

**The Master Plan Study
for
Promotion of the Mining Industry
in the Kingdom of Cambodia
Final Report
(Summary)**

September 2010

**JAPAN INTERNATIONAL COOPERATION AGENCY
Industrial Development Department**

Mitsui Mineral Development Engineering Co., Ltd.

IDD

JR

10-096

PREFACE

In response to a request from the Royal Government of Cambodia, the Government of Japan agreed to conduct the Master Plan Study for Promotion of the Mining Industry in the Kingdom of Cambodia, and the Study was implemented by the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team, headed by Mr. Masaharu Marutani of Mitsui Mineral Development Engineering Co. Ltd. (MINDECO), and consisting of MINDECO, RTT Mining, International Consulting Services Co. Ltd., the International Development Center of Japan, and Matsunaga Geosurvey Co. Ltd., to Cambodia between August 2008 and July 2010.

The team held discussions with the concerned officials of the Royal Government of Cambodia and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to further sustainable development of the mining sector in Cambodia and investment promotion, and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the concerned officials of the Royal Government of Cambodia for the invaluable assistance with this study.

September 2010

Kyoko Kuwajima

Director of Industrial Development Department
Japan International Cooperation Agency

Ms. Kyoko Kuwajima

Director of Industrial Development Department
Japan International Cooperation Agency

Letter of Transmittal

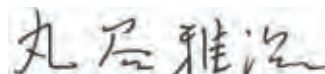
It is with great pleasure that we submit to you this final report on the Master Plan Study for Promotion of the Mining Industry in the Kingdom of Cambodia.

Under contract with your organization, this study was carried out by Mitsui Mineral Development Engineering Co. Ltd. (MINDECO) over 25 months, from August 2008 to September 2010. This report is written to provide a road map for sustainable development of the mining sector in Cambodia that gives due consideration to the country's environment, and to compile the investment policies of the mining sector into a Master Plan.

To increase the mining sector's share of Cambodian GDP, the Master Plan proposes effective action plans for promoting investment in the mining sector, organizational and institutional reform of mining administration, action plans for nurturing human resources, and improving mine safety and mining environmental management. Promoting exploration and development of the mining industry, and attracting investment from both foreign and domestic sources, are very important to the overall social and economic development of the Kingdom of Cambodia. As such, it is our expressed desire that the Royal Government of Cambodia make it a top priority to bring this plan to fruition.

In closing, we would like to express our sincere gratitude to your organization, to the Japanese Ministry of Foreign Affairs, and to the Japanese Ministry of Economy, Trade and Industry for your and their support and guidance with this project. We would also like to thank all the related organizations, such as the Cambodian Government, the Cambodian Ministry of Industry, Mines and Energy, and the Cambodian General Department of Mineral Resources, as well as the Japanese Embassy in Cambodia and the JICA Cambodia Office, for their assistance and support in carrying out this study.

September 2010



Masaharu Marutani

Team Leader

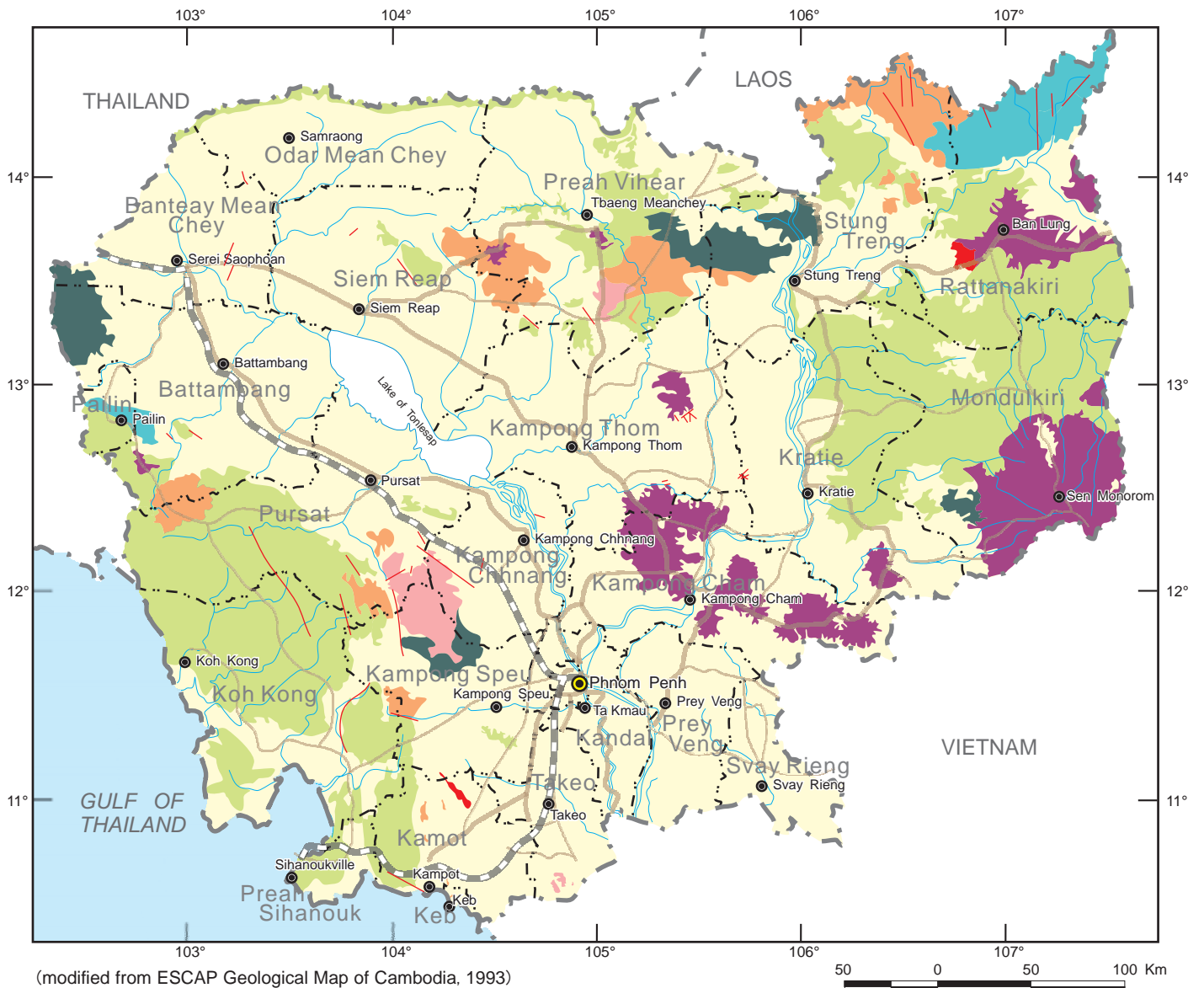
Study Team for the Master Plan Study
for Promotion of the Mining Industry
in the Kingdom of Cambodia



Kingdom of Cambodia



Location of Cambodia



SEDIMENTARY ROCKS

- Cenozoic
- Mesozoic
- Paleozoic/Precambrian

METAMORPHIC ROCKS

-

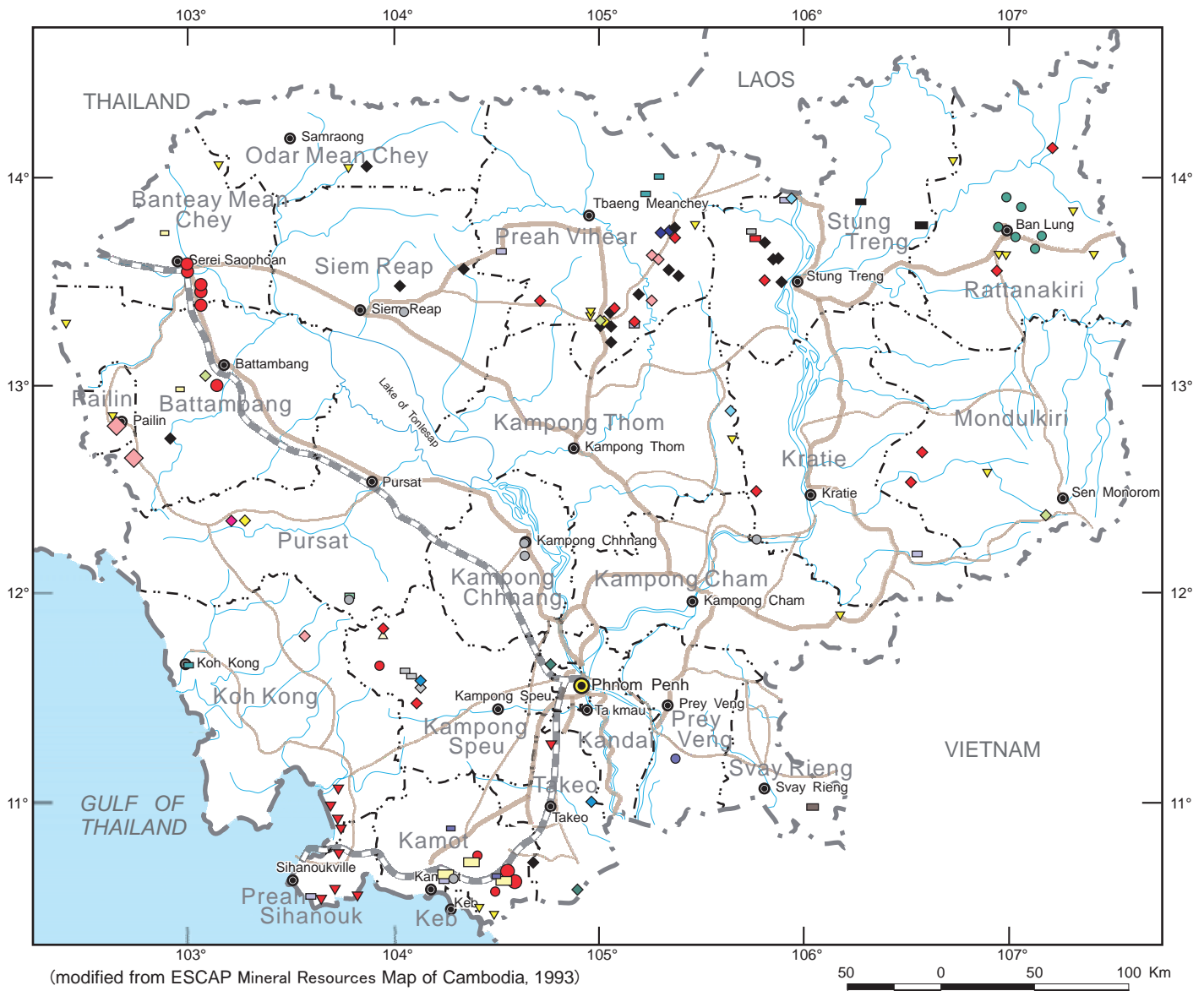
IGNEOUS ROCKS

- Cenozoic (basalt)
- Mesozoic-Paleozoic (rhyolite-andesite)
- Mesozoic(granitoids)
- Paleozoic/unknown era(granitoids)

- Fault

- Capital City
- Provincial center
- Country border
- Provincial boundary
- Rivers
- Principal roads
- Secondary roads
- Railway

Geological Map of Cambodia



METALLIC

- ◆ Antimony
- ◆ Base Metals
- ◆ Aluminium
- ◆ Chromium
- ▼ Gold
- ◆ Iron
- ◆ Manganese
- ◆ Molybdenum
- △ Silver
- ◆ Tin
- ◆ Tungsten

NON METALLIC

- Clay
- Fluorite
- Graphite
- Limestone
- Dolomite
- Phosphate
- ▼ Silica Sand
- Zircon

GEMSTONE AND ORNAMENTAL STONE

- ◆ Sapphire-Ruby-Zircon-Spinel Association
- ◆ Quartz-Amethyst-Opal Association
- Pagodite
- Jet
- Marble

FUEL

- Coal
- Lignite
- Peat

● Capital City

● Provincial center

--- Country border

--- Provincial boundary

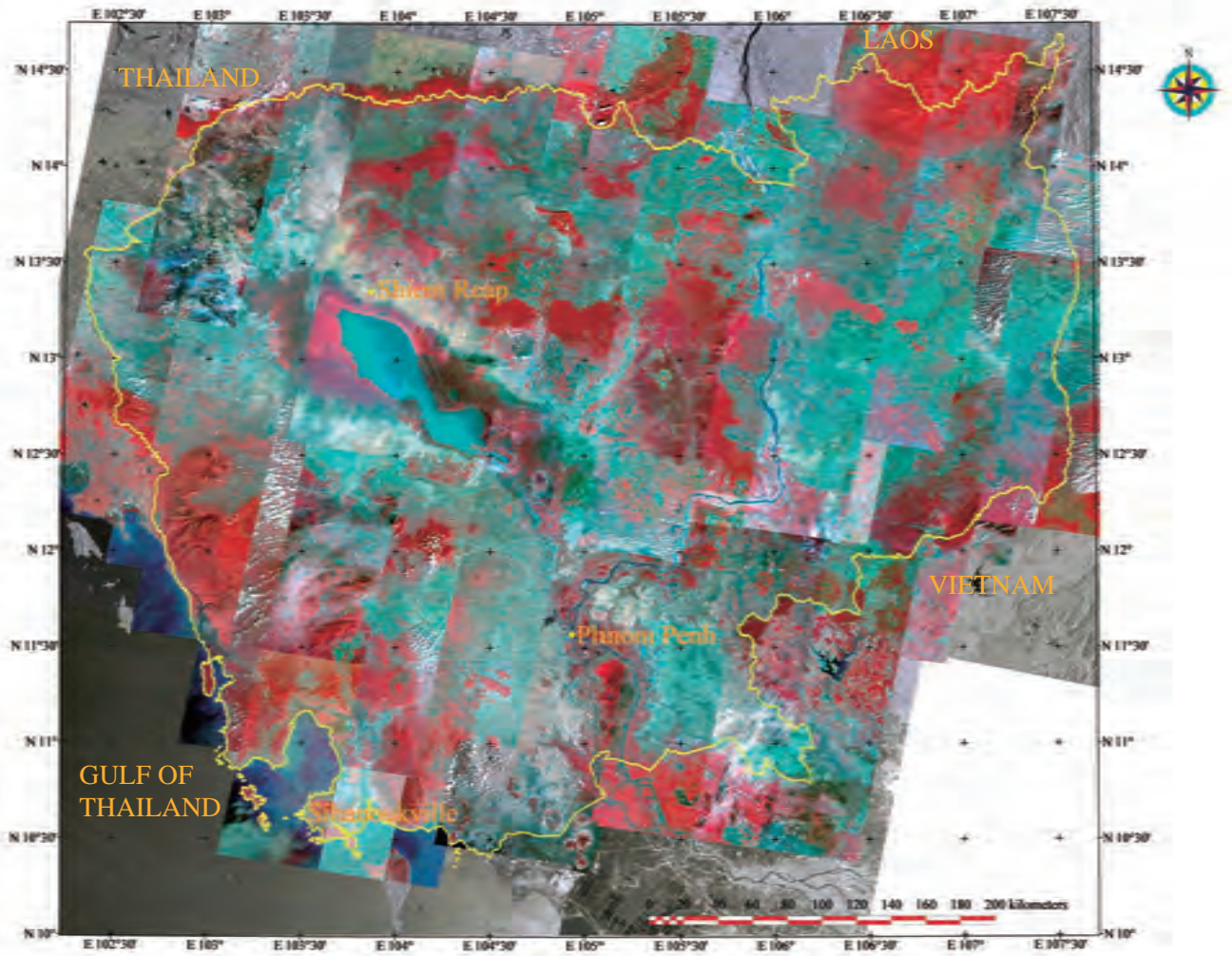
~ Rivers

~ Principal roads

~ Secondary roads

~ Railway

Map of Mineral Deposits and Occurrences of Cambodia



Satellite Image of Cambodia

The Master Plan Study for Promotion of the Mining Industry
in the Kingdom of Cambodia
Final Report
(Summary)

CONTENTS

CHAPTER 1	Pages
Overview of the Study	
1.1 Background of the Study	1
1.2 Purpose of the Study	1
1.3 Target Area for the Study	1
1.4 Method and Contents of the Study	1
1.5 Site Studies	2
1.6 Composition of the Task Force	4
CHAPTER 2	
Mining Investment Foundation	
2.1 Overview	5
2.2 Mining Policy	5
2.3 Mining Administration	7
2.4 Legal Framework for the Mining Sector	12
2.5 Cambodian Natural and Social Environment	17
2.6 Laws and Regulations Related to Environment in Mining Activities	18
2.7 Environment Administration	21
2.8 Infrastructure	21
2.9 Mining Development and Infrastructure	24
CHAPTER 3	
Current State of the Mining Sector and its Tasks	
3.1 Current Mining Activities in Cambodia	27
3.2 Mining Activities and Environmental Management	31
3.3 EITI and Foreign & Domestic Investment in Mining Exploration and Development	35
CHAPTER 4	
Organizational Reform and Capacity Building	
4.1 Current Status of the Organization of the GDMR and its Issues	37
4.2 Current Status and Issues with Capacity Building	41

CHAPTER 5	Geology and Mineral Resources	
5.1	Present Condition of Information on Geology and Mineral Resources	45
5.2	Geology and Mineral Resources of Cambodia	46
5.3	Satellite Image Analysis	50
5.4	Potential for Mineral Resources	55
5.5	Results of Geological Survey	56
CHAPTER 6	Compilation of Digital Spatial Datasets and Information Disclosure	
6.1	Status of the Current GIS Database	59
6.2	Construction of the GIS database	60
6.3	Website Construction	64
CHAPTER 7	Proposed Action Plan for Investment Promotion	
7.1	Goal for the Master Plan	67
7.2	Outline of the Action Plan for Mining Investment Promotion	69
7.3	Institutional Reform	73
7.4	Proposed Programs for Organizational Reform and Capacity Development	94
7.5	System for Managing and Utilizing Mineral Resource Information	103
7.6	Action Plan for Mine Safety/Mining Environmental Management	104

List of Tables

Table 1.1	Team Members List	2
Table 1.2	List of Task Force Members	4
Table 2.1	MIME Budget and Actual Results	11
Table 2.2	Royalties ,Land Rents and Fees related to Mining (2003-2007)	12
Table 2.3	Cambodian Legal Framework for the Mining Sector	12
Table 2.4	Tax Scheme of Cambodia	16
Table 2.5	Road Network Length	21
Table 3.1	Summary of Metal Exploration Concessions	30
Table 3.2	Summary of Construction Materials Concessions	30
Table 3.3	Cambodia – Negative Investment Factors	35
Table 3.4	Cambodia – Positive Investment Factors	36
Table 4.1	Characteristics and Activities of Departments of GDMR	37
Table 5.1	Existing Documents on Geology and Mineral Resources in Cambodia	45
Table 5.2	Geology and Mineralization of Cambodia	48
Table 5.3	Overview of satellite images purchased by this project	50
Table 5.4	Results of Geological Survey	58
Table 6.1	Evaluation of GIS Datasets and Databases	59
Table 6.2	Collected Datasets	60
Table 6.3	Main Specifications of the GDMR Web Development	64
Table 7.1	Comparison of Economic Indices of the 3 Countries of Indochina	67
Table 7.2	Summary of Action Plans	68
Table 7.3	Outline of the Detailed Action Plan for Institutional Reform	78
Table 7.4	Manpower Summary	80
Table 7.5	Detailed Action Plan for Institutional Reform	81
Table 7.6	Projected GDMR Staffing Requirements	94
Table 7.7	Estimated Investment Cost for MIS	98
Table 7.8	Action Plan for Mine Safety/Mining Environmental Management	104

List of Figures

Fig 2.1	Rectangular Strategy Plan	6
Fig 2.2	The Process for Reviewing Mining Law and Regulations	8
Fig 2.3	Mineral License Acquisition Process	9
Fig 2.4	The EIA Process for Mining Projects	20
Fig 2.5	Existing Road Network	22
Fig 2.6	Railway Lines in Cambodia	22
Fig 2.7	Maximum Navigable Vessel Size in the Mekong River Basin	23
Fig 2.8	Cargo Ratio 2007(tonnage)	23
Fig 2.9	Mineral Potential Areas and Infrastructure	25
Fig 3.1	Map of Metal Concessions in Cambodia	27
Fig 3.2	Main Illegal Gold Mining Districts	29
Fig 3.3	Production of Construction Materials in Cambodia	29
Fig 3.4	Forest Concessions and Mineral Concessions	31
Fig 3.5	Protected Areas and Mineral Concessions	32
Fig 3.6	Ethnic Minorities and Mineral Concessions	33
Fig 3.7	UXBs & Landmines and Mineral Concessions	34
Fig 5.1	Index Map of Existing Geological Maps	45
Fig 5.2	Geological Map of Cambodia	47
Fig 5.3	Mineral Deposits and Occurrences of Cambodia	49
Fig 5.4	ASTER False Color Images (RGB=VNIR3,2,1)	50
Fig 5.5	DEM Images Based on ASTER (grid size: 30m)	51
Fig 5.6	PALSAR Radar Image (HH polarization)	51
Fig 5.7	Flow Chart of the Method for Identifying Promising Areas	52
Fig 5.8	Location of the Sepon Mine, Laos	53
Fig 5.9	Distribution of Igneous Rocks	54
Fig 5.10	Composite Image of Oxidized Iron Distribution (RGB=4/7 4/3 2/1)	54
Fig 5.11	Geological Survey Routes and Sample Locations	57
Fig 6.1	General Structure of Databases for the GDMR Internal Usage	61
Fig 6.2	Structure of the Mineral Resources Database	62
Fig 6.3	Structure of the Concession Database	62
Fig 6.4	Distributions of Mineral Resource Concession as of November, 2008, Mineral Potential Areas, and Landmine and UXO	63

Fig 6.5	Concession Spatial Data with Related Attributed Information	63
Fig 6.6	General Structure of the GDMR Website	65
Fig 6.7	The GDMR top pages in English (left) and Khmer versions (right)	65
Fig 6.8	Web-GIS Site (Geological Map)	66
Fig 6.9	Administration Tool	66
Fig 7.1	Outline of the Action Plan for Mining Investment Promotion	72
Fig 7.2	Proposed Organizational Reform	95
Fig 7.3	Conceptual Diagram of the Proposed Technology Center for Mineral Resources	99
Fig 7.4	Overall Structure of the Proposed GDMR Organization	102
Fig 7.5	Flow-chart for Approval of Exploration Licenses	106

List of Abbreviations

ADB	: Asian Development Bank
ALOS	: Advanced Land Observing Satellite
ASEAN	: Association of South-East Asian Nations
ASTER	: Advanced Spaceborne Thermal Emission and Reflection Radiometer
BRGM	: Bureau of Geological and Mining Research
CCOP	: Coordinating Committee for Geoscience Programmes in East and Southeast Asia
CDC	: Council for the Development of Cambodia
CIB	: Cambodia Investment Board
CIP	: Carbon in Pulp
CMAC	: Cambodia Mine Action Center
CMDGs	: Cambodia Millennium Development Goals
CMDP	: Conceptual Mining Development Plan
CoW	: Contact of Work
C/P	: Counterpart
CRDB	: Cambodian Rehabilitation and Development Board
CRIRSCO	: CMMI Mineral Resources/Reserves International Reporting Standards Committee
DCMR	: Department of Construction Materials Resources
DEM	: Digital Elevation Model
DIME	: Provincial/Municipal Department of Industry, Mines and Energy
DMDP	: Detailed Mining Development Plan
DMR	: Development of Mineral Resources
DMRD	: Department of Mineral Resources Development
DoG	: Department of Geology
DoM	: Department of Meteorology
DWT	: Dead Weight Tonnage
EAC	: Electricity Authority of Cambodia
EDC	: Electricite du Cambodge
EE	: Environmental Evaluation
EIA	: Environmental Impact Assessment
EITI	: Extractive Industries Transparency Initiative
ERSDAC	: Earth Remote Sensing Data Analysis Center
ESCAP	: Economic and Social Commission for Asia and the Pacific
ETR	: Effective Tax Rate
GDMR	: General Department of Mineral Resources
GDP	: Gross Domestic Product
GIS	: Geographical Information System
GPS	: Global Positioning System
GRET	: Research and Technology Exchange Group
GTZ	: Deutsche Gesellschaft für Technische Zusammenarbeit
Halo Trust	: Halo Trust (NGO)
IEIA	: Initial Environmental Impact Assessment
IT	: Information Technology
ITC	: Institute of Technology of Cambodia
IUCN	: International Union for Conservation of Nature and Natural Resources
JAXA	: Japan Aerospace eXploration Agency

List of Abbreviations

JORC	: Joint Ore Reserves Committee
KIGAM	: Korea Institute of Geoscience & Mineral Resources
MAFF	: Ministry of Agriculture, Forestry and Fisheries
MAG	: Mines Advisory Group
MEF	: Ministry of Economy and Finance
MIME	: Ministry of Industry, Mines and Energy
MIS	: Management Information System
MoE	: Ministry of Environment
MOU	: Memorandum of Understanding
MOWRAM	: Ministry of Water Resources and Meteorology
MPWT	: Ministry of Public Works & Transport
MRC	: Mekong River Commission
MRD	: Ministry of Rural Development
MWRM	: Ministry of Water Resources and Meteorology
NDVI	: Normalized Difference Vegetation Index
NPRS	: National Poverty Deduction Plan
NSDP	: National Strategic Development Plan
OJT	: On-the-Job Training
Oxfam	: Oxfam (NGO)
PALSAR	: Phased Array type L-band Synthetic Aperture Radar
PDAC	: Prospectors and Developers Association of Canada
PO	: Project Owner
Prakas	: Ministerial Ordinance
QIP	: Qualified Investment Project
RCAF	: Royal Cambodian Armed Force
RGC	: Royal Government of Cambodia
SEACAP	: South-East Asian Community Access Program
SEZ	: Special Economic Zone
SMEM	: Small- and Medium-Scale Mining
SNDMS	: Strategy of National Development for Mineral Sector
SPOT	: Satellite Pour l'Observation de la Terre
Sub-Decree	: Government Ordinance
SWIR	: Short Wave Infrared Radiometer
TIR	: Thermal Infrared Radiometer
TOR	: Terms of Reference
UNIDO	: United Nations Industrial Development Organization
USGS	: United States Geological Survey
UXO	: Unexploded Ordnance
VNIR	: Visible and Near Infrared Radiometer
WGS84	: World Geodetic System 1984 Datum
WUP-FIN	: Water Utilization Program-Finish Environment Institute SYKE
