particularly given that the average ore grade of sample is currently only 25% which seems to be unprofitable. Even if both problems were solved, however, there is another question as to whether or not they could obtain enough electricity to operate the smelter at the site. This concession is located near the border with Laos, and so it might be possible if they could construct transmission lines direct from Laos for smelting operations.

(5) Construction Materials Concessions

The JICA study team visited four (4) active quarries (Table 3.1.5).

Table 3.1.5 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
	note	started from the beginning	started from JV with Taiwanese co.	transferred from Penich co.
location	Phnom Sam Bour, Kanpong Speu	same as left	Phnom Cheal, Kanpong Speu	Cha Quk Village, Kanpong Speu
type of license	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
last 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 & environmental me	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	to decrease royalty and income tax.	to support marketing.	need time to attain spareparts.

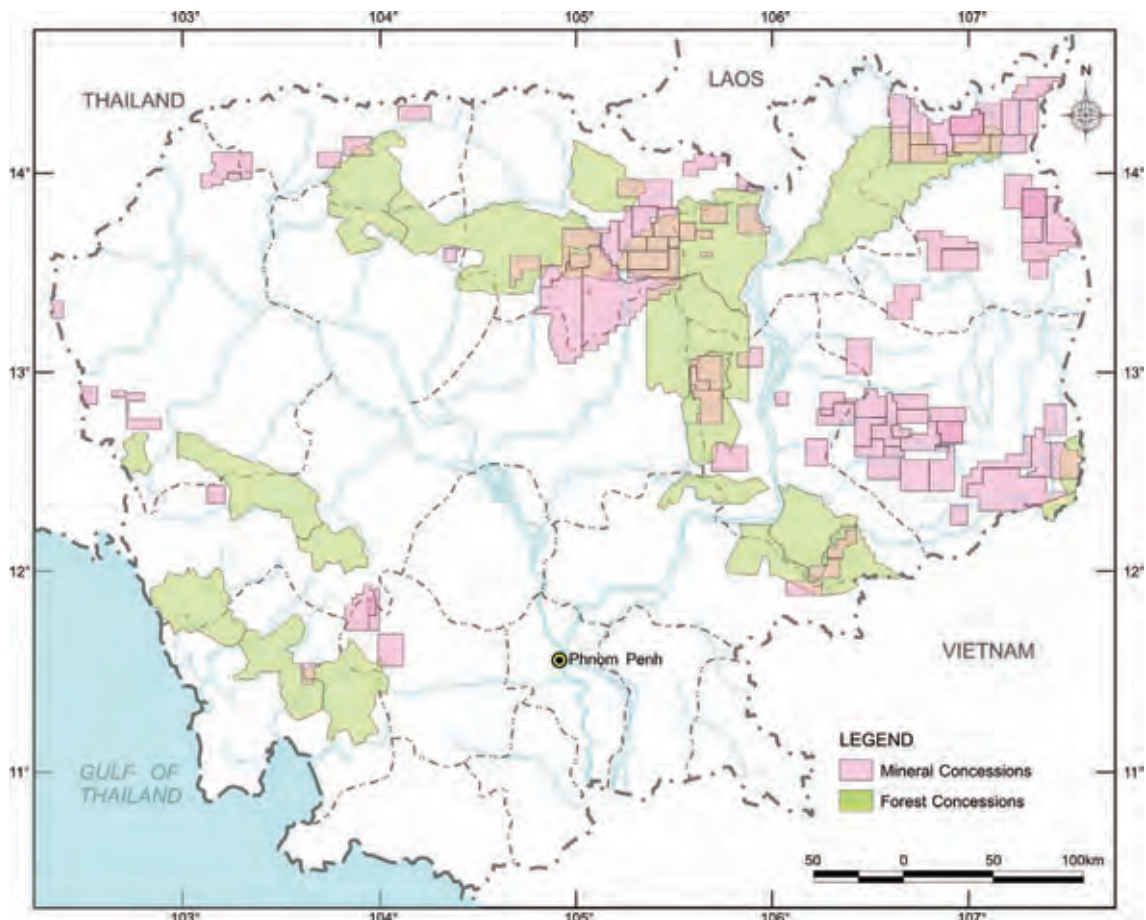
There were no problems with Swee Quarry's operations. However, there were several issues with operations at other quarries. The biggest problem is that these quarries have no benches for very high wall production. If some trouble were to occur under these high walls, there would be no means to address it. Especially during the rainy season, there is a chance for rocks on the wall to be loosened by flowing water, but there is no appropriate countermeasure in place. At Kamhwa, exploitation has been done up to the boundary of the concession with a very high wall. There is no space for safety benches, and so this dangerous state will remain indefinitely. At WKK, there were a few benches for production, which might cause problems in the near future due to constant production. They need to manage production from a long-term point of view. Only one of the 4 quarries, Swee Quarry, seems to have an experienced engineer.

3.2 Mining Activities and Environmental Management

3.2.1 Forest Resource and Mining Activities

Cambodia's forests provide important ecological functions such as ecosystem preservation, biodiversity conservation and the protection of soil and water resources.

Fig.3.2.1 shows that many mineral concessions overlap forest concessions. If the logging ban is lifted in the future, some trouble might occur. In addition, logging is necessary for mining operations, but it does not seem to be easy to obtain permission for logging from the MAFF.



(source: GDMR, MAFF)

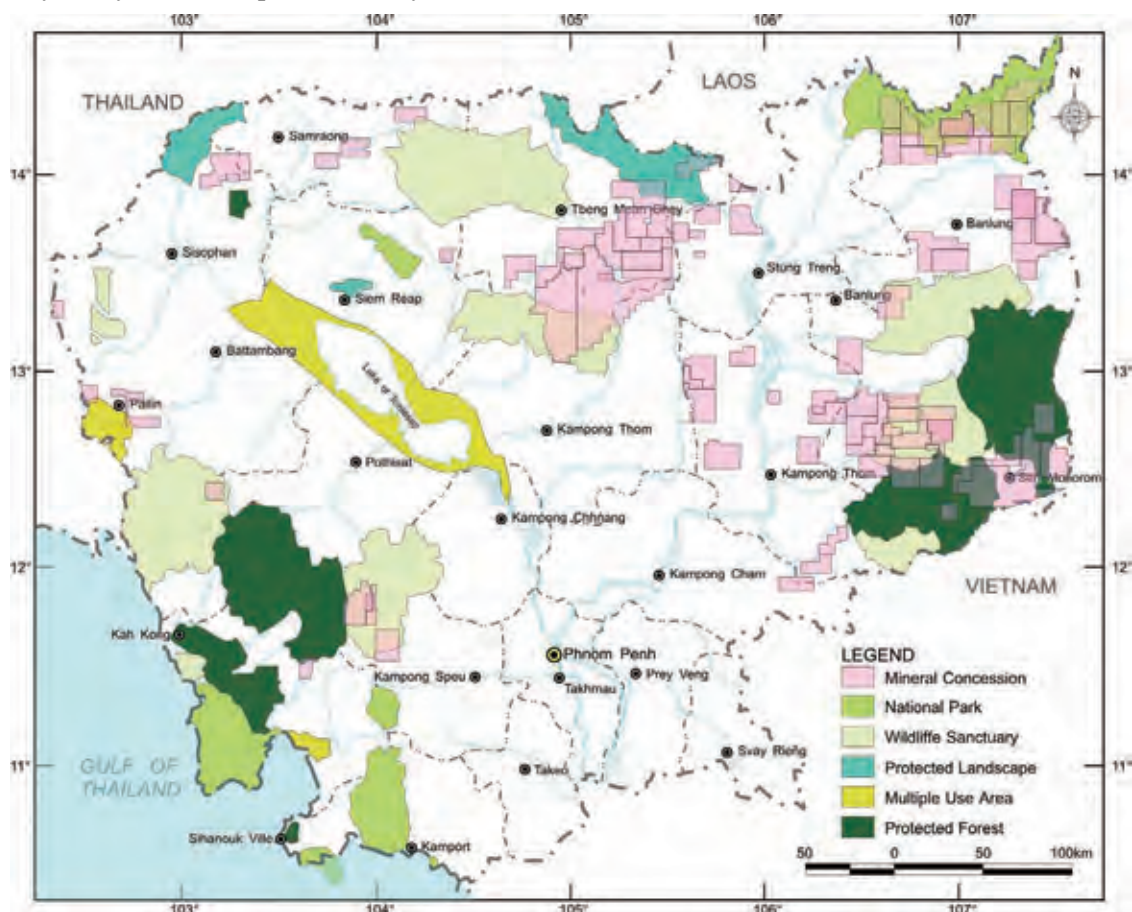
Fig.3.2.1 Forest Concessions and Mineral Concessions

There are many Economic Land Concessions (ELCs) except forest concession in Cambodia. ELCs are for sugar cane, cassava, rubber, corn, peanut, oil palm, cotton, acacia, coffee, etc. These ELCs, mainly agricultural concessions, are distributed all over the country, and they sometimes overlap with mineral concessions. For example, the Kratie concession of Southern Gold Ltd. is overlapped with an ELC of Green Island Ltd. Southern Gold has a lot of difficulties to continue exploration works. There may be other mineral concessions that overlap with other ELCs, and they have problems for smooth exploration. As the exploration operations are not always connected directly with mining development, free rein to work must be given to exploration which is the first step for mining development. When ore deposits are found through

exploration, concessionaires can negotiate with each other for mine-opening. If mineral exploration can't be implemented, the natural resources might be abandoned without providing economic opportunities. That would not be good for Cambodia's healthy economic development. Mining development is impossible without reasonable ore deposits, and unlike other economic activities such as agriculture, it 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 owing to the newly promulgated Protection Law. Fig.3.2.2 shows a map of protected areas overlapped with a map of concessions. Many concessions are located in protected areas, so it is very likely that some problems may occur in the future.



(source: GDMR, MoE, and MAFF)

Fig.3.2.2 Protected Areas and Mineral Concessions

In particular, there are many mineral concessions in the national parks and wildlife sanctuaries. As the current operations are at the stage of exploration, their impacts on these protected areas are small and minor. However, if ore deposits are discovered and some mines are opened in the future, it may be very difficult to mitigate the impacts on protected areas, even

if an EIA had been made. Moreover, these mineral concessions might be located in a core zone or conservation zone established by the new Protection Law. In this case, no development activity can be allowed.

As the protected areas had been configured before the mineral concessions were determined, it appears that the GDMR should have told the applicants to obtain the relevant permits from the Ministry of Environment, but there is no record that such advice was given. As in other counties, there are not so many mining activities allowed in the protected areas where endangered species and other wildlife have their habitats. If some ore body were found out after exploration, EIA for exploitation would be prepared to study on possibility of development.

3.2.3 Ethnic Minorities and Mining Activities

Fig.3.2.3 shows a distribution map overlapped with concessions. There are many concessions in areas inhabited by minorities. When mining activities begin on a large scale, some problems may occur such as involuntary relocation of inhabitants and forfeiture of livelihoods, among others. In particular, the socially vulnerable such as ethnic minorities are easily impacted by various environmental and economic activities, and do not have strong access to economic decision-making. Therefore, appropriate consideration must be given to their situation.

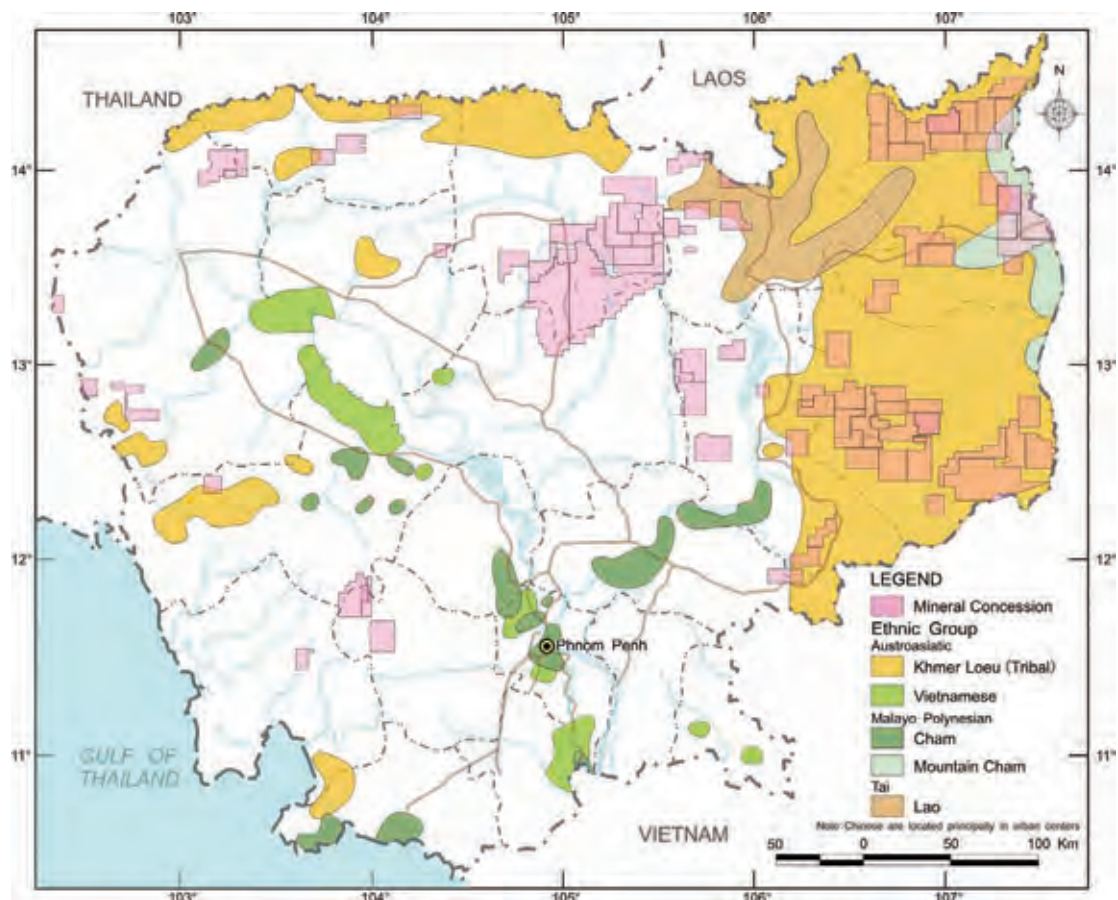


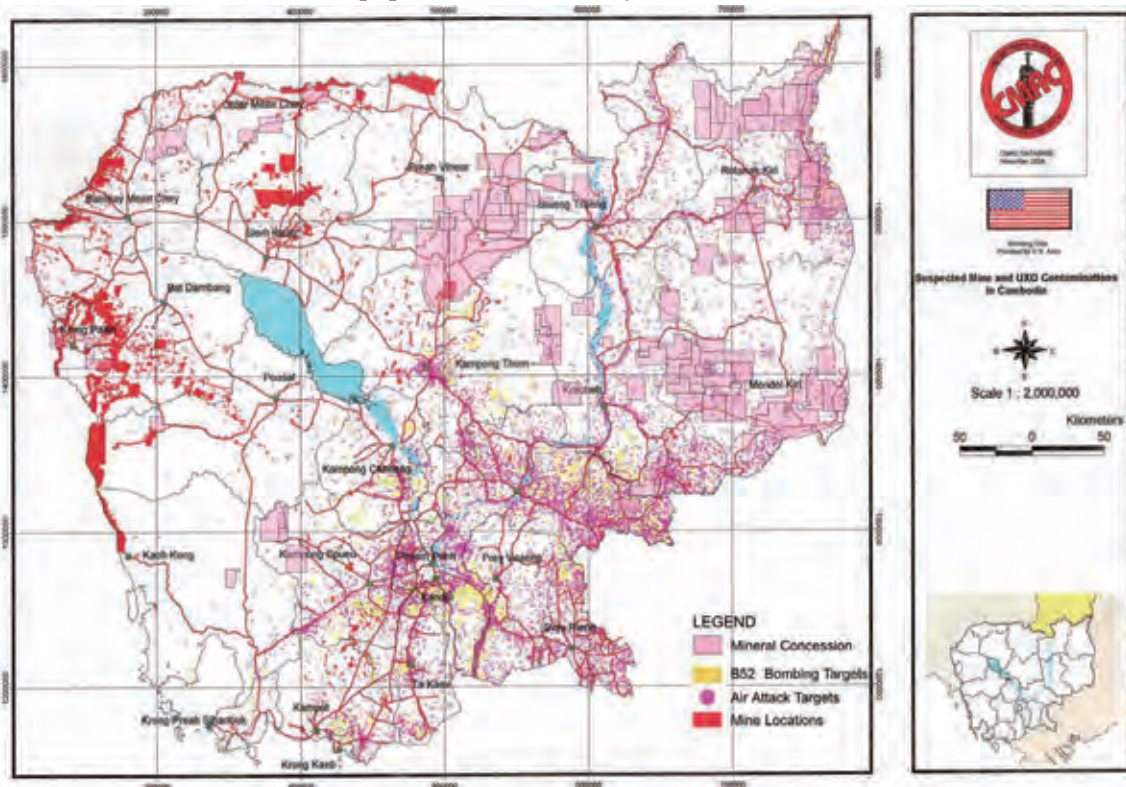
Fig.3.2.3 Ethnic Minorities and Mineral Concessions

There are many ethnic minorities in Rottanakiri, Kratie and Mondulkiri provinces where we can find many mineral concessions. Current operations are in the exploration stage. Sufficient consideration should be paid to these ethnic minorities if mining development is begun. On the other hand, as there is no major industry in these provinces, a new opened mine might have an impact on local economies, by, for example, increasing employment opportunities. It is desirable for mineral concessionaires to employ ethnic minorities for their economic supports.

3.2.4 UXBs/Landmines and Mining Activities

Fig.3.2.4 shows a map of potential 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 which are engaged in exploration must spend much money to detect these UXBs and landmines. Therefore, UXBs and landmines present a large disincentive to potential investors in mining activities.

Clearance of UXBs and landmines by the CMAC, RCAF, NGO's, etc., is mainly done in large cities. Therefore, concessionaires must clear UXBs and landmines in their concessions which are located in the under populated interior away from the cities.



(source: GDMR, CMAC)

Fig.3.2.4 UXBs/Landmines and Mineral Concessions

However, since there is no “miracle cure” for these hazardous materials, there is no way to remove them except the current method of making slow but steady progress.

3.2.5 Military Areas and Mining Activities

There are several military areas in addition to the areas mentioned above. It is impossible to have mining facilities there. However, since no concrete information was provided by the government, no comments can be made here. Nevertheless, information about these military areas should be given to the mining companies as basic information.

3.2.6 Mining Activities by Artisanal Gold Miners

There are many illegal artisanal gold mining activities all over the country, as shown in Fig.3.1.2. They reportedly have had a serious impact on the surrounding environment. For this matter, two issues should be addressed, current artisanal gold mining activities and environmental contamination caused by the past activities.

1) Illegal Artisanal Gold Mining Activities

As the Law on Management and Exploitation on Mineral Resources permits artisanal mining activities, the GDMR should register all the artisanal miners and give them mining licenses as legal miners. Then, it should know exactly their operational status, and if there are any problems, the GDMR should supervise them so that they will have any environmental impact. The largest problem in their operations seems to be with the methods they use to recover gold from ore. If they inappropriately use mercury amalgamation or cyanization leaching, which have a severe impact on the environment, the GDMR should construct corporative ore processing plants or tailings dams which would enable gold recovery in a controlled manner. The first step to address this issue is to have exact information on artisanal operations, and for the GRMR to take the initiative in pushing this forward.

2) Environmental Contamination Issue Caused by the Past Activities

Regarding this issues it is necessary to understand the exact situation of contaminated sites by means of detailed surveys. As each solution differs according to the extent and level of contamination, and seriousness of environmental damage, it is necessary to understand the state of contamination by analyzing scientific data on surface and underground water and soil samples collected from contaminated sites. The GDMR should survey contaminated sites in collaboration with the Ministry of Environment and international organizations. 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 Domestic and Foreign Investment in Mining Exploration and Development and EITI

3.3.1 Factors Influencing Investors

Mining investors select a target deposit based primarily on the perception of risk to capital. In deciding where to invest, they gather as much information as possible about all aspects of the intended venture and consider the benefits of one location vs. those of another. After comparing the risks of different investment destinations the investor selects the place which offers the lowest risk. These perceptions of risk, to some extent, may be applied to all investors. Some are common to all categories but others are category-specific. The key factors

that investors in medium- and large-scale operations use to evaluate risk are as follows:

1) Most important and specific to mining investors

- The geological setting and the quality, quantity, detail and variety of available geological information
- The legal regime related to prospecting, exploration and mining, permitting and tenure
- The fiscal regime of taxation, royalties and duties as applied to the sector
- Incentives offered by a government to attract investors
- The presence of a ‘mining culture’ and thus labour and professionals having industry experience
- Technology and technical skills with educational infrastructure able to maintain these capabilities

2) Having concern for mining investors

- Clear and practical environmental and social law with a cooperative approach to regulation
- An understanding of ‘sustainability’ as it may be applied to social issues in the mining sector

3) Applicable to all investors

- A suitable and stable market for the commodity produced by the operation
- A reputation for economic and political stability and good governance
- Economic performance and stable fiscal policy
- Fair and just system of law applied equally to all investor interests
- Adequacy, quality and distribution of infrastructure including transport, power and communications

As the Cambodia mining sector develops and its Institutions, Mining Policy, Law and Regulation are brought into conformance with global best practice, it will be a natural next step to adopt the EITI as the set of principles (see Appendix I-4) 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. These points were made based on discussions with MIME/GDMR, comments taken from interviews with exploration companies operating in Cambodia and reports about Cambodia found on a number of websites describing the countries – for examples the United Nations, the US Department of State, the UK Foreign Office to name a few.

Table 3.3.1 Cambodia – Negative Investment Factors

CATEGORY	NEGATIVE FACTORS	REMEDIAL ACTION
Geography & Climate	- Forested Mountain -High seasonal rainfall -Open borders difficult to patrol -Tropical climate creates health issues	-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	-Poor road network impassable in monsoon	- Plan and build roads, drainage, power grid,

	<ul style="list-style-type: none"> -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 	<p>telecoms system and bridges in areas of mining potential</p> <ul style="list-style-type: none"> - 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 & prospectively - 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 regulation 	<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	<ul style="list-style-type: none"> -Need to be oriented to encourage more foreign participation and JV's in sector 	<ul style="list-style-type: none"> -Upgrade to latest international standards and best practice
Regulation	<ul style="list-style-type: none"> -Inadequate and unimplemented -Require trained resources to implement 	<ul style="list-style-type: none"> -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 3.3.2 Cambodia – Positive Investment Factors

CATEGORY	POSITIVE FACTORS	COMPETITIVE ADVANTAGE
Geography & Climate	<ul style="list-style-type: none"> -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 	<ul style="list-style-type: none"> -Abundant cheap electric power -Modern mining uses much water, its abundance infers low cost supply -No heating of plant, workshops or equipment needed -Potential for bulk river transport is high -Much unexplored territory encourages risk- taking Junior 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 upgraded quickly -MIME staff are competent (but more specialists are needed) -Office and laboratory simple to upgrade	-Modernisation of MIME will place it ahead of competing departments within the region -Upgrading 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 practice throughout the sector	-Two-year recession must be used to plan and implement a complete law and tax overhaul
Regulation	-By adopting international best practice, investors should be free from intrusive regulation	-Early bird investors should be able to guide the government on appropriate measures.

The negative factors outweigh the positive by about 2:1 and to a certain extent this bias confirms the actual situation. Despite the huge boom in exploration activity between 2004 and 2008 and Cambodia being a virtually ‘virgin’ unexplored territory, only three major international companies are actively engaged in Cambodia at present.

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

Explanations of the method mining investors use to evaluate risk and the junior mining companies are given below. They will help to provide insights as to why Cambodia is not yet favored as a mining investment destination.

3.3.2 The Way Mining Investors Evaluate Risk.

Most ‘Western’ investors will evaluate all possible risk factors before committing to invest in a new project. Mining is all about money and return on investment. The risks are high and so companies are very cautious in their risk assessments.

The first assessment will evaluate whether the country is worthy of taking any investment risk. Its track record as an investment destination is important and the presence of prior investors will reassure an investor. At every subsequent stage of the process used to move from simple reconnaissance of a promising geological area to the point at which a mine reaches its full production, the forecast costs of the next stage are calculated and evaluated to estimate the probability of success. This process can be considered as a series of steps which it is necessary to climb to achieve mining success.

Good and unambiguous mining law, especially related to permitting, licensing, rights of tenure, transfer or renewal of licenses and the duration of licenses, should be written in harmony with the steps described in this process, so that at each stage the investor has no doubt about his legal rights in regards to the risks he takes at the next step. The government with which he is dealing has a responsibility to consider the investors rights but also to ensure that the law is not so onerous as to intimidate investors. Good, fair law and good government (= good governance) help to establish trust between the investor and the Ministry. Over time this establishes a good reputation for the host country throughout the global mining industry.

3.3.3 The Unique Role of Junior Mining Companies

A junior mining company is an exploration company that searches for new deposits of gold, silver, uranium, and other metallic and in some cases industrial minerals. These companies target 'properties' (areas of land or concessions on which a government permits exploration) that are believed to have significant potential for finding large mineral deposits.

It is important to understand the role of these companies as they form the majority of investors carrying out prospecting and exploration. The term 'Junior' is more related to their size and maturity as, typically they are small and recently formed.

These junior exploration companies are the major source of future mine supply. They find promising properties and prove the resources using geotechnical techniques and finally drilling. Staffed by a small number of geologists, geophysicists and engineers mainly working in the field, it is the junior mining company that is best positioned to determine whether a property is economically viable. Juniors are critical to the initial stages of the journey from mineral discovery to mine development. Discovery of a good deposit often encourages the senior companies to invest and partner with them to take the deposit to the point of mine production.

3.4 Internationally Supported Projects.

Internationally funding projects which may provide some benefit for the mining sector are as follows:

- The World Bank is providing regional and country grants as credits (e.g. \$33.5 million grants for power transmission lines) in Lao PDR and Cambodia. These will be able to carry power into Cambodia from Lao hydropower projects. This power will be to Northern Cambodia, where most exploration activity is in progress in geologically promising areas.
- The European Union is supporting educational projects in Cambodia with € 20,000,000 of funding. It is also arranging small funds to a total of € 60,000 for disadvantaged urban and rural communities for the defense of their basic human rights in the course of land conflicts and development process.

- The ADB is currently providing Cambodia with US\$71 million for education, jobs creation, road construction and market and financial system reform. US\$6m of this is to help maintain 950 km of roads managed by the MPWT.
- Cambodia is a member of the ASEAN Minerals Cooperation Action Plan 2005-2010. (This will likely continue through a second phase 2011 – 2015.) The purpose of this grouping is to co-operate with regional partners for the development of mineral resources in harmony and for the benefit of all the regional members.

The Royal Government of Cambodia and International Donor Agencies also acknowledges the support given by some 400 Non-Governmental Organisations (NGO's) in the rehabilitation, reconstruction and development efforts of the past 20 years. They play a major role in the provision of basic social services and are present in every province in Cambodia. There is no specific link between NGO's and the Mining Sector although they have been advocating for national reforms in several fields including education, the legal system, the environment and women and children's rights all of which are impacted by mining.