

Final Report
of
the Asia Region
Data Collection Survey on Geological Mapping
and Mineral Information System in ASEAN

Oct 2014

Japan International Cooperation Agency

Joint Venture
Sumiko Resources Exploration and Development Co., Ltd.
PASCO Corporation

Abbreviation

AIST	National Institute of Advanced Industrial Science and Technology
ASEAN	Association of Southeast Asian Nations
ASOMM	ASEAN Senior Officials Meeting on Minerals
CCOP	Coordinating Committee for Geoscience Programmes
C/P	Counterpart
DEM	Digital Elevation Model
EITI	Extractive Industries Transparency Initiative
GIS	Geographical Information System
GPS	Global Positioning System
GSJ	Geological Survey of Japan (one organization of AIST)
HIDA	Overseas Human Resources and Industry Development Association
JICA	Japan International Cooperation Agency
JOGMEC	Japan Oil, Gas and Metals National Corporation
JSS	Japan Space Systems
J/V	Joint Venture
METI	Ministry of Economy, Trade and Industry
PASCO	PASCO Cooperation
SMM	Sumitomo Metal Mining Co., Ltd.
SRED	Sumiko Resources Exploration & Development Co., Ltd.

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1. Outline of the Project

1.1 Background of the Project

As the economy of ASEAN countries has developed significantly, the rich potential of mineral resources in ASEAN countries has been attracted attention. Foreign and domestic companies have explored mineral resources and developed many mines in Indonesia and Philippines. However, other countries are still developing in resources development, because they lag in the management of basic data as geology, mineral resources and topography, and have the problem of infrastructure maintenance and procedure system to develop mines.

Based on this background, ASEAN Senior Officials Meeting on Minerals (ASOMM) agreed in 2008 that the Center of Geological Survey, Ministry of Energy and Minerals Resources, Indonesia would take the lead to construct the database of mineral resources information. In ASOMM meeting in 2010, ASEAN requested the support for the development and upgrade of database to the Japanese government. Geological Survey of Japan (GSJ) of National Institute of Advanced Industrial Science and Technology (AIST) had implemented three trainings in Japan from 2010 to 2012 for the geological survey organizations of ASEAN countries under the training scheme of Overseas Human Resources and Industry Development Association (HIDA).

Ministry of Economy, Trade and Industry (METI) requested Japan International Cooperation Agency (JICA) the cooperation to continue the training in Japan on May 2012. In response to this request, JICA started this project in order to collect and confirm basic information and to examine the possibility for further cooperation in mineral resources and mining fields. JICA and GSJ concluded the memorandum for cooperation and collaboration in this project.

1.2 Objective of the Project

To develop and promote the highly convenient information system and database for uses through the examination of present situation and issues of ASEAN database in each country.

To examine specifically the future possibility and direction of JICA's cooperation in mineral resources sector in ASEAN region.

To enhance personnel network between ASEAN and Japan in mineral resources sector through the invitation to Japan for geological survey organizations of each ASEAN country in this Project.

1.3 Scope of the Project

(1) Target area of the Project

ASEAN eight countries:

Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam

※ Target countries of On-site Works are six except for Thailand and Malaysia

(2) Relevant organizations and counterpart organizations

ASEAN Senior Officials Meeting on Minerals (ASOMM): in Indonesia

Counterpart organizations: Geological survey departments in each country

Cambodia	Department of Geology, General Department of Mineral Resources (DGMR) Ministry of Mines and Energy
Indonesia	Center for Geological Resources (CGR), Geological Agency, Ministry of Energy and Minerals Resources
Laos	Department of Mines (DoM), Ministry of Energy and Mines Department of Geology and Minerals (DGM), Ministry of Natural Resources and Environment
Malaysia	Mineral and Geoscience Department Malaysia (JMG) Ministry of Natural Resources and Environment
Myanmar	Department of Geological Survey and Mineral Exploration (DGSE), Ministry of Mines
Philippines	Mines and Geosciences Bureau (MGB) Department of Environment and Natural Resources
Thailand	Department of Mineral Resources (DMR), Ministry of Natural Resources and Environment
Vietnam	Center for Information and Archives of Geology (CIAG) and General Department of Geology and Minerals of Vietnam (GDGMV), Ministry of Natural Resources and Environment (MONRE)

1.4 Schedule of the Project

The outline schedule of the Project is as follows. The term of the Project contract is 21 November 2014. The target countries of On-site Works are shown in Table 1-1. The flow chart of project implementation is shown in Figure 1-1.

- (1) Preparation (Works in Japan): March to April 2014
- (2) The first On-site Works: 20 April to 12 July 2014
- (3) Invitation to Japan (the First Works in Japan): 3 August to 16 August 2014
- (4) The second On-site Works: 31 August to 19 September 2014
- (5) The second Works in Japan: September to October 2014

Table 1-1 Target countries and schedule of the Project

Country	The first On-site Works	Invitation to Japan	The second On-site Works
Philippines	20 April to 4 May	3 August to 16 August	×
Indonesia	4 May to 17 May	ditto	×
Cambodia	17 May to 31 May	ditto	31 August to 6 September
Laos	31 May to 14 June	ditto	20 to 23 September
Vietnam	14 June to 28 June	ditto	15 to 19 September
Myanmar	28 June to 11 July	ditto	7 to 14 September
Thailand	×	ditto	24 to 27 September
Malaysia	×	ditto	×

1.5 Project Implementation System

The joint venture of Sumiko Resources Exploration and Development Co., Ltd. (SRED) and Pasco Corporation (PASCO) implement the Project in cooperation with GSJ, AIST.

The study team is composed of the following four persons.

- Leader/ Geology/ Satellite image analysis : Takumi ONUMA (SRED)
- Sub-leader/ Geology : Atsushi NINOMIYA (SRED)
- Satellite image analysis : Masahiro TAKEDA (SRED)
- webGIS : Bhuvneshwar P. SAH (PASCO)

1.6 Policy of the Project Implementation

Policy 1: Implement the Project in cooperation with GSJ

Geological Survey of Japan (GSJ) of AIST had implemented the seminars of ASEAN mineral resources database in Japan three times from 2010 to 2012 by means of inviting engineers who belonged to the geological survey organizations of ASEAN countries. This JICA Project is designed to have the same kind of workshop in each ASEAN country because more engineers could learn technologies easily in their country. Also, the lecture of the workshop in each country is planned to be executed mainly by GSJ staffs.

Therefore, the JICA study team implements the Project in cooperation and collaboration with GSJ. The team holds effectively the workshop to let participants understand the lectures, and then hears opinions and issues about ASEAN database.

Policy 2: Implement the Project considering the future JICA project

JICA has focused mainly on the management of mineral resources in mineral resources and mining sector on the basis of human resource development. JICA had ever conducted several projects related to mining development in several ASEAN countries and may have new projects in the future.

Based on the results of this project implementation, the JICA study team examines the possibility and direction of JICA's cooperation and recommends the future cooperation project.

Policy 3: Safety management

As the JICA study team visits six countries and stays for about three months in total, the team collects the latest information of security and safety in each country and pays proper attention for safety management during stay. The team members individually carry Japanese or domestic mobile phones, and the team maintains the system to communicate at any time. The team members should follow the instructions by JICA office during their stay.

1.7 Methods of the Project implementation

(1) Preparation works in Japan

The study team collects existing information, examine methods and schedule of the Project and prepare the On-site Works. The team creates a questionnaire and sends it to the Directors of each organization before visits. The team recovers it and confirms contents on visits.

(2) The First On-site Works (workshop)

The study team visits six countries and stays for two weeks in each country. The team holds the workshop, which has a theme of seamless geological map, in the second week in cooperation with GSJ and confirms issues of ASEAN database and hears opinion.

(3) The First Works in Japan

Sixteen engineers from geological survey organizations of eight countries are invited to Japan after the First On-site Works. The study team implements the seminar for 14 days in cooperation with GSJ.

(4) The Second On-site Works (follow-up)

The study team visits four countries and stays for one week in each country. The team follows the development of ASEAN database in cooperation with GSJ.

(5) The Second Works in Japan

Based on the study results, the study team recommends the JICA cooperation in the future. The team creates a final report.

(6) Reports

The study team creates and submits reports and documents in each stage.

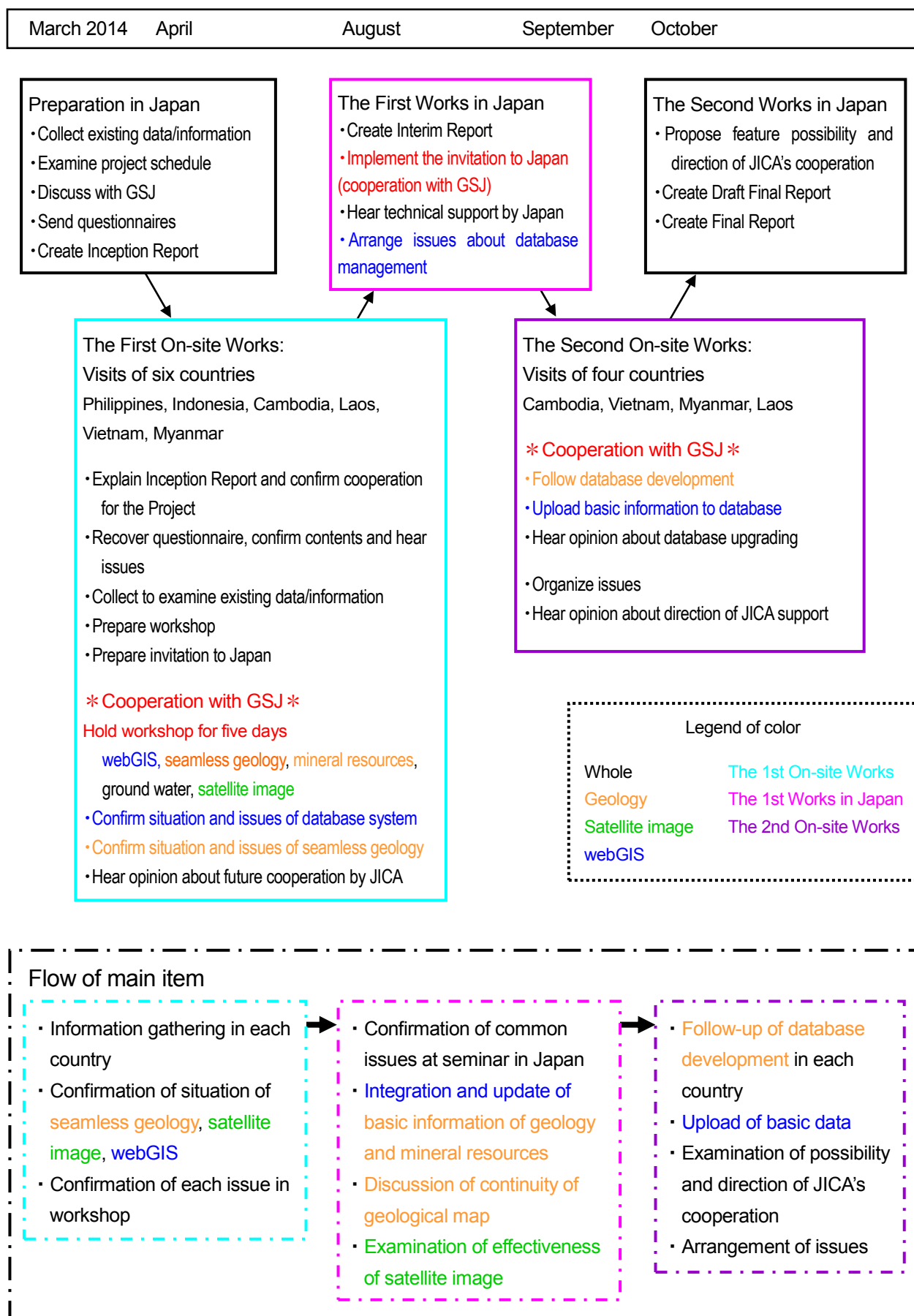


Figure 1-1 Flow chart of the Project Implementation

2. The First On-site Works

Target countries of the First On-site Works are six; Philippines, Indonesia, Cambodia, Laos, Vietnam and Myanmar. The study team visits them in order, and stays for two weeks in each country and moves on Saturday and/or Sunday. The team holds the workshop in the second week in each country in cooperation with GSJ. The outline schedule of the First On-site Works is shown in Table 2-1 and the study schedule which is generally common in each country in Table 2-2.

Each country except for Indonesia has counterpart organization in its capital city. The Center for Geological Survey in Indonesia is located in Bandung, to which it takes about two hours by vehicle from Jakarta. As the international airport of Myanmar is located in Yangon, it is necessary to move by domestic airplane from Yangon to Nay Pyi Taw, Capital.

2.1 Information collection

Explain the Inception Report to the geological survey organizations in each country and confirm the cooperation for the Project. Recover the answer of the questionnaire, and confirm its contents and question additionally as necessary. Hear issues about maintenance and management of mineral resources information and development of ASEAN database.

Collect, analyze and examine existing reports, published information and data. Collect especially basic information about geology, mineral resources, exploration projects and present situation of active mines in target countries. Prepare for the workshop described below.

2.2 The First Workshop

Based on the information which are collected and analyzed in the First On-site Works, hold the workshop with the theme of information sharing and seamless geological database which ASEAN geological organizations are conducting.

Table 2-1 Outline schedule of the First On-site Works

Week	Date	Contents	Place	JICA study team				GSJ
				Onuma	Ninomiya	Takeda	Sah	
	20 April (Sun)	Departure from Japan, move to Philippines		○	○	○	○	
1	21~27 April	On-site works	Manila, Philippines	○	○	○	○	
2	28 April~2 May 3 May (Sat)	Workshop Data arrangement		○	○	○	○	○
	4 May (Sun)	Move to Indonesia			○	○	○	
3	5~11 May	On-site works	Bandung, Indonesia		○	○	○	
	6 May	Move to Bandung			○	○	○	
4	12~16 May	Workshop		○		○	○	○
	17 May (Sat)	Move to Cambodia			○	○	○	
5	18~25 May	On-site works	Phnom Penh, Cambodia		○	○	○	
6	26~30 May	Workshop			○	○	○	○
	31 May (Sat)	Move to Laos			○	○	○	
7	1~8 June	On-site works	Vientiane, Laos		○	○	○	
8	9~13 June	Workshop			○	○	○	○
	14 June (Sat)	Move to Vietnam		○	○		○	
9	15~22 June	On-site works	Hanoi, Vietnam	○	○		○	
10	23~27 June	Workshop		○	○		○	○
	28 June (Sat)	Move to Myanmar		○	○		○	
11	29 June~6 July	On-site works	Nay Pyi Taw, Myanmar	○	○		○	
	1 July	Move to Nay Pyi Taw		○	○		○	
12	7~11 July	Workshop		○	○		○	○
	11 July (Fri)~ 12 July (Sat)	Move to Yangon, return to Japan		○	○		○	

○: participation

Table 2-2 Detailed schedule of the First On-site Works (common in each country)

Week	JICA study team	GSJ
First	<ul style="list-style-type: none"> - Explain the schedule and contents of the project according to Inception Report - Recover the questionnaire and confirm its contents - Hear issues about ASEAN database - Collect basic information of geology and mineral resources - Prepare the second week's jobs and the workshop - Hear opinion about the possibility of JICA's future cooperation 	<p>* Transfer from Japan to each country on weekends</p> <p>* Lecturers: Okubo, Takahashi, Ohno, Uchida, Bandibas (GSJ)</p>
Second	<p>Workshop</p> <ul style="list-style-type: none"> - Support lectures in cooperation with GSJ - Collect and arrange information - Prepare the invitation to Japan (see section 3.5) 	<p>Workshop</p> <p>Mon/ AM: Setting PM: Demonstration of Web-GIS</p> <p>Tue/ AM: Groundwater PM: Seamless geology</p> <p>Wed/ AM: Mineral resources, Geophysics PM: Web-GIS</p> <p>Thu/ AM: Install of Web-GIS software PM: Remote sensing</p> <p>Fri/ AM: Wrap-up PM: Discussion</p>

2.3 Number of participants for the Workshop in each country

Tables 2-3 and 2-4 show the number of total and detail of the participants for Workshop in each country. See attachments for the detail of each organization structure. The participants are detached from various organizations related to not only mineral resources but also disaster or water resources and so on because Web-GIS and remote sensing analysis is useful in the various fields. The position of the participants from Indonesia and Vietnam is unknown. The total number of the participants for the Workshops is 176.

Table 2-3 Number of total and detail of the participants for the Workshops

Country	Number		Organization
	Total	Detail	
Philippines	30	15	Mines and Geosciences Bureau Central Office
		15	Regional Office
Indonesia	28	23	Geologica Agency
		17	Center for Geological Resources
		2	Center for Groundwater and Geological Environment
		2	Research Center for Marine Geology
		1	Center for Geological Survey
		1	Center for Volcanology and Geological Hazard Mitigation
		1	Affiliation and Information Division
		1	Center for Data and Information, Secretariat General
		1	Geological Department, Padjadjaran Univ.
Cambodia	37	26	General Department of Mineral Resources (GDMR)
		9	General Department of Petroleum (GDP)
		2	Information Division, Energy and Mineral Office of West Jawa
		2	Institute of Technology of Cambodia (ITC)
Laos	33	10	Department of Mines (DoM, MEM)
		7	Department of Geology and Minerals (DGM, MONRE)
		4	Polytechnic College
		2	Faculty of Engineering, National University of Laos
		2	Department of National Disaster Management and Climate Change
		2	Lao Statistics Bureau, Ministry of Planning and Investment
		1	Department of Investment Promotion
		1	Department of Water Resource
		1	Unknown
		3	Department of Mineral Resources (DMR), Thailand
Vietnam	26	22	General Department of Geology and Minerals of Vietnam (GDGMV)
		10	Center for Information and Archives of Geology (CIAG)
		3	General Department of Geology and Minerals of Vietnam
		1	Center for Geological verification and Technology
		1	Northern Department for Control of Mineral activities
		2	Northern Geological Mapping Division
		2	Geophysical Division
		1	Geological Division for Radioactive and Rare Elements
		2	Northeast Geological Division
		4	Vietnam Institute of Geosciences and Mineral Resources (VIGMR)
Myanmar	22	4	Department of Mines
		3	No(1) Mining Enterprise
		3	No(2) Mining Enterprise
		3	No(3) Mining Enterprise
		9	Department of Geological Survey and Mineral Exploration
Total	176		

Table 2-4 Position of the participants for the Workshops

Country	No.	Position
Philippines Total: 30	2	Administrative Assistant III
	4	Chief
	3	Chief Geologist
	2	Chief Geoscience Division
	1	Chief Mine Management Division
	1	Computer Programmer
	1	Development Management Officer III
	1	Engineer II
	2	Engineer III
	1	Mathematician I
	1	Science Research Assistant
	4	Senior Geologist
	4	Senior Science Research Specialist
	1	Statistician III
	1	Supervising Geologist
	1	Supervising Science Research Specialist
Cambodia Total: 37	1	Chief of Geo-Research Office
	1	Chief of Mapping Office
	4	Chief Office
	3	Deputy Director
	2	Deputy Director of Geology Dept.
	1	Director of Geology Dept.
	1	Lecturer
	10	Officer
	2	Staff
	1	Student
	4	Vice Chief Office
	7	Unknown
Laos Total: 25	1	Deputy Director
	2	Director
	1	General Director
	3	Geologist
	5	Technical Official
	4	Technician
	17	Unknown
Myanmar Total: 22	2	Engineer
	4	Geologist
	1	Admin Officer
	1	Assistant Director
	1	Director
	1	Engineer
	1	Geophysist
	10	Junior Geologist
	1	Mining Engineer

2.4 Philippines

2.4.1 Information collection

(1) Consultation in the Counterpart organizations

i. Mines and Geosciences Bureau

Date/Place	Participants	Contents
21 Apr (Mon) 9:00 - 10:30 am Assistant Director room	MGB: Elmer Billedo (AD), Romualdo Aguilos, Michael Luna JICA Team: Onuma Ninomiya, Sah, Takeda	<ul style="list-style-type: none"> - Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



Gate of the MGB



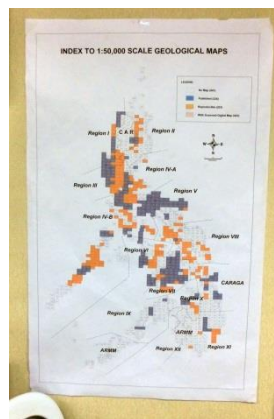
Group photo

ii. IT section

Date/Place	Participants	Contents
21 Apr (Mon) 10:40 - 11:00 am Office of IT section	MGB: Michael Luna JICA Team: Onuma, Ninomiya, Sah, Takeda	- Recover the answer of the Questionnaire - Study for the GIS database



Demonstration for GIS system



Index of the Geological maps

iii. Lands Geological Survey

Date/Place	Participants	Contents
22 Apr (Tue) 11:30 - 12:10 am Lecture room	MGB: Lilian Rolien, Marnette Puthenpurekal, Romualdo Aguilos, Federico Jacoba JICA Team: Onuma, Ninomiya, Sah, Takeda	- Recover the answer of the Questionnaire



Consultation

iv. Mine Rehabilitation

Date/Place	Participants	Contents
23 Apr (Wed) 10:00 - 11:10 am Meeting room	MGB : Marcial Mateo, Romualdo Aguilos JICA Team: Onuma, Ninomiya, Sah, Takeda	- Presentation from the Mine Rehabilitation section about mining and environment (Accompanying material : Information collection) - Recover the answer of the • Questionnaire



Consultation

v. Mining Tenement Management

Date/Place	Participants	Contents
23 Apr (Wed) 11:15 -11:50 am Office	MGB : Ann Brenice JICA Team: Onuma, Ninomiya, Sah, Takeda	- Presentation from the Mining Tenement Management section about application and law for exploration and exploitation of mining - Recover the answer of the Questionnaire



Consultation

vi. Marine Exploration

Date/Place	Participants	Contents
23 Apr (Wed) 13:30 - 14:40 am Division Office	MGB: Conrado Miranda, Reynaldo Villela, Yolanda Aguilar, Pancho Caculitan, JICA Team: Onuma, Ninomiya, Sah, Takeda	- Presentation about the function of the Marine Exploration section - Recover the answer of the Questionnaire



Consultation

vii. IT section2

Date/Place	Participants	Contents
23 Apr (Wed) 14:50 -15:10 am Lecture room	MGB: Federico Jacoba, JICA Team: Onuma, Ninomiya, Sah, Takeda	- Interview about hardware, software and their usage along the Questionnaire



Consultation

viii. Hearing in Metallurgical Technology

Date/Place	Participants	Contents
23 Apr (Wed) 15:15 - 15:30 am Processing plant	MGB : Hector Andres JICA Team: Onuma Ninomiya, Sah, Takeda	- Receive an explanation about facility in the laboratory



Introduction of processing facility

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_Philippines.docx

Reference Data (Accompanying material)

JICA survey attachment 1.docx

JICA survey attachment 2.docx

JICA survey attachment 3.docx

MGB - Organizational Structure.docx

MGB-Organizational Diagram.pptx

JICA survey attachment.pdf

Text book

Geology of the Philippines, Mines and Geosciences Bureau, 2010

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name
 - Geological Survey Organization name
 - Number of personnel in each section
 - Organization chart
- See attachment files (i) MGB-Organizational Diagram.pptx and (ii) MGB - Organizational Structure.docx

2. Please let us know the following items in your Organization/Country.

-FOR QUESTION 2, PLEASE REFER TO ATTACHMENT 3

(1) System

- Information gathering
- Information / Data management

(2) Geology

- Existing geological maps
 - + Scale and area
 - + Printed maps or digital data

- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
- + Blank area of geological map with 1:1M scale
- + Methods to fill up the blank area
- + Issues in creation of seamless geological map

(3) Topography

- Existing topographic maps
 - + Scale and area
 - + Printed maps or digital data
- Other relevant data
 - + Road, river
 - + Administrations, district boundary

(4) Mineral resources data

- Contents of data
- Printed maps or digital data

(5) Geophysical data

- Gravity, magnetic and radioactive survey
 - + Survey date and organization
 - + Area and map scale
 - + How is it used?

-FOR QUESTION 2 (5), PLEASE REFER TO ATTACHMENT 1 and 3

(6) Satellite data

- What kind of satellite data does your Organization have?
 - + Satellite name
 - + Area
 - + How do you use it?

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole?
 - + Location, usage, depth
 - + Can someone measure the temperature?

3. Please let us know the situation of following items related to the seamless

geological database in your Organization.

For 3-1, 3-2 and 3-3 see attachment “JICA survey attachment 3.docx”.

(1) Hardware for digital data/information

- System of data management
 - Kinds, names and numbers of hardware
 - Condition of their management
- IBM server system is recently installed for database creation and management.
 - Most recent, but not fully installed and configured.

(2) Software

- Usage situation of open source software
 - Kinds, names and numbers of software for GIS and remote sensing
 - Usage situation of GIS and remote sensing
- Open source software is not much in use. Recently QGIS is being used just for data conversion and simple GIS operation.
 - For GIS mainly ESRI software is being used for most of the operation such as data capturing, data analysis and publishing using Web-GIS portal.
 - Traditional for GIS, Mapinfo was used, which is gradually phased-out.
 - For remote sensing ENVI is in use.
 - The use situation is moderate, which is going to be enhanced soon.

(3) Data

- Contents and quality of data
 - Situation of usage, frequency of updates
 - Condition of data dissemination
- Recently there is effort to convert available archive data from Mapinfo format to ESRI ArcGIS (shape file) format. However, due to lack of metadata, there is difficulty to do so.
 - MGB is concentrating on creation of geohazard Web-Portal mainly to share MGB geospatial data, which is termed as “Geological database information system”. At the moment, (i) available 1:50,000 geological map and (ii) 1:50,000 geohazard (landslide and flood) map in JPG format have been uploaded into the web-portal for the part of country. For this NAMRIA 1:50,000 topographic map is used as base map. Furthermore, work is under way to prepare

1:10,000 geohazard map for most part of the country by the end of this year.

- The “Geological database information system” has been newly created, thus it is up to date at the moment.
- MGB web page, including web-Portal for data sharing and dissemination has, reasonably, valuable information about its activities.

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

- Name of training, date, place, participants
- Organization of lecturers
- Objectives of training

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment
- How to get it

(2) Tenement

- Which department manages the tenement?
- What is the management system of tenements?
- How to apply the tenement

-FOR QUESTION 5, (1) & (2), PLEASE REFER TO ATTACHMENT 2

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information?
- How is it managed?
- Is it available?

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines?
- What is the content?

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development?

-YES

- Name, establishment date
-RA7942, CDAO No. 2010-21
- How to get it
-Through MGB website, www.mgb.gov.ph

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?
-YES
- Are there any resident problems caused by mines?
-YES
- What are they?
-Dust, siltation, noise, AMD
- What are results?
-Conduct mitigating measures, monitoring and audit

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
- Is it available?
- How does your Country manage/control them?

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?
-Philippine President Benigno Aquino III committed to implementing the EITI Standard in July 2012. After establishing the multi-stakeholder group in January of 2013, the Philippines submitted its Candidature Application (annexes) to the EITI International Secretariat on 5 April 2013. The EITI Board, during its 23th meeting in Sydney on 22 May 2013, approved the Philippine application and declared the Philippines an EITI Candidate country.
- If not, will your Country plan to implement EITI?
-n/a

2.4.2 Workshop

(1) Venue

Because the venue is not available in Mines and Geosciences Bureau, the Workshop was held in the meeting room of the Eurotel Hotel (North EDSA, Quezon City).

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program_Philippines.xls).

28 Apr (Mon)

Morning

- ✓ Opening
 - Praying
 - Welcome speech by Mr. Leo L. Jasareno, Director

Afternoon

- ✓ Introduction of the Workshop (Dr. Okubo, GSJ)
- ✓ Web-GIS demonstration (Dr. Joel, GSJ)
- ✓ ASEAN Mineral Resources Database Information System (Mr. Prima Muharam Hilman, Geological Agency, Indonesia) Accompanying material: asomm indonesia.pptx

29 Apr (Tue)

Morning

- ✓ Groundwater (Dr. Okubo, GSJ)
 - Ground Water Flow System
 - Case Studies of Groundwater Observations
 - Geothermal Heat Pump
 - Web-GIS for Groundwater Database
- ✓ Seamless Geology (Dr. Okubo, GSJ)
 - Introduction of Geological Maps Available
 - Correlation of Legends Over Cross-Border Areas
 - Unified Legend

Afternoon

- ✓ Mineral Resources (Dr. Ohno, GSJ)
 - Review of Questionnaire (Accompanying material : Ohno_q_ph.ppt)
- ✓ Geophysics (Dr. Okubo, GSJ)
 - Mirano

Magnetics

Gravity

30 Apr (Wed)

Morning

- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients
- ✓ Web-Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)
 - Major Components of a Web GIS system
 - Web Services Based Information Sharing System
 - WMS Clients and AIST's Current Information System Using FOSS and OGC

Afternoon

- ✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)
 - Database Creation
 - Web Map Service Formulation

1 May (Thu)

Morning

- ✓ Web GIS System Development (Dr. Bandibas, GSJ)
 - Web Service Formulation for Seamless Geology
 - Web Service Formulation for Minerals
 - WMS Client Development
 - Spatial Database Query
 - Basic SQL Formulation for Querying POSTGIS Database
 - Integration of Web GIS System Components

Afternoon

- ✓ Application of GIS for geohazard (Mr. Miyazaki, Asian Development Bank)
 - Accompanying material : Miyazaki_Application of GIS for Disaster Management
- ✓ Remote Sensing Analysis (Mr. Takeda, JICA/SRED)
 - Satellite Images
 - Exercise

2 May (Fri)

Morning

- ✓ Wrap up (Dr. Okubo, GSJ)
 - Summarization the Workshop by the participants (Accompanying material : Wrap Up Day

1 to 4.docx)

Review of the Q & A (Accompanying material : Q&A_Philippines)

✓ Closing session

Certificate for all participants from Dr. Elmer Billedo and Dr. Okubo

(3) Participants

Table 2-5 shows number of the participants. The participants are 15 from Mines and Geosciences Bureau Central Office, 15 from Regional Office and total 30. 15 Regional Offices in Philippines is distributed in Baguio, La Union, Tuguegarao, Pampanga, Calabarzon (Manila), Mimaropa (Manila), Legaspi, Iloilo, Mandanue, Leyte, Cagayan, Davao, South Cotabato and Surigao. The participant is 1 from each Regional Office.

The list of participants is included in Accompanying material (List of participants_Philippines.xls).

Table 2-5 Number of the participants for the Workshop in Philippines

Country	Number		Organization
	Total	Detail	
Philippines	30	15	Mines and Geosciences Bureau Central Office
		15	Regional Office

(4) Photo of the Workshop



Upper; Group photo of the participants

Lower left: lecture by Dr. Okubo, GSJ

Lower right: Exercise for the development of Web-GIS by Dr. Bandibas, GSJ

2.5 Indonesia

2.5.1 Information collection

(1) Consultation with Counterpart organization

i. JICA Indonesia

Date/Place	Participants	Contents
5 May (Mon) 9:00 - 10:00 am JICA Office	JICA Indonesia: Mr. Juraku JICA Team: Ninomiya, Sah, Takeda	- Explain the Project and introduce the member - Share the information about security conditions



JICA Indonesia office



Consultation

ii. Center for Geological Resources (CGR)

Date/Place	Participants	Contents
6 May (Tue) 9:10 – 10:40 am Director room	CGR: Calvin Karo Karo Gurusinga (Director), Prima Hilman Indora Sukmayana Rina Wahyumngsih JICA Team: Ninomiya, Sah, Takeda	<ul style="list-style-type: none"> - Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



CGR office



Group photo

iii. Information section (consultation 1)

Date/Place	Participants	Contents
6 May (Tue) 10:50 am – 12:20 pm Information section office	CGR: Prima Hilman Indora Sukmayana Rina Wahyumngsih Dwi Asmoro JICA Team: Ninomiya, Sah, Takeda	<ul style="list-style-type: none"> - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop



Consultation

iv. Information section (consultation 2)

Date/Place	Participants	Contents
6 May (Tue) 14:30 – 15:30 pm Information section office	CGR : Indora Sukmayana, Rina Wahyumngsih, Dwi Asmoro JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the Questionnaire



Consultation

v. Information section (consultation 3)

Date/Place	Participants	Contents
6 May (Tue) 15:40 – 16:00 pm Information section office	CGR : Prima Hilman, Indora Sukmayana, Rina Wahyumngsih, Dwi Asmoro JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the Questionnaire - Explain from the Information section about GIS database and related hardware, software and facility



Server for the database



Consultation

vi. Groundwater and Environmental Geology

Date/Place	Participants	Contents
7 May (Wed) 9:00 – 10:30 am Center office	CGR: Arif Daryanto, Erna Theresia, Indora Sukmayana, Rina Wahyumngsih JICA Team: Ninomiya, Sah, Takeda	- Presentation from the function of the section about groundwater monitoring - Recover the answer of the Questionnaire



Groundwater and Environmental Geology



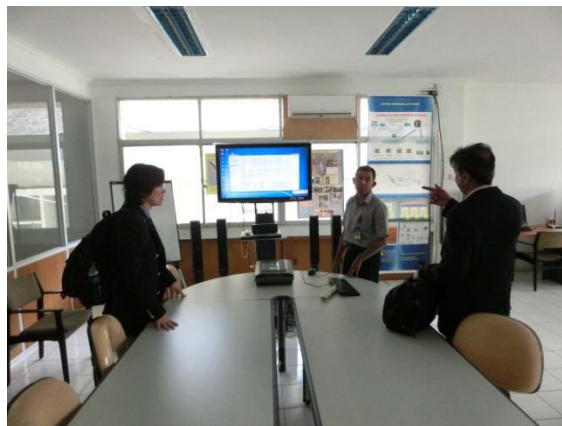
Consultation

vii. Groundwater and Environmental Geology

Date/Place	Participants	Contents
7 May (Wed) 11:00 – 11:40 am Observation well	CGR: Arif Daryanto, Indora Sukmayana, Rina Wahyumngsih, JICA Team: Ninomiya, Sah, Takeda	- Visiting the facility for the groundwater monitoring



Observation well



Monitoring facility for groundwater monitoring

viii. Geological Survey

Date/Place	Participants	Contents
8 May (Thu) 9:00 – 10:00 am Center office	CGR: Ipranta, Indora Sukmayana, Rina Wahyumngsih, JICA Team: Ninomiya, Sah, Takeda	- Presentation from the Center about the function - Recover the answer of the Quetsionnaire



Center for Geological Survey



Consultation

ix. Volcanology and Geological Hazard Mitigation

Date/Place	Participants	Contents
8 May (Thu) 11:30 am – 12:40 pm Center office	CGR: Supriyati Andreastuti, Imam Santosa, Cipta M Firmansyah, Indora Sukmayana, Rina Wahyumngsih JICA Team: Ninomiya, Sah, Takeda	- Presentation from the Center about the function - Recover the answer of the Questionnaire



Center for Volcanology and Geological Hazard Mitigation



Consultation

x. Volcanology and Geological Hazard Mitigation

Date/Place	Participants	Contents
8 May (Thu) 13:30 – 14:00 pm Monitoring facility for the volcanic activity	CGR: Hetty Triastuti, Indora Sukmayana, Rina Wahyumngsih, JICA Team: Ninomiya, Sah, Takeda	- Visiting the facility for the volcano monitoring system



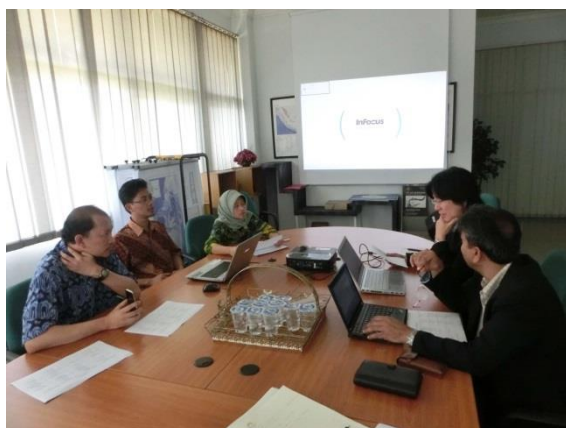
Monitoring facility



Text book about tsunami for kids

xi. Information section (consultation 4)

Date/Place	Participants	Contents
9 May (Fri) 10:30 – 11:30 am Information section office	CGR: Prima Hilman, Indora Sukmayana, Rina Wahyumngsih JICA Team: Ninomiya, Sah, Takeda	- Confirm the answer of the • Questionnaire



Consultation

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_Center for Geological Resources.docx

Questionnaire_Center for Geological Survey.docx

Questionnaire_Center for Groundwater Resources and Environmental Geology.docx

Questionnaire_Center for Volcanology and Geological Hazard Mitigation.docx

Reference Data (Accompanying material)

CGR_Mining Act_Lisence

CGR_hardware & software.pdf

CGREG_database groundwater 2014.pptx

CGREG_PROFIL_psdagl-1.ppt

CGS_Outline_PSG_Geological_Map.ppt

CGS_Pres_BI_database.ppt

Geologica Agency_WebGIS_Organization Structure_Oct 2013.pdf

Geological Agency.pptx

Marine Geological Institute (MGI).pdf

Organization Structure_MEMR_2013.pdf

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name: [Ministry of Energy and Mineral Resources](#)
- Geological Survey Organization name: [Geological Agency, Center for Geological Resources](#)
- Number of personnel in each section: [There are 4 divisions and X research working groups. The number of personnel as given below.](#)
[Divisions: XX in Information, XX in Technical Support, XX in Cooperation and Program, XX in Administration \(number is approximate\),](#)
[Research Working Groups:](#)
[All staffs are geologist and geophysicist.](#)
- Organization chart: [See Attachment,](#)
[File name: Geological Agency_WebGIS_Organization Structure_Oct 2013](#)

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering
- Information / Data management

(2) Geology [Center for Geological Survey](#)

- Existing geological maps

- +Scale and area
- + Printed maps or digital data
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
- +Blank area of geological map with 1:1M scale
- + Methods to fill up the blank area
- + Issues in creation of seamless geological map

(3) Topography [Center for Geological Survey](#)

- Existing topographic maps
- +Scale and area
- + Printed maps or digital data
- Other relevant data
- +Road, river
- + Administrations, district boundary

(4) Mineral resources data [Center for Geological Resources Presentation](#)

[File name: Geologica Agency_WebGIS_Organization Structure_Oct 2013](#)

- Contents of data
- Printed maps or digital data

(5) Geophysical data [Center for Geological Resources and ask all of Center](#)

- Gravity, magnetic and radioactive survey
- +Survey date and organization
- + Area and map scale
- + How is it used?

(6) Satellite data [Center for Geological Survey only landsat in some area Aster, ask other Center](#)

- What kind of satellite data does your Organization have?
- +Satellite name
- + Area
- + How do you use it?

(7) Well data [Center for Geological Resources, no database only reports, plan to digitize](#)

- Does your Organization know any wells to be able to measure the temperature in the hole?
- +Location, usage, depth

+ Can someone measure the temperature? [Thermal gradient well](#)

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management
- Kinds, names and numbers of hardware
- Condition of their management

(2) Software

- Usage situation of open source software
- Kinds, names and numbers of software for GIS and remote sensing
- Usage situation of GIS and remote sensing

(3) Data

- Contents and quality of data
- Situation of usage, frequency of updates
- Condition of data dissemination

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan. [Center for Geological Resources](#)

- Name of training, date, place, participants
- Organization of lecturers
- Objectives of training

5. Please let us know the following information related to mining sector. [Directorate General of Mineral and Coal in Jakarta](#)

(1) Mining act/legislation

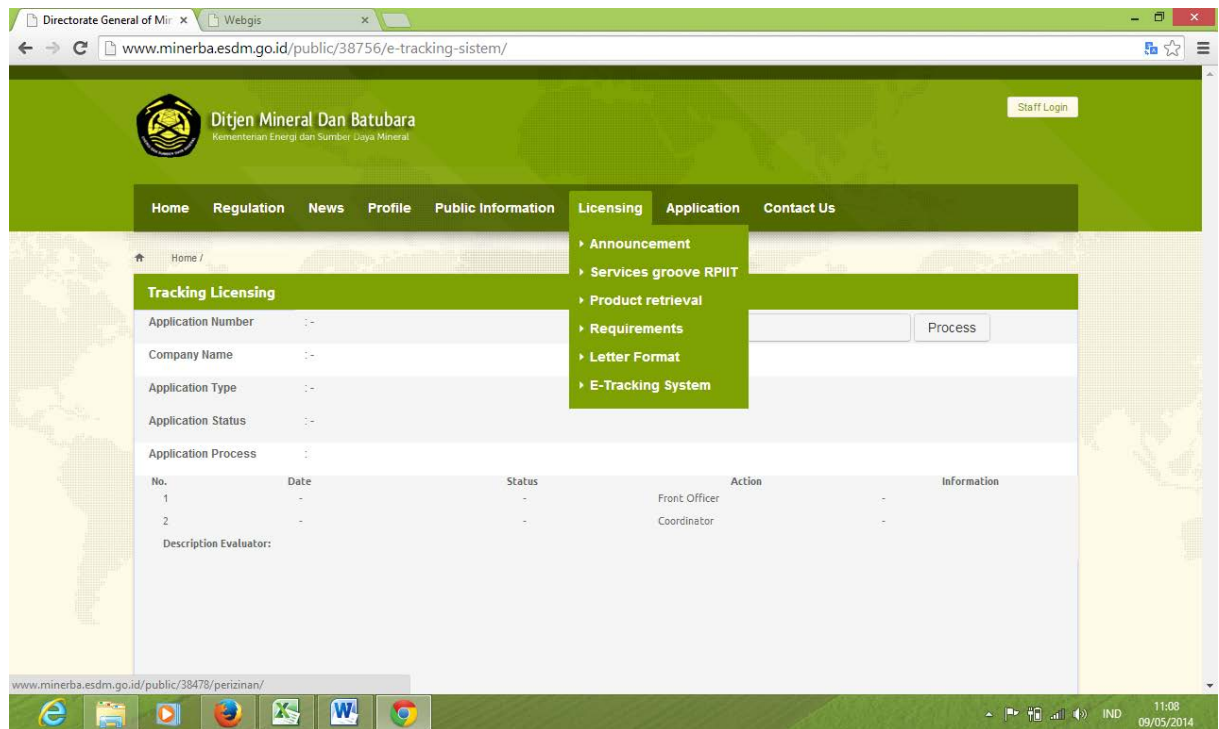
<http://prokum.esdm.go.id/uu/2009/UU%204%202009.pdf>

http://www.gbgindonesia.com/en/main/useful_resources/documents/regulation/s/Law%20No.4%20of%202009%20Mineral%20and%20Coal%20Mining%20%28Bahasa-English%29.pdf

- Date of establishment 01/21/2009
- How to get it [Download from website](#)

(2) Tenement

- Which department manages the tenement? [Ministry of Energy and Mineral Resources > Directorate General Of Mineral And Coal > Directorate of Mineral and Coal Program > Sub Directorate of Planning and Minerals and Coal Information](#)
- What is the management system of tenements?
<http://www.minerba.esdm.go.id>
- How to apply the tenement
The Management System of Tenement including application procedure shown in the figure below

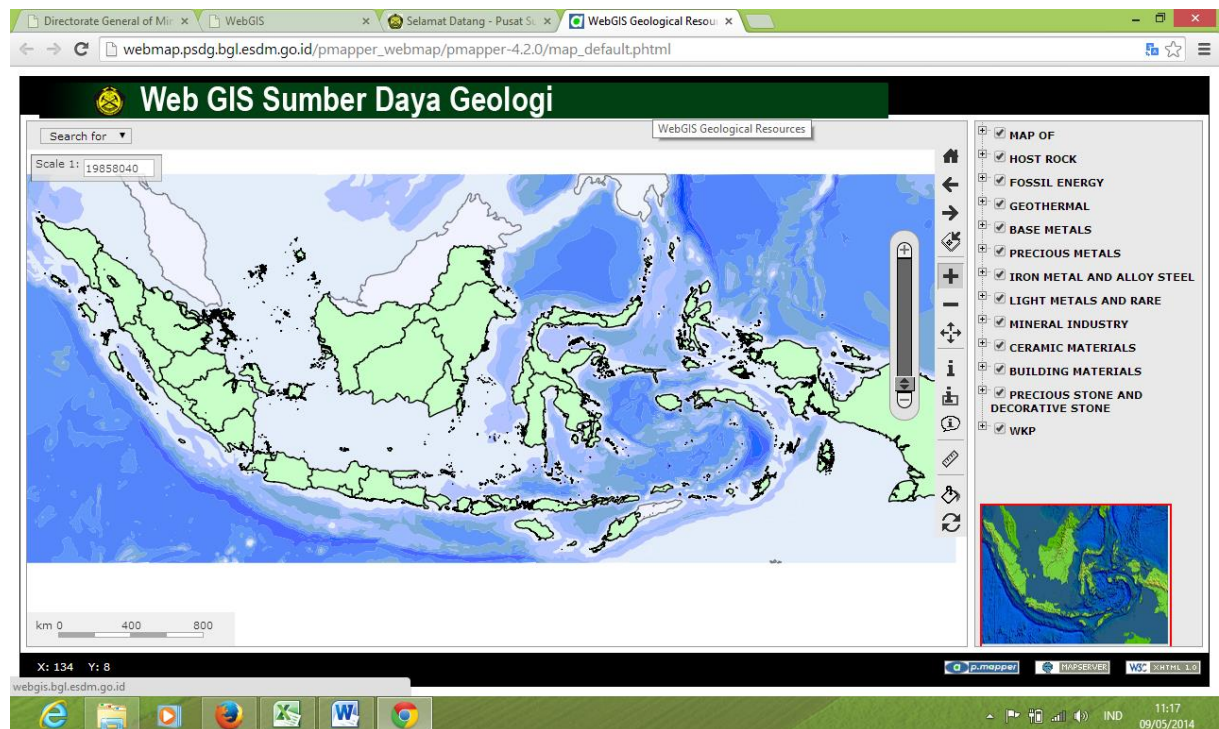


(3) Exploration/exploitation information of mineral resources [Directorate General of Mineral and Coal in Jakarta and Geological Agency](#)

- Does your Organization have this information? [Yes](#)
- How is it managed? [With Web GIS](#)
- Is it available? [Yes](#)
<http://gis.djmbp.esdm.go.id:8008/mapguide2011/fusion/templates/mapguide/indonesia/index.html?ApplicationDefinition=Library://Webgis/Layouts/Indonesia.ApplicationDefinition>



- Note: the above information is exploitation information. For exploration information it is under Geological Agency as below:
http://webmap.psdg.bgl.esdm.go.id/pmapper_webmap/pmapper-4.2.0/map_default.phtml



(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to

develop mines? [Yes](#)

- What is the content? [Law number 4/2009 about mineral and coal mining.](#)

Please download from this link:

http://www.gbgindonesia.com/en/main/useful_resources/documents/regulations/Law%20No.4%20of%202009%20Mineral%20and%20Coal%20Mining%20%28Bahasa-English%29.pdf

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development? [Yes](#)
- Name, establishment date
[Execution Of Mine Reclamation And Post-Mining Activities And Coal Minerals](#)
(<http://prokum.esdm.go.id/permen/2014/Permen%20ESDM%2007%202014.pdf>)
- How to get it [Download](#)

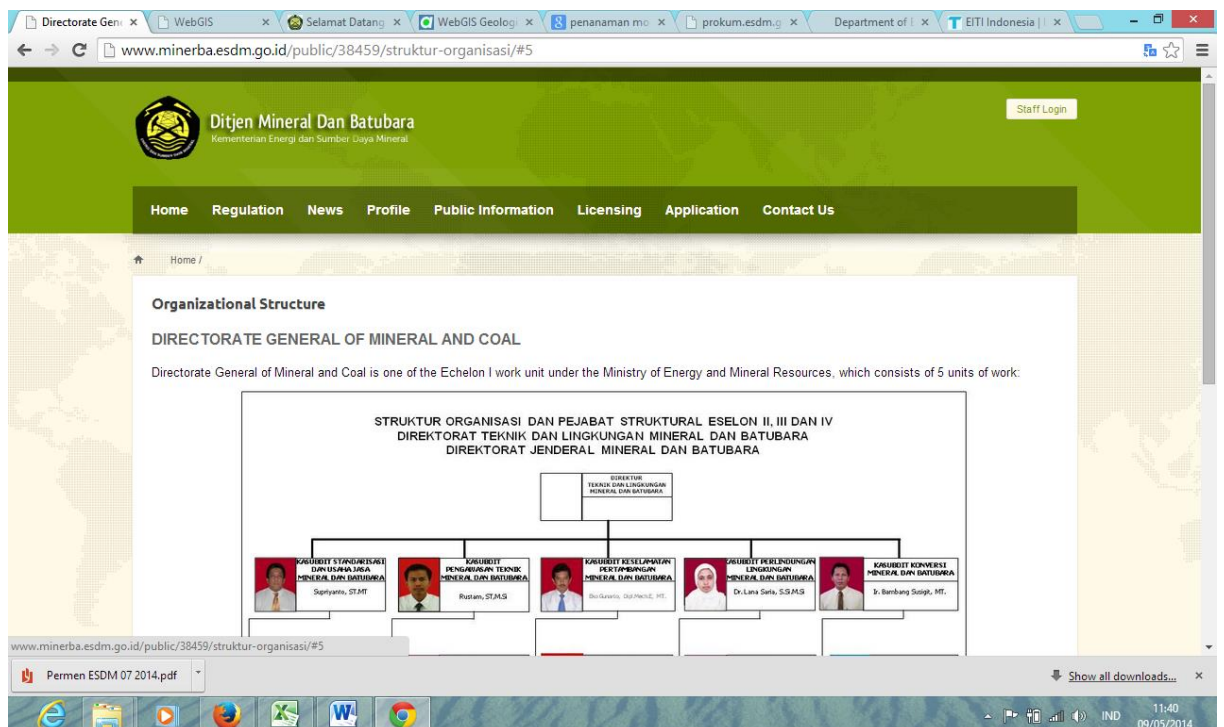
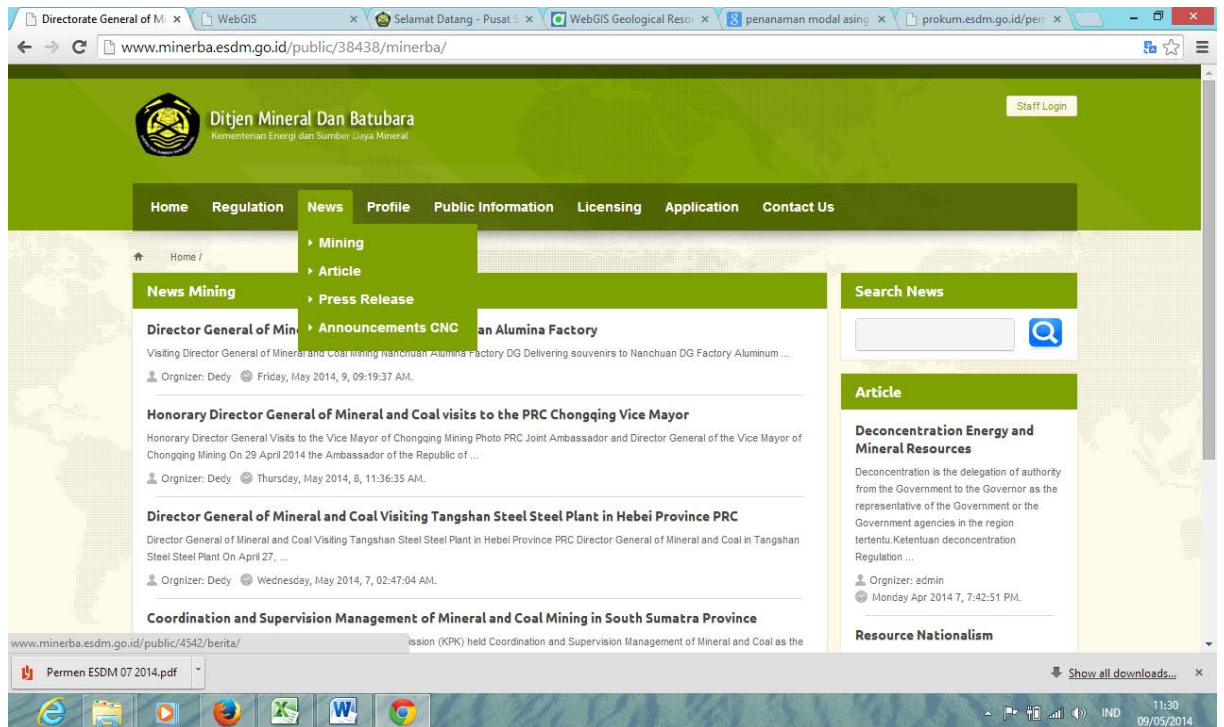
(6) Environmental problem in mining

[Directorate General of Mineral and Coal in Jakarta > Directorate of Environmental Engineering and Mineral and Coal](#)

Contact : <http://www.minerba.esdm.go.id/public/38596/hubungi-kami/>

- Are there any environmental problems as pollution caused by mines?
- Are there any resident problems caused by mines?
- What are they?
- What are results?

[there is no information, however if it hapen it will appear at below website :](#)



(7) Small Scale/ Artisanal Mining Local Government

Contact : Department Of Energy And Mineral Resources Of West Java

(<http://esdm.jabarprov.go.id/index.php?mod=Public&act=lsContact&kat=10>)

- Does your Organization have the information of small-scale mining?
- Is it available?

- How does your Country manage/control them?
the small scale mining is control and manage by local government
Under chapter 9 of the law no 4/2009 article 66 – 73

(8) Extractive Industries Transparency Initiative (EITI) **Coordinating Ministry for Economy**

- Did your Country implement EITI? **Yes**, <http://eti.ekon.go.id/en>
- If not, will your Country plan to implement EITI?



JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

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Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name [Ministry of Energy and Mineral Resources](#)
- Geological Survey Organization name [Geological Agency, Center for Geological Survey](#)
- Number of personnel in each division: [There are 4 divisions and 5 research working groups. The number of personnel as given below.](#)
[Divisions: 20 in Information, 25 in Technical Support, 10 in Cooperation and Program, 20 in Administration \(number is approximate\),](#)
[Research Working Groups: Mapping, Oil and Gas, Metallogenic, Quaternary Dynamic, Geophysics: There are more than 100 scientist and researcher including 8 professors in total for all 5 research working groups. All staffs are geologist and geophysicist.](#)
- Organization chart [Attachment similar to CGR](#)

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering: Satellite [Remote Sensing](#), Field work and secondary source (ex. research papers, topographic maps prepared by BIG)
- Information / Data management: [simple data management is in place along with well structured database management framework plan, but yet to be](#)

implemented. It is expected that the plan will be implemented soon.

(2) Geology

- Existing geological maps
 - + Scale and area: all over of Indonesia scale are 1:5,000,000, 1:1,000,000, 1:500,000, 1:250,000, 1:100,000 and 1:50,000. For preparation of 50,000 scale map additional information is only remote sensing and rest of information coming from 1:250,000 scale map. In order to prepare true 1:50,000 scale map, additional field work is required.
 - + Printed maps or digital data: both
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
 - + Blank area of geological map with 1:1M scale: with Malaysia work is going on and will be completed in 2015. With Timor Leste and Papua New Guinea not started yet but planed.
 - + Methods to fill up the blank area: satellite image and field check.
 - + Issues in creation of seamless geological map: Country cooperation with Malaysia goes well. Timor Leste and PNG discussion going well no any issues.

(3) Topography

- Existing topographic maps
 - + Scale and area: 1:50,000 scale from BIG (Agency of Geospatial Information)
 - + Printed maps or digital data: Digital
- Other relevant data
 - + Road, river: Yes
 - + Administrations, district boundary: Yes

(4) Mineral resources data Not Applicable (NA)

- Contents of data
- Printed maps or digital data

(5) Geophysical data

- Gravity, magnetic and radioactive survey
 - + Survey date and organization: Gravity data for whole country at CGS and airborne magnetic data only for Java, Papua and Maluku
 - + Area and map scale: Whole country for Gravity data, 1:250, 000

- + How is it used? : for mineral, oil and gas exploration, also for scientific research

(6) Satellite data

- What kind of satellite data does your Organization have?
 - + Satellite name: IFSAR (Sulawesi and Sumatra), Radarsat 2 (Kalimantan and Papua), Terrasar X (Java and Nusa Tenggara), free Satellite Image, such as Landsat.
 - + Area: covering whole country. For SAR data the sources are different as mentioned above.
 - + How do you use it? : for all geological aspect such as structural, mapping...

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management: hardware is available and just simple database, not well organized database system
- Kinds, names and numbers of hardware: server with 120TB, several PC and Workstation, Laptop...
- Condition of their management: in good condition in use for other purposes such as mapping and storage of maps and data, but not configured and installed with geographic database management system.

(2) Software

- Usage situation of open source software: QGIS is in use recently
- Kinds, names and numbers of software for GIS and remote sensing: ArcGIS 10.1 (5 licenses) , MapInfo (6 licenses), Global Mapper (1 license), ER Mapper (1 license), software for oil and gas (PETREL)
- Usage situation of GIS and remote sensing: well used

(3) Data

- Contents and quality of data: data is good
- Situation of usage, frequency of updates: good, regularly with set annual plan.
- Condition of data dissemination: not online dissemination, data is available if someone visit CGS

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.
- Name of training, date, place, participants: 1. 2008 training from GSJ, Tsukuba, 2. 2006 training from JAXA
 - Organization of lecturers: 1. GSJ and 2. JAXA
 - Objectives of training: 1. webGIS, database management and 2. Remote Sensing: application of ALOS satellite imagery

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

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Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name: [Ministry of Energy and Mineral Resources](#)
- Geological Survey Organization name: [Geological Agency, Center of for Groundwater Resources and Environmental Geology](#)
- Number of personnel in each section [4 sections, 44 in Engineering Geology, 81 in Groundwater, 38 in Environmental Geology and 56 in Administration](#)
- Organization chart [Attachment](#)

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering: Borehole drilling to monitor the groundwater level and telemetric data transfer of data to the center
- Information / Data management: Groundwater monitoring room connected to borehole; development of groundwater database.

(2) Geology (NA)

- Existing geological maps
 - + Scale and area
 - + Printed maps or digital data
- Situation of the seamless geological map implemented by ASEAN

Geological Survey Organization

- + Blank area of geological map with 1:1M scale
- + Methods to fill up the blank area
- + Issues in creation of seamless geological map

(3) Topography

- Existing topographic maps
 - + Scale and area
 - + Printed maps or digital data
- Other relevant data
 - + Road, river
 - + Administrations, district boundary

Having 4900 topographic map sheets (prepared by BIG) in library.

(4) Mineral resources data (NA)

- Contents of data
- Printed maps or digital data

(5) Geophysical data (NA)

- Gravity, magnetic and radioactive survey
 - + Survey date and organization
 - + Area and map scale
 - + How is it used?

(6) Satellite data (NA)

- What kind of satellite data does your Organization have?
 - + Satellite name
 - + Area
 - + How do you use it?

(7) Well data (Only for monitoring groundwater level, that is being used mainly for drinking water purpose)

- Does your Organization know any wells to be able to measure the temperature in the hole? **No**
 - + Location, usage, depth **Yes, on the database**
 - + Can someone measure the temperature? **Dr. Uchida of Japan gave equipment for temperature profiling but Mr. Arief does not have knowhow to use it.**

Hydrogeological map of Indonesia at 1:250,000 scale: Map of Groundwater basin

421 basins have been delineated at country level.

These basins are rechargeable; not fossil water. There are 4 kinds of basin (i) interstate basin (ii) Cross border of province (iii) Cross border of regency and (iv) ...??

There are 17 existing wells, which can be used for research purpose. Besides this we have 15 planned wells. At the moment, center is having plan for only observing (i) water level and (ii) quality. These research wells are located only in Java. Measurement of water level is done twice a day. **We are looking for donor (such as JICA) support to extend the use of these well such as monitoring of temperature profile for geothermal applications.**

Engineering Geology section has conducted 5 drilling (300 m) in Jakarta and collected core samples for testing (i) strength of rock (ii) land subsidence (sinking) issues.

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

We have reasonably good capacity, in terms of HW/SW, to manage and disseminate groundwater data.

(1) Hardware for digital data/information

- System of data management
- Kinds, names and numbers of hardware
- Condition of their management

(2) Software

- Usage situation of open source software
- Kinds, names and numbers of software for GIS and remote sensing
- Usage situation of GIS and remote sensing

(3) Data

- Contents and quality of data
- Situation of usage, frequency of updates
- Condition of data dissemination

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

No

- Name of training, date, place, participants
- Organization of lecturers
- Objectives of training

5. Please let us know the following information related to Groundwater

(1) Groundwater act/legislation

- Date of establishment

Law Number 7 Year 2004 concerning Water Resources

- How to get it: based on above law, necessary regulations have been promulgated, which are summarized below.

Government Regulation Number 43 Year 2008 concerning Groundwater : which regulates the groundwater conservation zone, the management of groundwater, groundwater information systems, requirements and procedures for obtaining groundwater permits, administration sanction, etc. At this time we are working for the implementation of this Regulation.

As the implement of the Government Regulation Number 43 Year 2008, we already issued:

- Presidential Decree Number 26 Year 2011 concerning The Stipulation of Groundwater Basin in Indonesia = As stated in this law, Indonesia has 421 groundwater basins
- Regulation of the Minister of Energy and Mineral Resources Number 15 Year 2012 concerning the Safe Use of Groundwater.

(2) Tenement

- Which department manages the tenement?
- What is the management system of tenements?
- How to apply the tenement

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information?
- How is it managed?
- Is it available?

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to

develop mines?

- What is the content?

(5) Environmental legislation related to mining (groundwater: mentioned above)

- Does your Country have the legislation to protect environment against mining development?
- Name, establishment date
- How to get it

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?
- Are there any resident problems caused by mines?
- What are they?
- What are results?

Environmental geology is having some activities related to environmental issues related to groundwater; for example (i) monitoring of declared protected area where no mining activities is allowed (ii) Suitability map for garbage dumping site and (iii) Land subsiding (sinking) problem due to unsustainable pumping of groundwater.

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
- Is it available?
- How does your Country manage/control them?

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?
- If not, will your Country plan to implement EITI?

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name: [Ministry of Energy and Mineral Resources](#)
- Geological Survey Organization name: [Geological Agency, Center for Volcanology and Geological Hazard Mitigation](#)
- Number of personnel in each section
- Organization chart

Total number of staff 443 (year 2011); booklet has been received showing general introduction about the center.

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering
- Information / Data management

Early warning system for volcano eruption

(2) Geology Center for Volcanology

- Existing geological maps
 - + Scale and area: [Volcano-geological map for 127 volcanic sites, 1:50,000 scale](#)
 - + Printed maps or digital data: [Printed, now preparing digital not completed](#)

- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
- + Blank area of geological map with 1:1M scale
- + Methods to fill up the blank area
- + Issues in creation of seamless geological map

(3) Topography

- Existing topographic maps
- + Scale and area
- + Printed maps or digital data
- Other relevant data
- + Road, river
- + Administrations, district boundary

(4) Mineral resources data

- Contents of data
- Printed maps or digital data

(5) Geophysical data

- Gravity, magnetic and radioactive survey: [not surveyed here](#)
- [Seismic, GPS, EDM: monitoring around volcano and telemetrically collected](#)
- + Survey date and organization
- + Area and map scale: [72 volcanoes are monitored. 16 regional center connected center office in Bandung, for 5 volcanoes level 3, 19 volcanoes level 2, no volcano level 4 for eruption.](#)
- + How is it used?

(6) Satellite data

- What kind of satellite data does your Organization have?
- + Satellite name: [Landsat from LAPAN, ALOS from JAXA, TerraSAR-X from Germany](#)
- + Area: [Volcanic area](#)
- + How do you use it? : [for volcanic hazard mapping, modelling for pyroclastic flow, lahar, volcanic ash, and modelling for earthquake and tsunami](#)

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole?
- + Location, usage, depth

+ Can someone measure the temperature?

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management
- Kinds, names and numbers of hardware
- Condition of their management

(2) Software

- Usage situation of open source software
- Kinds, names and numbers of software for GIS and remote sensing
- Usage situation of GIS and remote sensing

(3) Data

- Contents and quality of data
- Situation of usage, frequency of updates
- Condition of data dissemination

Data gathering (telemetric) from volcano monitoring stations and early warning system for 127 volcanos; which are categories into 4 categories; No. 4 is highest level. All necessary HW/SW are in place for this purpose. There is collaboration from Japanese university.

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

- Name of training, date, place, participants: 2008, 2 weeks, Tsukuba, 10 participants from Center of Volcanology
- Organization of lecturers: RESTEC and JICA
- Objectives of training: image processing SAR interferometry for land use, DEM

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment
- How to get it

(2) Tenement

- Which department manages the tenement?
- What is the management system of tenements?
- How to apply the tenement

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information?
- How is it managed?
- Is it available?

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines?
- What is the content?

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development?
- Name, establishment date
- How to get it

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?
- Are there any resident problems caused by mines?
- What are they?
- What are results?

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
- Is it available?
- How does your Country manage/control them?

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?
- If not, will your Country plan to implement EITI?

2.5.2 Workshop

(1) Venue

From 12 to 14 May: Center for Geological Resources (CGR) Meeting Room

16 May: Grand Hani Hotel (Jalan Raya Lembang Km 12,1 No 15, Jawa Barat 40391 Bandung Indonesia)

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program indonesia_final.xls).

12 May (Mon)

Morning

✓ Opening

Welcome speech from Mr. Calvin Karo Karo Gurusinga (director of the CGR)

Introduction of the participants

Introduction of the Workshop (Dr. Okubo)

✓ ASEAN Mineral Resources Database Sysem

ASEAN Mineral Resources Database Information System (Prima Muharam Hilman, Indra Sukmayana CGR)

✓ Web-GIS demonstration (Dr. Joel, GSJ)

Afternoon

✓ Groundwater (Dr. Okubo, GSJ)

Ground Water Flow System

Case Studies of Groundwater Observations

Geothermal Heat Pump

Web-GIS for Groundwater Database

✓ Geophysics (Dr. Okubo, GSJ)

Mirano

Magnetics

Gravity

13 May (Tue)

Morning

✓ Mineral Resources (Dr. Ohno, GSJ)

Review of the Questionnaire (Accompanying material : Ohono_q_id.ppt)

- ✓ Seamless Geology (Dr. Okubo, GSJ)
 - Introduction of the Geological Maps, Indonesia (Mr. Prima Muharam Hilman, CGR)
 - Introduction of Geological Maps Available
 - Correlation of Legends Over Cross-Border Areas
 - Unified Legend

Afternoon

- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients
- ✓ Web Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)
 - Major Components of a Web GIS system
 - Web Services Based Information Sharing System
 - WMS Clients and AIST's Current Information System Using FOSS and OGC

14 May (Wed)

Morning

- ✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)
 - Database Creation
 - Web Map Service Formulation

Afternoon

- ✓ Web GIS System Development (Dr. Bandibas, GSJ)
 - Web Service Formulation for Seamless Geology
 - Web Service Formulation for Minerals
 - WMS Client Development
 - Spatial Database Query
 - Basic SQL Formulation for Querying POSTGIS Database
 - Integration of Web GIS System Components

15 May (Thu, National Holiday of Indonesia)

16 May (Fri, Venue: Grand Hani Hotel, Bandung)

Morning

- ✓ Wrap up
 - Review of the Q & A (Dr. Okubo, GSJ) Accompanying material : Q&A_Indonesia
 - Participants are divided into Web-GIS and Geoscience groups to have Group Discussion
 - ✂GSJ Team (Dr. Okubo, Dr. Bandibas and Dr. Ohno) left Bandung after morning session.

Afternoon

✓ Remote Sensing Analysis (Mr. Takeda, JICA/SRED)

Satellite Images

Exercise

(3) Participants

23 participants from Geological Agency (17 from Center for Geological Resources, 1 from Center for Geological Survey, 2 from Center for Groundwater and Geological Environment, 1 from Center for Volcanology and Geological Hazard Mitigation and 2 from Research Center for Marine Geology), 1 from Affiliation and Information Division, 1 from Center for Data and Information, Secretariat General, 1 from Geological Department, Padjadjaran University, 2 from Information Division, Energy and Mineral Office of West Java, Total 28 participants (Table 2-6).

The list of the participants is included in Accompanying material (List of participants_Indonesia.xlsx).

Table 2-6 Number of the participants for the Workshop in Indonesia

Country	Number		Organization
	Total	Detail	
Indonesia	28	23	Geologica Agency
		17	Center for Geological Resources
		2	Center for Groundwater and Geological Environment
		2	Research Center for Marine Geology
		1	Center for Geological Survey
		1	Center for Volcanology and Geological Hazard Mitigation
		1	Affiliation and Information Division
		1	Center for Data and Information, Secretariat General
		1	Geological Department, Padjadjaran Univ.

(4) Photo of the Workshop



Upper: Group Photo of the Workshop participant

Lower left: Lecture by Dr. Okubo, GSJ

Lower right: Remote Sensing Analysis by Mr. Takeda,

2.6 Cambodia

2.6.1 Information collection

(1) Consultation with Counterpart organizations

i. General Department of Mineral Resources (GDMR)

Date/Place	Participants	Contents
19 May (Mon) 15:00 – 16:30 pm GDMR meeting room	GDMR : Yos Monyrath (DG), Peng Navuth (DDG), Teang Sokhom, Nuon Narin, Sieng Sotham, Mak Sopheaktra, Chrea Vichett JICA Team: Onuma, Sah, Takeda	<ul style="list-style-type: none"> - Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



GDMR office



Consultation

ii. Mineral Resources section, GDMR (consultation 1)

Date/Place	Participants	Contents
20 May (Tue) 8:30 – 9:30 am GDMR meeting room	GDMR: Teang Sokhom, Sieng Sotham, Yos Samuth JICA Team: Onuma, Sah, Takeda	- Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop



Consultation

iii. Mineral Resources section, GDMR (consultation 2)

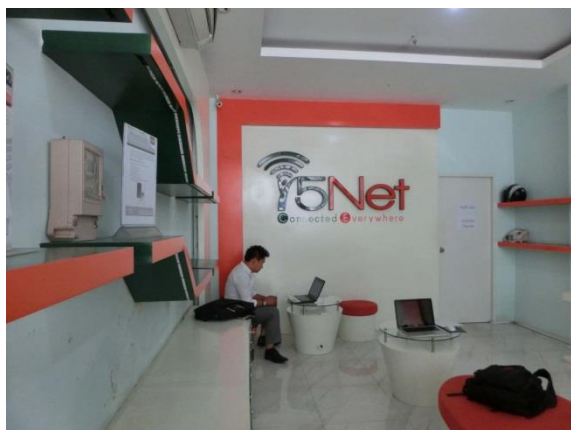
Date/Place	Participants	Contents
20 May (Tue) 14:30 – 16:00 pm GDMR meeting room	GDMR: Nuon Narin, Chrea Vichett, Mean Thay JICA Team: Onuma, Sah, Takeda	- Presentation from GDMR about the function for the management and the operation of mine - Recover the answer of the •Questionnaire



Consultation

ix. Negotiation with the provider company by GDMR

Date/Place	Participants	Contents
21 May (Wed) 10:20 – 10:40 am Provider company	GDMR: Vannarith Ieng Provider company JICA Team: Onuma, Sah, Takeda	- Request the setting for the network system during the Workshop because the internet system is not available in the office of GDMR



Provider company (next building to GDMR)



Setting of the network system

v. Mineral Resources section, GDMR (consultation 3)

Date/Place	Participants	Contents
22 May (Thu) 9:00 – 9:40 am DDG room	GDMR: Peng Navuth JICA Team: Onuma, Sah, Takeda	- Recover the answer of the • Questionnaire - Collect the information about collaboration project with other Japanese organizations



Consultation

v. Geology section

Date/Place	Participants	Contents
22 May (Thu) 10:20 -11:30 am Geology section office	GDMR : Sieng Sotham JICA Team: Onuma, Sah, Takeda	- Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop



Consultation

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_Reviewed_Cambodia.docx

Reference Data (Accompanying material)

Q_Atch01_Chart.pdf

Q_Atch02_Mining_law.pdf

Q_Atch03_License.pdf

Q_Atch04_Mining_sector.pdf

Q_Atch05_Environ_law.pdf

Flowsheet for applying mineral licenses Cambodia.pdf

Policy Brief-Artisanal and Small-Scale Mining-Eng.pdf

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire / Cambodia

May 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Sub-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name:
Ministry of Mines and Energy (MME)
- Geological Survey Organization name:
General Department of Mineral Resources (GDMR), Department of Geology
Besides, there are 4 other General and 4 Supporting Departments in MME.
Department of Geology is having 5 offices; namely (i) Administrative, (ii) Mapping and Geological Data Information Management, (iii) Exploration and Assessment of Mineral Resources, (iv) Geological Research and (v) Mineral Laboratory.
- Number of personnel in each section:
Each General Department has 15 to 20 persons.
Each General Department has 1 General Director and 2 Deputy General Director
Each Department has 1 Director and 2 to 3 Deputy Director
- Organization chart:
See attachment 1 (English name is unofficial)
General Department of Mineral Resources is composed of five Departments;
1: Department of Geology (5 offices; 19 staff), 2: Department of Promotion and Development of Mineral Resources (6 offices; 21 staff), 3: Department of

Exploration Management (4 offices; 17 staff), 4: Department of Construction Materials (4 offices; 19 staff), 5: Department of Mining (4 offices; 16 staff).

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering:
By geological field works, mostly together with mining company
Regional collaboration such as (i) Viet Nam, Cambodia and Laos (ii) ASOMM
Digitize the geological data and make a digital map.
Other secondary sources.
- Information / Data management:
Each Department has and manages a database, but they are not unified
No trained IT staff to collate and create well organized database
Having plan to compose a team of 3 staff

(2) Geology

- Existing geological maps
+ Scale and area
1:200,000 scale created by French in 1960's
Whole country / 14 sheets
They are old and error at many places because remote sensing data was used to create geological maps in many areas.
+ Printed maps or digital data:
Digital / ArcView format (created by JICA Project)
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
1:1M scale map was compiled among Cambodia, Laos and Vietnam during 1987-1989, titled Geological Map of Cambodia, Laos and Vietnam. In 2013 it is updated and scale is modified to 1:1.5M scale map for Cambodia, Laos and Vietnam. 1:200,000 map published in 1972 and 1973 created by French in 1960's, has been used as the base source for maps mentioned above. There are 14 sheets covering whole country.
Hard copy; Digital data is kept in Vietnam.
+ Blank area of geological map with 1:1M scale:
There are a few blank areas. Compilation was completed.
+ Methods to fill up the blank area:
Satellite image could be used. See below.

+ Issues in creation of seamless geological map:
Border conflict between Thailand and Cambodia.
10-15 years ago it was tried to be solved.

(3) Topography

- Existing topographic maps
 - + Scale and area
1:100,000 scale, 83 sheets, image file (PDF format) available.
The original data are kept in Ministry of Land Use and Urban Construction,
Department of Geography.
 - + Printed maps or digital data:
Image file
- Other relevant data
 - + Road, river
River by Department of Geography
Road by Ministry of Public Works and Transport
 - + Administrations, district boundary
Boundary by Department of Geography
Department is still using old one as new (updated during last election) data
could not be obtained.

(4) Mineral resources data

- Contents of data
1:1M scale map
Except for constructing materials
- Printed maps or digital data
ArcView shape file
It was revised in 2010 by JICA Project.

(5) Geophysical data

- Gravity, magnetic and radioactive survey
No data available
Mining companies have the data acquired by exploration, but it could not be
disclosed; need permission from company.
- + Survey date and organization
JOGMEC completed aeromagnetic survey on April 2014 based on MOU
concluded in 2013. The contractor was Australian CGG (Company of
General Geophysics).

+ Area and map scale

North by JOGMEC aeromagnetic survey

Northeast by KORES airborne magnetic survey in 2012

North central by Chinese company airborne magnetic survey

+ How is it used?

They are kept by the Ministry. Just keeping; could not use due to (i) terms of confidentiality from mining company and (ii) do not have knowhow.

(6) Satellite data

- What kind of satellite data does your Organization have?

+ Satellite name:

ASTER, PALSAR (provided by JICA Project)

LANDSAT (image file at 1:100,000 scale, 1996&1999)

+ Area:

Whole country

+ How do you use it?

Interpretation of geology and mineral information, geological mapping, topographical data

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole?

There were many water wells (mainly for drinking water) before, but now they were destroyed by the expansion of Phnom Penh city and development of surface water supply.

Data may be available in Ministry of Water Resources and Ministry of Rural Development.

Mining company's well data are available in Department of Mineral Exploration Management. Nittetsu drilled several holes in Cu-Mo porphyry exploration at 20km north of Phnom Penh.

JICA Cambodia has old well data collected by the JICA water supply project.

+ Location, usage, depth

No information

+ Can someone measure the temperature?

No information

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management

No any such system; no any server for data management.

- Kinds, names and numbers of hardware

Mainly desktop and note PC as given in table below

List of Computer in General Department of Mineral Resources (GDMR)

No.	List of Computer	Characteristic					
		Processor	Ram	Hard Disk	Monitor	Number	System type
1	Dell Optiplex380mt	Intel Core 2Duo (2.93Ghz) 3mb	2GB	HDD sata 500GB	LCD monitor 19.3" wide screen	16	64-bit Window 7 Operating System
2	Dell Optiplex380mt	Intel Core 2Duo (2.93Ghz) 3mb	2GB	HDD sata 500GB	LCD monitor 20 " wide screen	5	ditto
3	Sony Laptop(Weight 2.2Kg)	Intel processor Core i5m2410 (2.3Ghz)	4GB	HDD sata 320GB-5.2GB	screen13.3" (1366*768) Vaio Battery; 6-cell	6	ditto
4	Dell Vostro 3460	Core 3i-3120m	4GB	500GB DVDRW	14" 6C BT FP WC.	3	ditto

- Condition of their management

Not managed with any specific protocol

(2) Software

- Usage situation of open source software

Limited information; mostly depends on individual staff

- Kinds, names and numbers of software for GIS and remote sensing

ArcView 3.1 (no license informaiton), ArcInfo (very old version; license outdated), TNTmips (1 license), No open sources GIS in Department of Geology or Petroleum. QGIS in ITC.

- Usage situation of GIS and remote sensing

Not much use

(3) Data

- Contents and quality of data

No proper database

- Situation of usage, frequency of updates

Intermittent; occasionally

- Condition of data dissemination

On visit; limited

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in

Japan.

- Name of training, date, place, participants
- Organization of lecturers
- Objectives of training

HIDA training program, 4 times from 2010 to 2012, in Yokohama

- 2010: Satellite image (1st training; 25 Participants (5 government; 20 private)),
- 2011: Mining development (2nd training; 25 participants),
- 2012: Mining exploration law (3rd training; 12 participants),
- 2012: Mining safety (4th training; 15 participants)

3 weeks

JOGMEC, etc.

HIDA training program, 3 times from 2011 to 2012, in Tokyo

Mineral Resources Database in ASEAN

3 (2 government + 1 private) persons first two and 2 persons last training; 2 weeks

GSJ (main), JSS, university, private company, etc.

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment
Law on management and exploitation of mineral resources/ 2001
Law on environmental protection natural resources management/ 1996
- How to get it
See attachment 2 (Mining Law 2001, PDF file)

(2) Tenement

- Which department manages the tenement?
Department of Mineral Exploration
- What is the management system of tenements?
?? (report)
- How to apply the tenement
See attachment 3: License Procedures (PDF file)

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information?

Yes, but not open.

- How is it managed?

Department of Mineral Exploration Management is managing.

- Is it available?

NA, not open

See attachment 4 : ESCAP 1993 Atlas volume No.10 (PDF file)

Refer to “Atlas of Mineral Resources for the ESCAP Region Cambodia Vol. 10 (1993)”

Only three mines are active. Two are gold mines and one is coal mine.

Five to six companies conduct mineral exploration.

Exploration is possible even in Protected Areas. However, the Protected Area has the Core Area, where any activities are prohibited; which is managed/ subject to the regulation of (i) Ministry of Environment and (ii) Ministry of Agriculture & Forestry.

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines?

NA, there is a draft (2010, UNDP)

- What is the content?

Mineral Policy (UNDP) was prepared.

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development?

Yes

- Name, establishment date

Law on Environmental Protection and Natural Resources Management
1996

- How to get it

See attachment 5: Environmental Law (PDF file)

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?

Yes.

As mercury is used to produce gold in ASM, Minamata disease occurred by ASM. ASM miners have been changing gold processing method from amalgamation to cyanization.

- Are there any resident problems caused by mines?
Yes
- What are they?
Environmental pollution
- What are results?
Deposit restoration fund in the mining agreement with company.
Company has to submit proper plan in accordance to law including EIA approved by Ministry of Environment
Mining license for 5 year: Deposit 20% of estimated cost.

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
Yes. ASM is active and they have many problems.
- Is it available?
NA for detailed information.
- How does your Country manage/control them?
The government tried to stop ASM in 1999, but could not stop them.
The project for regulating ASM was started in 2001 by OXFAM (fund of USA). The first phase for general assessment was succeeded; how many miners and gold deposits, how they mine and process. The second phase for focus to training miners was started, but stopped by the Cambodian Ministry. The Ministry thought that ASM was a method to live/survive and was impossible to be stopped.
The government does not have law and regulation for ASM, but discusses to create policy, license regulation and training and Ministry agrees to work with ASM so that it can be managed.
Recently (year 2010) helped to draft ASM mining policy (report may be UNDP [website;](http://library.opendevdevelopmentcambodia.net:8080/newgenlibtxt/CatalogueRecords/Policy%20Brief-Artisanal%20and%20Small-Scale%20Mining-Eng.pdf)
<http://library.opendevdevelopmentcambodia.net:8080/newgenlibtxt/CatalogueRecords/Policy%20Brief-Artisanal%20and%20Small-Scale%20Mining-Eng.pdf>).
There is no any license issued to ASM.
See Policy Brief-Artisanal and Small-Scale Mining-Eng.pdf

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?
No
- If not, will your Country plan to implement EITI?

The government thinks it is good system, but does not decide to apply it.
The reasons are 1: Other Asian countries have not yet implemented EITI, 2:
Mining has not been grown yet and mines are not developed in Cambodia.

2.6.2 Workshop

(1) Venue

The Workshop was held in the meeting room of the General Department of Mineral Resources (GDMR). Wi-Fi router was provided by Provider company during the Workshop because the internet system is not available in the office of GDMR.



Wi-Fi router



The cable (arrow) from Provider company to the meeting room of GDMR.

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program Cambodia_V2.xls).

26 May (Mon)

Morning

✓ Opening

Welcome speech form Mr. Yos Mony Rath, Director General of Department of Mineral Resource

Introduction of the Workshop (Dr. Okubo, GSJ)

✓ Web-GIS demonstration (Dr. Joel, GSJ)

Web-GIS (ASEAN Mineral Resources Database Information System)

Afternoon

✓ Seamless Geology (Dr. Okubo, GSJ)

Introduction of Geological Maps Available

Correlation of Legends Over Cross-Border Areas

Unified Legend

✓ Geodynamics (Dr. Okubo, GSJ)

Magnetics

Gravity

27 May (Tue)

Morning

- ✓ Geophysics (Dr. Okubo, GSJ)
 - Magnetics (additional lecture)
- ✓ Groundwater (Dr. Uchida, GSJ)
 - Ground Water Flow System
 - Case Studies of Groundwater Observations
 - Geothermal Heat Pump
 - Web-GIS for Groundwater Database

Afternoon

- ✓ Mineral Resources (Dr. Ohno, GSJ)
 - Review of the Questionnaire (Accompanying material: Ohno_q_kh.ppt)
- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients

28 May (Wed)

Morning

- ✓ Web-Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)
 - Major Components of a Web GIS system
 - Web Services Based Information Sharing System
 - WMS Clients and AIST's Current Information System Using FOSS and OGC
- ✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)
 - Database Creation
 - Web Map Service Formulation

29 May (Thu)

Morning

- ✓ Web GIS System Development (Dr. Bandibas, GSJ)
 - Web Service Formulation for Seamless Geology
 - Web Service Formulation for Minerals
 - WMS Client Development
 - Spatial Database Query
 - Basic SQL Formulation for Querying POSTGIS Database

Integration of Web GIS System Components

Afternoon

- ✓ Remote Sensing Analysis (Mr. Takeda, JICA/SRED)
 - Satellite Images
 - Exercise

30 May (Fri)

Morning

- ✓ Wrap-up (Dr. Okubo, GSJ)
 - Review of Q & A (Accompanying material : Q&A_Cambodia)
- ✓ Group Discussion
 - Development of ASOMM, introduction of the Workshop in Philippines, Fieldwork in Myanmar (Dr. Okubo, GSJ)

Afternoon

- ✓ Group Discussion (continuation)
 - Group Discussion and Action Plan (Accompanying material:
Group Discussion_Cambodia)
- ✓ Closing session
 - Certificate for the participants from Mr. Yos Mony Rath, Director General, Dr. Okubo and Mr. Peng Navuth, Deputy Director General

(3) Participants

26 from General Department of Mineral Resources (GDMR), 9 from General Department of Petroleum (GDP) and 2 from Institute of Technology of Cambodia (ITC), Total 37 participants (Table 2-7).

The list of participants is included in Accompanying material (List of Participant_Cambodia.docx).

Table 2-7 Number of the participants for the Workshop in Cambodia

Country	Number		Organization
	Total	Detail	
Cambodia	37	26	General Department of Mineral Resources (GDMR)
		9	General Department of Petroleum (GDP)
		2	Information Division, Energy and Mineral Office of West Jawa
		2	Institute of Technology of Cambodia (ITC)

(4) Photo of the Workshop



Upper: Group Photo of the Workshop participants
Lower left: Lecture by Dr. Okubo, GSJ
Lower right: Group Discussion

2.7 Laos

2.7.1 Information collection

(1) Consultation with Counterpart organizations

i. Department of Geology and Minerals (DGM)

Date/Place	Participants	Contents
2 Jun (Mon) 8:50 – 9:40 am Deputy Director General office	DGM: Boualay Saatsy(DDG), Vannapha Phommachanh JICA Team: Ninomiya, Sah, Takeda	- Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



DGM office



Consultation

ii. Department of Mines(DoM) (consultation 1)

Date/Place	Participants	Contents
2 May (Mon) 10:00 – 11:30 am Director General office	DOM: Simone Phichit (DG), Keosanguan Vinnarath Boualay Saatsy JICA Team: Ninomiya, Sah, Takeda	- Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



DoM office



Consultation

iii. Information section

Date/Place	Participants	Contents
3 Jun (Tue) 9:00 – 10:30 am Information section office	DGM: Pathana Keobounmy(DD), Vannapha Phommachanh JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the • Questionnaire



Information section office



Consultation

iv. DoM (consultation 2)

Date/Place	Participants	Contents
4 Jun (Wed) 10:00 – 11:30 am DOM meeting room	DOM: Keosanguan Vinnarath JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the •Questionnaire



Consultation

v. DoM (consultation 3)

Date/Place	Participants	Contents
4 Jun (Wed) 11:30 am – 12:10 pm DoM meeting room	DOM: Manomay Vilayhong, Sayphet Vilaypaseuth, Buavanh Chanbounmy, Keosanguan Vinnarath JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the •Questionnaire - Prepare the venue for the Workshop



Consultation



Venue for the Workshop

vi. JICA Laos office

Date/Place	Participants	Contents
5 Jun (Thu) 11:00 – 12:00 JICA office	JICA: Mr. Yuzurio JICA Team: Ninomiya, Sah, Takeda	- Explain the Project and introduce the member - Share the information about security conditions



JICA Laos office



Consultation

vii. DoM (consultation 4)

Date/Place	Participants	Contents
6 Jun (Fri) 11:15 – 12:00 DoM meeting room	DOM: Keosanguan Vinnarath JICA Team: Ninomiya, Sah, Takeda	- Recover the answer of the •Questionnaire - Prepare the venue for the Workshop



Consultation

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_DGM

Questionnaire_DoM

Reference Data (Accompanying material)

organization structure_DGM

Q_Atch 1_Organization chart_DoM

Q_Atch 2_Law on Minerals (English)

Q_Atch 3_Procedure for Mining License

Q_Atch 4_Tenement UPDATE 14 03 2014 1(rev)

Q_Atch 5_Decree on the Implementation of the Investment Promotion Law_2009

Q_Atch 6_Investment Promotion Law2009

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-team leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name: [Ministry of Natural Resources and Environment](#)
- Geological Survey Organization name: [Department of Geology and Minerals](#)
 - [Director General: 1 person](#)
 - [Deputy Director General: 2 persons](#)
- Number of personnel in each section: [107 staff for whole Department](#)
- Organization chart: [6 Divisions and 3 Units](#)
 - [Geoinformation Division](#)
 - [Administration and planning Division](#)
 - [Geological Survey Division](#)
 - [Management of agreement and concession Division](#)
 - [Technical geology and mineral Division](#)
 - [Chemical analysis Division](#)

 - [Geological Survey Unit \(for Southern part\)](#)
 - [Geological Survey Unit \(for Central part\)](#)
 - [Geological Survey Unit \(for Northern part\)](#)

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering
 - Geological field survey on the basis of existing geological maps to record locality of the outcrop with portable GPS, to describe lithology and structure on the outcrop and sample collection.
 - The field book memo is taken, which is typed after field work.
 - GPS coordination and result of chemical analysis are stored as excel files
- Information / Data management
 - Server (with database/management system) is discontinued when Department moved from ministry to current location last year
 - To try to organize the new server with support from World Bank

(2) Geology

- Existing geological maps
 - Scale and area
 - Geological maps: 1:1M scale maps for whole country, 1:500,000 scale maps for southern part of Laos, 1:200,000 maps which covers part of the country (see attached map). Area not covered are; between the South of Laungphaban Province and the North of Vientiane Province and some area of Savannakhet and Xekong Province.
 - + Printed maps or digital data
 - Hard copy and PDF files
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
 - + Blank area of geological map with 1:1M scale
 - + Methods to fill up the blank area
 - + Issues in creation of seamless geological map
 - All Geological map with Report except for 500:000 map (southern part) created by Vietnam. Three areas of 1:200,000 map reports are written in Vietnamese.

(3) Topography

- Topographical maps are organized by National Geographic Department, Ministry of Home Affairs
- Existing topographic maps
 - + Scale and area
 - Scale: 1:100,000, 1:200,000 and 1:500,000, for whole country; prepared by National Geographic Department, Ministry of Home Affairs
 - + Printed maps or digital data

- Hard copy, PDF, and Shape files are available
- Other relevant data
 - + Road, river
 - + Administrations boundary

(4) Mineral resources data

Contents of data

- 1:1.5M scale map is published in 1990 supported by United Nation (UNDP??)
- Including Metallic, Base, Light, Precious and Non-metallic minerals
- Report is available
- Printed maps or digital data
 - Hard copy and PDF are available
- Plan to update

(5) Geophysical data

- Gravity, magnetic and radioactive survey
 - + Survey date and organization
 - + Area and map scale
 - + How is it used?
- Electromagnetic data from Newmont company (AU company)
- Seismic data in southern Laos area around Savannakhet Province from Enterprise Oil company (not Laos)

(6) Satellite data

- What kind of satellite data does your Organization have?
 - + Satellite name
 - + Area
 - + How do you use it?
- Not available
- Plan to buy satellite data to create geological map (possibly 1:50,000)

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole?
 - + Location, usage, depth

+ Can someone measure the temperature?

- Yes in Savannakhet, Champasak (capital Pakse) and Bolikhamsai Provinces
- For oil exploration in Bolikhamsai by Hund Oil, in Champasak by Monument Oil, and in Savannakhet by Enterprise Oil.
- Report is available. However well is not exist anymore.

- No information about well for drinking water in DGM
- Data is managed by Department of Water Resources, Ministry of Natural Resources and Environment

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management
- Kinds, names and numbers of hardware
- Condition of their management

- 3 HP computers, 2 printers A4, and 1 Plotter; dedicated to geology and minerals data and mapping.

(2) Software

- Usage situation of open source software
- Kinds, names and numbers of software for GIS and remote sensing
- Usage situation of GIS and remote sensing

- ArcGIS with ArcInfo ver. 10.1 and ENVI ver. 5

- Open source software not much idea

(3) Data

- Contents and quality of data
- Situation of usage, frequency of updates
- Condition of data dissemination

- The last updating of Geological map conducted during 2006-2008 (JICA project); information of 1:1M from UNDP data before 1996

- Concession map is updated in every 4-6 months (depend on the detail)

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

- Name of training, date, place, participants
 - The training program on Mineral Resource Database for ASEAN 11-20/1/2012
 - 2 persons
- Organization of lecturers
 - The Association for Overseas Technical Scholarship (AOTS)
- Objectives of training
 - Mineral resource database

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment
 - Law on Minerals, 2013, DOM, MEM in cooperation with Law Dissemination Department, Ministry of Justice.
- How to get it
 - By printed hardcopy; softcopy (PDF) might be available (need to be checked)

(2) Tenement

- Which department manages the tenement?
- What is the management system of tenements?
- How to apply the tenement

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information?
 - Yes
- How is it managed?
 - We are collection it in hard copy only
- Is it available?
 - Yes, available

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to

develop mines?

- What is the content?

- The government of Lao P.D.R. allows foreigner who is interested to invest in mining sector

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development?
- Name, establishment date
- How to get it

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?
- Are there any resident problems caused by mines?
- What are they?
- What are results?

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
- Is it available?
- How does your Country manage/control them?

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?
- If not, will your Country plan to implement EITI?

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-Team leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?

- Ministry name: [Ministry of Energy and Mines](#)
- Geological Survey Organization name: [Department of Mines \(DoM\)](#)
- Number of personnel in each section: [There are 6 divisions and 2 Project. The number of personnel as given below.](#)

[Divisions: 10 in Administration, 9 in Mining Title and Policy, 9 in Mining and Metallurgical Technology, 9 in Mining Economics and Community Development, 10 in Mines Safety, Health and Environment, 11 in Mining Information and Evaluation.](#)

[Projects:](#)

- [Support for a Sustainable Development of the Mining Sector \(SDMS\), 2 exports from BGR, Germany](#)
- [Technical assistant for capacity building in the hydropower and mining sector \(HMTA\), collaboration with World Bank](#)
[HMTA is ongoing \(2013-2015\) at the moment and there will be extension with Phase II, tentatively until Sep 2018.](#)
- Organization chart: [Attachment 1_Organization chart_DoM](#)

2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering
- Information / Data management

(2) Geology

- Existing geological maps
 - + Scale and area
 - + Printed maps or digital data
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
 - + Blank area of geological map with 1:1M scale
 - + Methods to fill up the blank area
 - + Issues in creation of seamless geological map

(3) Topography

- Existing topographic maps
 - + Scale and area
 - + Printed maps or digital data
- Other relevant data
 - + Road, river
 - + Administrations, district boundary

(4) Mineral resources data

- Contents of data
- Printed maps or digital data

(5) Geophysical data

- Gravity, magnetic and radioactive survey
 - + Survey date and organization
 - + Area and map scale
 - + How is it used?

(6) Satellite data

- What kind of satellite data does your Organization have?
 - + Satellite name
 - + Area
 - + How do you use it?

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole?
 - + Location, usage, depth
 - + Can someone measure the temperature?
3. Please let us know the situation of following items related to the seamless geological database in your Organization.
- (1) Hardware for digital data/information
- System of data management
 - Kinds, names and numbers of hardware
 - Condition of their management
- (2) Software
- Usage situation of open source software
 - Kinds, names and numbers of software for GIS and remote sensing
 - Usage situation of GIS and remote sensing
- (3) Data
- Contents and quality of data
 - Situation of usage, frequency of updates
 - Condition of data dissemination
4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan. (Source: Sathaphone)
- Name of training, date, place, participants:
 - JICA Training Course on “Sustainable Mining Development & Environmental Managing Process in Mining Sector”
 - 3 persons in year 2012
 - 2 persons in year 2011
 - Organization of lecturers:
 - MINETEC
 - Objectives of training:
 - Part of Lesson Trained: Image Analysis of Satellite Data and GIS including:
 - Image analysis of satellite and GIS,
 - Introduction to image and processing of remote sensing,
 - Introduction to satellite system and image,

- Introduction to GIS
- Review of SAR.

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation (Source: Vinnasone)

- Date of establishment
 - Law on Minerals
 - It is established in 1997, revised in 2008 and amended in 2011 and printed in 2013
 - See Attachment 2_Law on Minerals (English)
- How to get it
 - Available at DoM (for Sale of 100,000 kip/ 13USD)

(2) Tenement

- Which department manages the tenement?
Mining Title and Policy Division (??) at Department of Mines
- What is the management system of tenements?
- How to apply the tenement
 - At the moment, there is lack of well-defined tenement management system in place. With the ongoing technical assistance from the World Bank (HMTA project), Department of Mines is in process of formulating necessary policy, legislation, and management system of tenements. The international consultant firm Spatial Dimension is developing “Mineral Cadastre Management System (MCMS)” by using “FlexiCadastre”, the enterprise scale land management solution widely adopted for mining sector.
 - See Attachment 3_Procedure for Mining License and Attachment 4 Tenement UPDATE 14 03 2014 1(rev)

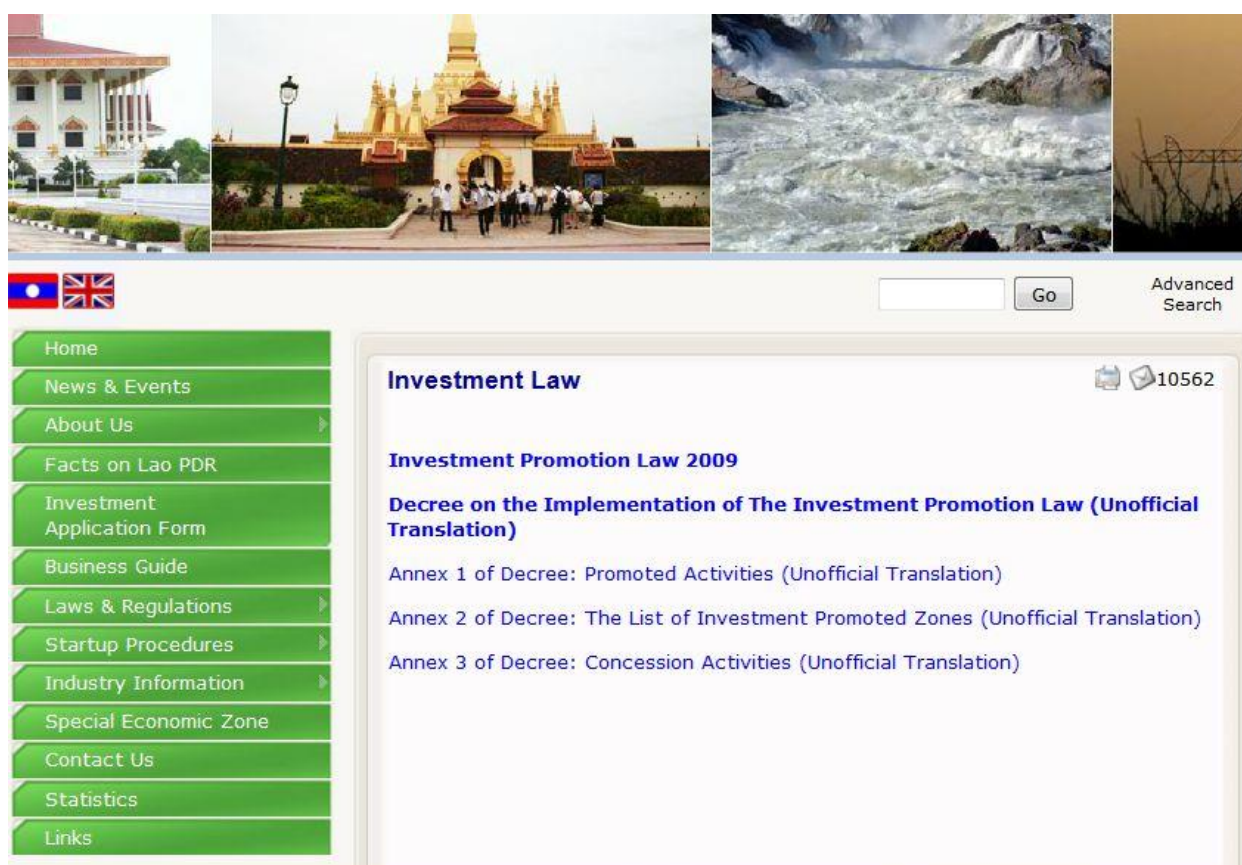
(3) Exploration/exploitation information of mineral resources (Source: Ms. Buavanh)

- Does your Organization have this information?
 - Yes
 - Company, Project, Locality, Commodity, Date of issuance, Validity of Contract
 - 66 companies and 100 projects
 - Large to medium scale mining
 - N/A on web

- Map is available only in hardcopy
- How is it managed?
 - By excel file written in Lao
- Is it available?
 - List written in Lao is available
 - Map is also available only hardcopy

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines? (Source: Mr. Manomay)
 - The policy for foreign investments is going to be developed; the existing one is out of date.
- What is the content?
 - There is other organization concerned related to foreign investment promotion that is department of investment and promotion of ministry of planning and investment.



- Top page of Ministry of Planning and Investment
- URL: http://www.investlaos.gov.la/show_encontent.php?contID=1
- See Attachment 5_Investment Promotion Law2009 and Attachment 6_Decree on the Implementation of the Investment Promotion Law_2009

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development? (Source: DSEA, MONRE)
 - There is environmental legislation related to mining.
- Name, establishment date
 - Law on Environmental Protection
 - Decree on compensation and resettlement
 - Instruction on ESIA (Environmental and Social Impact Assessment)
 - Guideline on Public Involvement
- How to get it
 - Department of mines (DoM) under HMTA (World Bank funded project) is now drafting regulations and guideline relating to environment and mining inspection (Source: Vonthong T)

(6) Environmental problem in mining (Source: Vonthong T)

- Are there any environmental problems as pollution caused by mines?
 - There is water pollution caused from Tin mining in Khammouane province
- Are there any resident problems caused by mines?
 - There are some residential problems caused by mining but it is not a big problem most of them related to land compensation and resettlement,
- What are they?
- What are results?

(7) Small Scale/ Artisanal Mining (Source: Sayphet)

- Does your Organization have the information of small-scale mining?
 - DoM is drafting regulation regarding to Artisanal and Small scale mining
- Is it available?
 - There was a government notification No. 13 (currently valid until 2015) to halt small scale and related activities throughout the country. This notification also applies to new mining activities as well. There will be further appropriate measures in place after expiry of this notification.
- How does your Country manage/control them?
 - There are 359 companies operated in 420 project of small scale mining, licenses issued by provincial department of energy and mines, that means this category of mining scale is under management of provinces, These licenses are issued only for Limestone and Building Materials; not for

metallic commodity.

- However there is some information occasionally available at the DoM

(8) Extractive Industries Transparency Initiative (EITI) (Source: Mr. Manomay/Mr. Eravanh)

- Did your Country implement EITI?
- If not, will your Country plan to implement EITI?

- Our country has been not implemented EITI, and will plan to implement it in accordance with the suggestion from World Bank under HMTA.

2.7.2 Workshop

(1) Venue

The Workshop was held in the meeting room of the Department of Mines. The Wi-Fi is available in the DoM located in the same area as Ministry of Energy and Mines. On the other hand, the Wi-Fi is not available in the DGM because it is isolated from Ministry of Natural Resources and Environment.

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program Laos_revised.xls).

9 Jun (Mon)

Morning

- ✓ Opening
 - Welcome speech from Dr. Simone Phichit (Director General of Department of Mines)
 - Opening speech and introduction of the Workshop (Dr. Okubo, GSJ)
- ✓ Web-GIS demonstration (Dr. Joel, GSJ)
 - Web-GIS (ASEAN Mineral Resources Database Information System)
- ✓ Seamless Geology
 - Development of seamless geological maps in ASEAN (Dr. Okubo, GSJ)

Afternoon

- ✓ Mineral Resources (Dr. Ohno, GSJ)
 - Review of the Questionnaire (Accompanying material : Ohno_q_la.ppt)
- ✓ Seamless Geology
 - Mr. Kuangnuvong Telpvongsa (Geo-information Division, Department of Geology and Minerals, Ministry of natural Resource and Environment) “Geological and Minerals in Lao PDR” (Accompanying material: Geological and Minerals in Lao PDR_Kuangnuvong Telpvongsa.pptx)
- ✓ Geophysics (Dr. Okubo, GSJ)
 - Mirano
 - Magnetics
 - Gravity
- ✓ Mineral Resources
 - Introduction for Mineral Resources Map in Asia (Dr. Ohno, GSJ)

10 Jun (Tue)

Morning

- ✓ Groundwater (Dr. Uchida, GSJ)
 - Ground Water Flow System
 - Case Studies of Groundwater Observations
 - Geothermal Heat Pump
 - Web-GIS for Groundwater Database

Afternoon

- ✓ Seamless Geology
 - Development of the seamless geology (Dr. Okubo, GSJ)
 - Correlation the geological map in the border area between Laos and Thailand (Dr. Takahashi, GSJ)
 - Discussion between Laos group and Thailand group
 - Presentation about the result of discussion by each group
- ✓ Homework (Dr. Okubo, GSJ)
 - Introduction for the group discussion in Friday and homework

11 Jun (Wed)

Morning

- ✓ Seamless Geology
 - Review of the discussion in 10 Jun (Dr. Takahashi, GSJ)
 - Discussion for the correlation of the geology in the border area among geologists from Thailand and Laos and Dr. Takahashi
 - Presentation about geological survey of collaboration project between Thailand and Laos by Mr. Kittu Khaowiset (DMR) Accompanying material : Thai-Lao 2013_Romote-sensing Interpretation.pptx
 - Summarization by all participants (Accompanying material : Status of Seamless Geological Mapping at Thai-Laos border Area_discussion.pdf)
- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients

Afternoon

- ✓ Web-Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)
 - Major Components of a Web GIS system
 - Web Services Based Information Sharing System
 - WMS Clients and AIST's Current Information System Using FOSS and OGC
- ✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)

Database Creation

Web Map Service Formulation

12 Jun (Thu)

Morning

- ✓ Web GIS System Development (Dr. Bandibas, GSJ)
 - Web Service Formulation for Seamless Geology
 - Web Service Formulation for Minerals
 - WMS Client Development
 - Spatial Database Query
 - Basic SQL Formulation for Querying POSTGIS Database
 - Integration of Web GIS System Components

Afternoon

- ✓ Web GIS System Development (continuation, Dr. Bandibas, GSJ)
- ✓ Remote Sensing Analysis (Mr. Takeda, JICA/SRED)
 - Satellite Images
 - Exercise

13 Jun (Fri)

Morning

- ✓ Remote Sensing Analysis (continuation, Mr. Takeda, JICA/SRED)
- ✓ Group Discussion
 - Group Discussion (Web-GIS group, Geology group and Other Geoscience group)

Afternoon

- ✓ Group discussions (continuation)
 - Presentations from three groups (Accompanying material : Group Discussion_Laos)
 - The presentations is ranked by Dr. Okubo. First and Second group won prizes.
- ✓ Geophysics (Dr. Okubo, GSJ)
 - Mirano
 - Magnetics
 - Gravity
- ✓ Seamless Geology (Dr. Takahashi, GSJ)
 - Unified legend settled by Thailand geologists and Dr. Takahashi
- ✓ Wrap-up (Dr. Okubo, GSJ)
 - Review of the Q & A (Accompanying material : Q&A_Laos)
- ✓ Closing session
 - Greetingsh by Dr. Okubo, Mr. Sompob (DMR), Dr. Joel、 Dr. Sah]
 - Certificate for the participants by Mr. Eravanh Boungnaphalom (Deputy Director General

of DOM)

Closing speech by Mr. Eravanh Bounnaphalom

(3) Participants (Table 2-8)

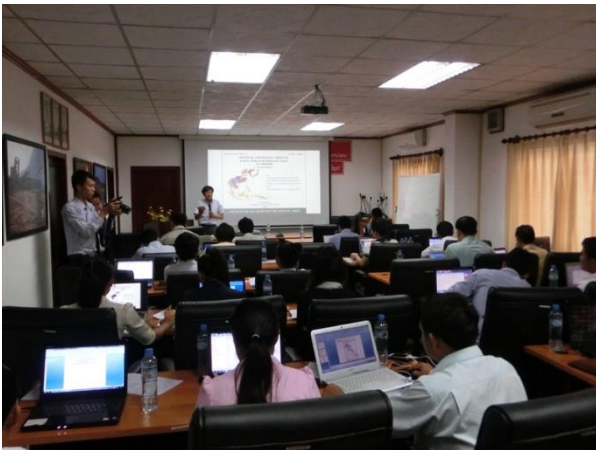
10 from DoM, 7 from DGM, 2 from Faculty Of Engineering (National University Of Laos), 4 from Polytechnic College, 2 from Department of National Disaster Management and Climate Change, 1 from Department of Investment Promotion, 1 from Department of Water Resource, 2 from Lao Statistics Bureau (LSB), Ministry of Planning and Investment (MPI), and 1 from unknown. 3 geologists from Thailand DMR were invited by Laos. All persons did not take part in all sessions.

The list of participants is included in Accompanying material (List of Participants).

Table 2-8 Number of the participants for the Workshop in Laos

Country	Number		Organization
	Total	Detail	
Laos	33	10	Department of Mines (DoM, MEM)
		7	Department of Geology and Minerals (DGM, MONRE)
		4	Polytechnic College
		2	Faculty of Engineering, National University of Laos
		2	Department of National Disaster Management and Climate Change
		2	Lao Statistics Bureau, Ministry of Planning and Investment
		1	Department of Investment Promotion
		1	Department of Water Resource
		1	Unknown
		3	Department of Mineral Resources, Thailand

(4) Photo of the Workshop



Upper: Group photo of the Workshop participants
Lower left: Lecture by Dr. Okubo, GSJ
Lower right: Presentation of the Group Discussion about Seamless Geology

2.8 Vietnam

2.8.1 Information collection

(1) Consultation with Counterpart organization

i. JICA Vietnam

Date/Place	Participants	Contents
16 Jun (Mon) 9:00 – 10:30 am JICA office	JICA: Mr. Yamamoto JICA Team: Onuma, Ninomiya, Sah	- Explain the Project and introduce the member - Share the information about security conditions

ii. Center for information and Archives of Geology (CIAG)

Date/Place	Participants	Contents
16 Jun (Mon) 14:00 – 17:00 pm CIAG meeting room	CIAG: Tran Hong Hai (CIAG) Dao Thai Bac (CIAG) Chu Thi Bich Hue (CIAG) Van Thi Vi (GDGMV) Nguyen Duy Thanh (GDGMV) Nguyen Thua Quang (GDGMV) Le Tuan Anh (GDGMV) Tran Thi Thuy Dung (GDGMV) JICA Team: Onuma, Ninomiya, Sah	- Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



CIAG office



Consultation

iii. CIAG (consultation 2)

Date/Place	Participants	Contents
17 Jun (Tue) 9:00 – 12:00 CIAG meeting room	CIAG: Tran Hong Hai (CIAG) Dao Thai Bac (CIAG) Chu Thi Bich Hue (CIAG) Le Tuan Anh (GDGMV) JICA Team: Onuma, Ninomiya, Sah	- Presentation from •CIAG about the function - Presentation from •CIAG about the database (Accompanying material: CIAG, GDGMV_GeoMinInfo_VN.ppt)



Consultation



Explanation about the database

iv. CIAG (consultation 3)

Date/Place	Participants	Contents
20 Jun (Fri) 10:00 – 12:00 CIAG meeting room	CIAG: Tran Hong Hai (CIAG) Dao Thai Bac (CIAG) Chu Thi Bich Hue (CIAG) Tran Thi Thuy Dung (GDGMV) Nguyen Viet Anh (GDGMV) JICA Team: Onuma, Ninomiya, Sah	- Confirm the schedule, contents and venue for Workshop



Consultation



Visit the venue for the Workshop

v. General Department of Geology and Minerals of Vietnam(GDGMV)

Date/Place	Participants	Contents
27 Jun (Fri) 13:00 – 14:00 GDGMV Head Office	GDGMV: Assoc. Prof Dr Do Canh Duong, Deputy Director general, Dr. Quach Duc Tin, Director, Department of International Cooperation, Dr. Mai Trong Tu, Director, Department of Geology, Mr. Le Tuan Anh, IT Manager, Administration Office Ms. Tran Thi Thuy Dung, Department of International Cooperation, Ms. Pham Thi Chung, Director, Analytical and Experimental Center for Geology CIAG, GDGMV: Mr. Tran Hong Hai, Director, Ms. Van Thi Vi, Chief Administrative GSJ Team: Okubo, Takahashi, Joel, Uchida, Ohono, CCOP: Dr. Adicaht Surinkum, JICA Team: Onuma, Ninomiya, Sah	Result of the mission and the workshop as well as the possibilities on Japan - Vietnam cooperation in geology and mineral assisted by Japan through JICA



Vietnamese participants



Japanese participants



Group Photo

vi. Vietnam Institute of Geosciences and Mineral Resources (VIGMR)

Date/Place	Participants	Contents
27 Jun (Fri) 15:00 – 16:00 VIGMR Office	VIGMR Dr. Tran Tan Van, Director, Dr. Nguyen Quoc Dinh, Deputy head, Department of Science, Planning, and International Cooperation and one lady GSJ Team: Okubo, Takahashi, Joel, Uchida, Ohono, CCOP: Dr. Adicaht Surinkum, JICA Team: Onuma, Ninomiya, Sah	Result of the mission and the workshop as well as the possibilities on Japan - Vietnam cooperation in geology and mineral assisted by Japan through JICA



Consultation



Vietnamese participants

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_Vietnam_finalized.docx

Reference Data (Accompanying material)

Atch01_Vietnam_CENTER INFORMATION STORAGE AND GEOLOGY_Vietnam.pdf

Atch02_Vietnam_Vitnam's 2010 Mineral Law.pdf

Atch03_Vietnam_LAW On environmental protection_Vietnam.pdf

Text book

Geology and Earth Resources of Viet Nam, General Department of Geology and Minerals of Vietnam 2011

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

Questionnaire

April 2014
JICA study team

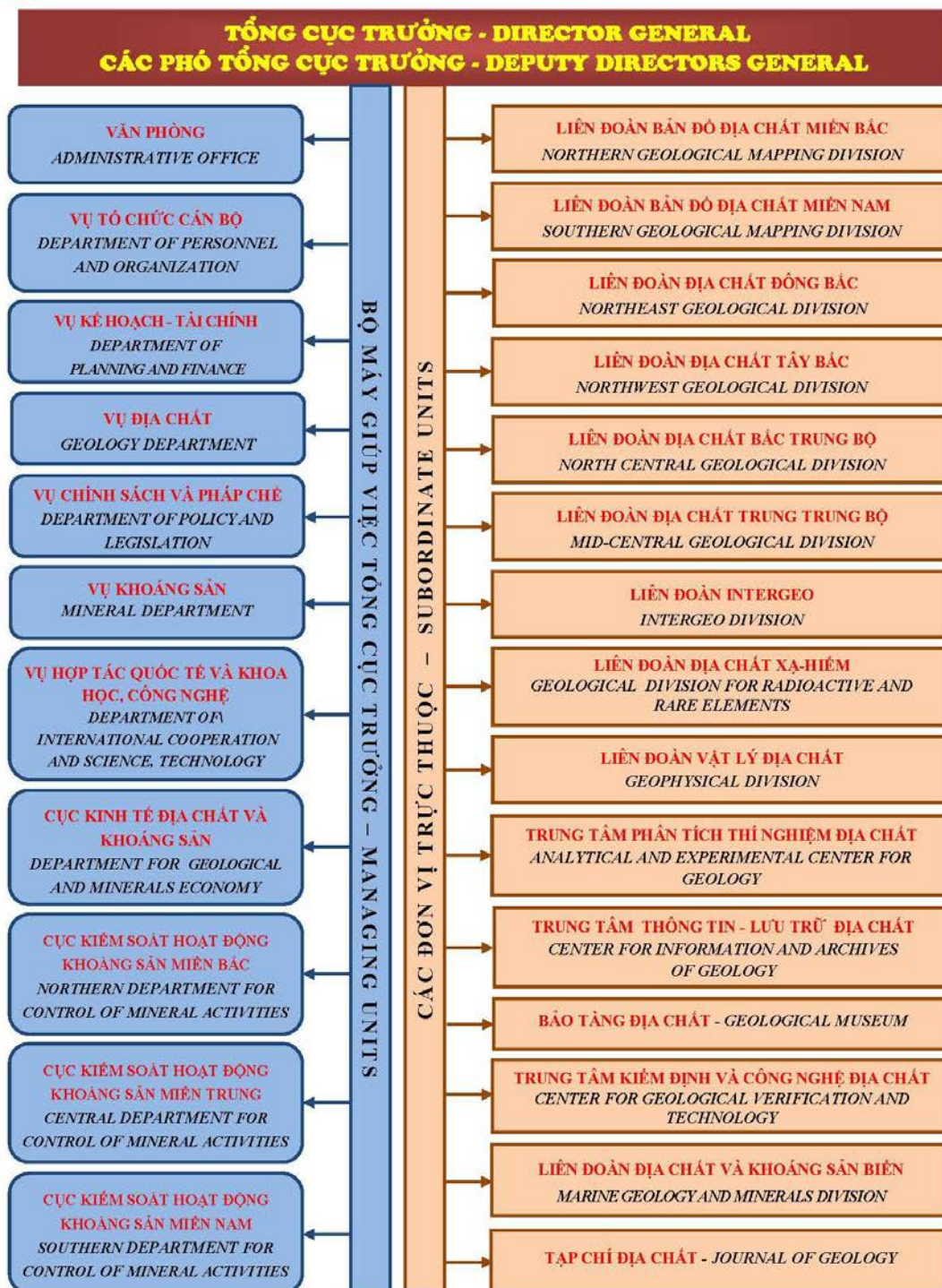
I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-Team leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?
 - Ministry name: [Ministry of Natural Resources and Environment \(MONRE\)](#)
 - Geological Survey Organization name: [General Department of Geology and Minerals of Vietnam \(GDGMV\)](#)
 - Number of personnel in each section: [2,240 \(29 PhD., 142 Ms, 961 Univ. Degree\), 140 total of Managing Units, 195 Northern Geological Mapping Division, 195 Southern Geological Mapping Division, 231 Northeast Geological Division, 194 Northwest, 225 North Central, 230 Mid Central, 250 Integeo, 212 Radioactive and Rare elements, 149 Geophysical, 71 Analytical, 50 CIAG, 28 Geological Museum, 33 Geological Verification, \), Marine \(under development\), 6 Journal of Geology](#)
 - Organization chart



SƠ ĐỒ TỔ CHỨC TỔNG CỤC ĐỊA CHẤT VÀ KHOÁNG SẢN VIỆT NAM
ORGANIZATION CHART OF
GENERAL DEPARTMENT OF GEOLOGY AND MINERALS OF VIETNAM



2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering
 - *Field Survey to collect information of geology and all kind of sampling for example, lithology, physical and chemical analysis*
 - *Field work for the projects from Government and private companies*
 - *Synthesized Data after field survey (Geological Reports): Geological Archives, 3,750 reports (Central and Subordinate Units)*
 - *Computerised Data: Rasterized, Vectorized data and some are in databases and e-document (scanned PDF)*
- Information / Data management
 - *Documentary systems (e-book or e-report)*
 - *Multidisciplinary Geological Databases Systems*
 - *GIS and Web-GIS including geological maps, mineral distribution maps in vectorized format at different scales*

(2) Geology

- Existing geological maps
 - *Index maps*
- +Scale and area
 - *Geological & Mineral Mapping completed*
 - *1/1 000 000 scale (compiled) published*
 - *1/500 000 whole country (mainland and some island) published*
 - *1/200 000 whole country (mainland) published*
 - *1/50 000 (60% mainland and some island) not published, partly confidential*
- + Printed maps or digital data
 - *Both; Printed maps and shape file*
- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization
 - +Blank area of geological map with 1:1M scale: *None*
 - + Methods to fill up the blank area
 - + Issues in creation of seamless geological map: *It is already created. International Standard Unified Legend and neighbouring borders with Laos and Cambodia have been harmonized. Vietnam plans to update; but not sure about what kind of cooperation, if any, with Cambodia and Laos.*

(3) Topography

- Existing topographic maps
 - Department of Survey and Mapping of Vietnam (DOSMV), MONRE
 - +Scale and area: Whole country
 - 1/1 000 000
 - 1/500 000
 - 1/250 000
 - 1/50 000
 - 1/25 000
 - 1/10 000
 - + Printed maps or digital data
 - All are in digital data, also in printed maps
- Other relevant data
 - +Road, river: available
 - + Administrations, district boundary: available

(4) Mineral resources data

- Contents of data
 - Mineral occurrences recorded: >5000 (nearly 60 kinds of minerals)
 - Printed maps or digital data: Printed maps and shape file

(5) Geophysical data

- Gravity, magnetic and radioactive survey
 - +Survey date and organization: Majority of survey by Geophysical Division, General Department of Geology and Minerals of Vietnam
 - + Area and map scale
 - ▣ Carried out airborne magnetic and gamma spectrometric survey at 1:25,000 - 1:50,000 scale in 20.5% of the territory;
 - + How is it used?
 - ▣ not only for geology (ex. ore occurrence or potential area of minerals, geohazard) but other applications such as forestry, agriculture

(6) Satellite data

- What kind of satellite data does your Organization have?
 - +Satellite name: mainly SPOT but Vietnam Remote Sensing Center, MONRE has a lot of types of satellite image such as Landsat 7 and 8 and also stereo pair aerial photograph
 - + Area: Whole country
 - + How do you use it? Image Processing for extraction of different information using software such as ERMAPPER, ILWIS, DICDACTIM

and ENVI etc. For example, SPOT data was used in northeast Vietnam for gold exploration during 1990s

(7) Well data

- Does your Organization know any wells to be able to measure the temperature in the hole? : National Center for Water Resources Planning and Investigation, MONRE, Contact person: Mr. Nghia, Director of Water Resources Monitoring Department and Ms. Ha, Director of National Monitoring Center

+ Location, usage, depth

+ Can someone measure the temperature?

- *National Monitoring Network of ground water regime*
 - *Bac Bo plain (North Vietnam)*
 - *Area: 17.000km²*
 - *Coverage: 12 provinces*
 - *Stations: 78*
 - *Nam bộ Plain*
 - *Area: 57.000km²*
 - *Coverage: 16 provinces*
 - *Station: 85*
 - *Tây nguyên Area*
 - *Area: 55.500km²*
 - *Coverage: 5 provinces*
 - *Stations: 132*
- *Hydrogeological works in the projects of geological survey and mineral resources prospecting*

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management: Microsoft Windows Based System
- Kinds, names and numbers of hardware: 100 IBM compatible servers and PC in the LAN and Web Environment
- Condition of their management: Standard Office

(2) Software

- Usage situation of open source software: Open source for Starting only
- Kinds, names and numbers of software for GIS and remote sensing:

MapInfo, ArcGIS, Intergraph, Autodesk,

- Usage situation of GIS and remote sensing: Low levels

(3) Data

- Contents and quality of data: Good quality
- Situation of usage, frequency of updates: nearly 100 reports are submitted every year
- Condition of data dissemination: normally open but some of them is confidential, need permission from higher authority, GDGMV, to access

List of database compiled by Information Technology and geology

<http://idm.gov.vn/42P43N111PI1T/vi-VN/Chi-Tiet-Linh-Vuc/San-pham-cong-nghe-thong-tin.aspx>

Atch01_Vietnam_CENTER INFORMATION STORAGE AND GEOLOGY_Vietnam

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

- Name of training, date, place, participants
 - GEOGRID training and Conference 2008, Tsukuba, Tokyo, 2 participants
 - First AOTS/GSJ/AIST Training for ASEAN Mineral Database, Feb 28 – March 9 2011, Tokyo, 2 participants.
 - Second AOTS/GSJ/AIST Training for ASEAN Mineral Database, Jan 11 – 20, 2012, Tokyo and Osaka, 3 participants.
 - Third HIDA/GSJ/AIST Training for ASEAN Mineral Database, Sep 18 – 26, 2012, Tokyo, 2 participants.
- Organization of lecturers
 - GSJ/AIST, JOGMEC, ...
- Objectives of training

The objectives of the training program are to have the participants to be able to do the following:

(1) To have the understand necessary knowledge and practical methods related to the following points;

- Establish Web Service on international standards and Web Portal
- Install of Web GIS software and its usage technique
- Open source GIS such as “GRASS” and Remote Sensing Data Analysis

(2) To create for each country an action plan related to integrating each country's Mineral Database into GEO Grid system

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment: [Minerals Law, established in 1996, modified in 2005 and 2010](#)
- How to get it:

[Vietnam's 2010 Mineral Law](#)

<http://www.camcf.org:11002/upload/EditorUploads/2010%20Mineral%20Law.pdf>

[Atch02_Vietnam_Vitnam's 2010 Mineral Law](#)

[LEGAL DOCUMENTS ON MINERALS](#)

http://idm.gov.vn/Nguon_luc/Xuat_ban/Anpham/LuatKS/Mucluc.htm

(2) Tenement

- Which department manages the tenement?: [Policy and law by General Department of Land Administration \(GDLA\), Ministry of Natural Resources and Environment \(MONRE\), but managed by Local Government such as province or city \(this is general tenement including cadastral map to maintain land ownership\)](#)
- What is the management system of tenements? :
[GDGMV – MONRE comprehensively manage information on mining property, including:](#)
 - [Name of the company](#)
 - [No. of Decision, date of issue](#)
 - [Location of mine that to be granted license. Coordinate area of mine](#)
 - [Types of minerals that to be allowed to mine, associated minerals](#)
 - [The area, depth for mining from sea level](#)
 - [Reserves of main minerals, associated minerals that to be allowed to mine](#)
 - [Annual mining capacity](#)
 - [Duration of mining.](#)
 - [Concerning mineral license and investment license \(for small scale\) is processed at local government; for example Department of Natural](#)

Resource and Environment (DONRE), of Provincial Government.

- How to apply the tenement? :

1. Basic geological survey on minerals:

According to the Minerals Law, state management on basic geological survey has been conducted based on approved master plan;

The costs for basic geological survey are allocated in the state annual budget.

Based on basic geological survey master plan which approved by the Prime Minister and the estimated budget allocated by the Government, MONRE organize the basic geological survey on minerals.

2. Documents for application for mineral exploration license:

a) An application for mineral exploration licensing

b) Mineral exploration proposal (plan) (made by a consulting organization having legal entity and its own seal of national coat of arms form. This is stipulated in Circular No. 17/2012/TT-BTNMT dated 29/11/2012 of the MONRE)

c) A map of the area of mineral exploration granted by the Provincial People's Committee (PPC). PPC will work with the companies for the areas falling in mineral master plan, not falling in areas where mineral activities are forbidden, areas where mineral activities are temporarily forbidden.

d) A Commitment for environmental protection in case of toxic mineral exploration (just for toxic minerals such as Uranium, Th, rare earths)

e) A copy of business registration certificate. In case of foreign Enterprises, it needs to have a copy of the decision of establishing the representative offices or branches in Vietnam granted by PPCs, cities directly under the Central

f) Documents certifying equity (get from the Bank where company opens bank account)

g) In case of successful bidder for the areas that have not been carried out exploration, providing the written document of successful bidder.

(The GDGMV organize auction. Documents include:

- An application for auction of mineral exploration, mining rights
- A copy of business registration certificate
- Company capability profile

Valid companies' Application documents applied before 01 July 2011 do not conduct auction. New companies' application documents must participate in auction, except for cases decided by the Prime Minister,

such as key economic zones, and boundary areas

3. Documents for application for mineral mining license:

- a) An application for mineral mining licensing
- b) A map of the area of mineral mining
- c) Decision on approving mineral reserves by appropriate authorities (After conducting exploration, company submit the results to the National Council for Approval of Mineral Reserve. After consideration, The Council grants Decision approving mineral reserve. This step is conducted by a Consulting Organization which is usually the subordinate unit of GDGMV)
- d) Mineral mining and investment proposal (plan) enclosed with Approval Decision and a copy of business registration certificate (made by a Consulting Organization. Business registration certificate is granted by PPC/cities directly under the Central)
- e) Report on environmental impact assessment or Environment Protection Commitment (made by a Consulting Organization, and adopted by the Council of MONRE)
- f) A copy of business registration certificate
- g) In case of successful bidder of mineral mining rights auction, provide the written document of successful bidder
- h) Written certification of equity;

4. The procedures for submitting and receiving the Documents

- a) Regulations on Documents Receiving Agency for mineral mining license, mineral reserves approval, mine closure:
 - GDGMV is the Receiving Agency for mineral mining license, mine closure under the licensing authority of MONRE.
 - The Office of the Board for Evaluation of National Mineral Reserve is the Receiving Agency for mineral reserves approval, basing on the report on mineral exploration results which follow mineral exploration license under the licensing authority of MONRE.
 - Provincial Department of Natural Resources and Environment (DONRE) is Receiving Agency for mineral licenses; mineral reserve approval, based on the report on mineral exploration results; for mine closure which is under the licensing authority of PPC.
- b) Procedures for receiving, returning record results for mineral licensing, mineral reserves approval.
 - Application documents for mineral licenses/mine closure are submitted directly at or via post office to Receiving Agency.
 - Application documents for mineral reserves approval is submitted

directly at Receiving Agency.

- The applicant should get final decision from the Receiving Agency.

5. The differences on documents and procedures for mining application between domestic and foreign enterprises

- According to the Minerals Law, the mining licenses have only been granted for Vietnamese enterprises.
- Foreign enterprises having the representative offices or branches in Vietnam have the right to apply for mineral exploration license; the Documents for application are similar to the domestic enterprises application for mineral exploration license. The foreign enterprises, however, need a copy of Decision on establishing representative office/branch in Vietnam. Besides, the Minerals Law does not have any difference between domestic and foreign enterprises in preparing, submitting and considering documents for application for mineral exploration license.

(*): MONRE assign basic geological investigation for whole Vietnam to GDGMV. In some cases, need to have approval of the Prime Minister for basic geological investigation (example: capital contribution between organizations/individuals; joint venture between foreign company and Vietnamese company)

(3) Exploration/exploitation information of mineral resources

- Does your Organization have this information? **Yes**
- How is it managed? **Geological Archives and Computerizes Databases**
- Is it available? **Yes, upon the permission/approval from higher authority GDGMV**

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines?
 - The foreign and domestic investments are almost equal in mineral exploration licensing but a little different for mineral mining licensing they should be joint venture with domestic companies (Investment Law and Minerals Law).
- What is the content?
The Government encourages the foreign investments on downstream mineral development

Law on investment

<http://www.chinhphu.vn/portal/page/portal/English/legaldocuments?type=2>

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development? [Yes](#)
- Name, establishment date: [Law on Environment Protection, 2005](#)
- How to get it: www.chinhphu.vn

[Law on Environment](#)

<http://www.chinhphu.vn/portal/page/portal/English/legaldocuments?type=8>

[Atch03_Vietnam_LAW On environmental protection_Vietnam](#)

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines? [Yes. Compensation, pollution, conflict; so may problems due to lack of necessary policy and law and regulations. Government is moving forward to draft such policy.](#)
- Are there any resident problems caused by mines? [Yes](#)
- What are they? [Difficult to list it up; several problems](#)
- What are results? [Government legal documents and policy under preparation for long time, but yet to be finalized; taking time](#)

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining? [Yes, list of ASM including commodity and locality, after confirmation by Minister, it will be published, more than 2000 mining companies, update by report annually. Illegal mining is considered as a problem. We are preparing to solve this problem.](#)
- Is it available? [Yes upon permission from higher authority GDGMV and PPC](#)
- How does your Country manage/control them? [GDGMV \(General Department of Geology and Minerals of Vietnam\) manages mineral including metal whereas DONRE \(Provincial Department of Natural Resources and Environment\) is taking care of construction material. And DONRE manages and reports to GDGMV annually for construction material.](#)
 - about the metallic mines GDGMV and MONRE prepare the list of sites and DONRE receives the application and president of local authority issues licenses
 - the areas not included in the list; application should be submitted to GDGMV

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI? [Not yet](#)
- If not, will your Country plan to implement EITI? [Yes; and going abroad and consult other expert of EITI. Also participating in international initiatives \(such as ASOMM\) to learn about it.](#)

2.8.2 Workshop

(1) Venue

The venue is the meeting room of Center for information and Archives of Geology (CIAG).

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program VietnamUpdated140628.xls).

23 Jun (Mon)

Morning

✓ Opening

Welcome speech by Associate Professor PhD DO CANH DUONG, Deputy Director
General of General Department of Geology and Minerals of Vietnam (GDGMV)

Greetings from Dr. Okubo (GSJ) and Mr. Onuma (JICA/SRED)

Introduction of the Workshop (Dr. Okubo, GSJ)

✓ Web-GIS demonstration (Dr. Joel, GSJ)

Web-GIS (ASEAN Mineral Resources Database Information System)

✓ Mineral Resources (Dr. Ohno, GSJ)

Review of the Questionnaire (Accompanying material: Ohno_q_vn.ppt)

Afternoon

✓ Seamless Geology

Geology of Vietnam by Mr. Tran Hong Hai (Director General, Center for information and
Archives of Geology) Accompanying material : GeoMapVN_presentation by Mr.
HAI.ppt

Status of the harmonized geology among countries around Vietnam by Dr. Tran Van Tri,
Professor Emeritus/ Geological University of Vietnam (GUV)

Discussion for the Unified Legend (Dr. Okubo, Dr. Takahashi, Mr. Tran Hong Hai and Dr.
Tran Van Tri)

✓ Geodynamics (Dr. Okubo, GSJ)

Thermal structure of the Earth

Heat transfer

Tectonic evolution

Mid-ocean ridge

Magnetic isochrones

Hot spring

24 Jun (Tue)

Morning

- ✓ Groundwater (Dr. Uchida, GSJ)
 - Ground Water Flow System
 - Case Studies of Groundwater Observations
 - Geothermal Heat Pump
 - Web-GIS for Groundwater Database
 - Translation of the lecture from English to Vietnamese by Mr. Nguyen Chi Nghia (Department of Water Resources Monitoring)
- ✓ Mineral Resources
 - Introduction for Mineral Resources Map in Asia (Dr. Ohno, GSJ)

Afternoon

- ✓ Geophysics (Dr. Okubo, GSJ)
 - Mirano
 - Magnetics
 - Gravity
- ✓ Introduction of the Group Discussion (Dr. Okubo, GSJ)
 - (1) Summarize you have learned
 - (2) Show average annual atmospheric temperature and amplitude of annual change in Hanoi
 - (3) Illustrate a model of earth's thermal structure
 - (4) Essential problems in Vietnam
 - (5) Solutions
 - (6) Feasible actions
 - (7) Future Plan
- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients

25 Jun (Wed)

Morning

- ✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (continuation, Dr. Bandibas, GSJ)
 - OGC Based Web Services
 - Web Map Service
 - Web Map Services Clients

- ✓ Web-Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)
 - Major Components of a Web GIS system
 - Web Services Based Information Sharing System
 - WMS Clients and AIST's Current Information System Using FOSS and OGC

Afternoon

- ✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)
 - Database Creation
 - Web Map Service Formulation
- ✓ Web GIS System Development (1) (Dr. Bandibas, GSJ)
 - Web Service Formulation for Seamless Geology
 - Web Service Formulation for Minerals

26 Jun (Thu)

Morning

- ✓ Web GIS System Development (2) (Dr. Bandibas, GSJ)
 - Spatial Database Query
 - Basic SQL Formulation for Querying POSTGIS Database
 - Integration of Web GIS System Components
- ✓ Remote Sensing Analysis (Mr. Onuma, JICA/SRED)
 - Satellite Images
 - Exercise

Afternoon

- ✓ Remote Sensing Analysis (continuation, Mr. Onuma, JICA/SRED)
 - Satellite Images
 - Exercise
- ✓ CCOP-ASEAN Harmonized Geology (Dr. Adicah Surinkum, Director, CCOP TS)
- ✓ CCOP version Web-GIS (Dr. Okubo, GSJ)

27 Jun (Fri)

- ✓ Group Discussion (Dr. Okubo, GSJ)
 - Presentation of the discussion (Accompanying material: Group Discussion_Vietnam)
 - The presentations is ranked by Dr. Okubo. First and Second group won prizes.
- ✓ Wrap-up (Dr. Okubo and Dr. Ohno, GSJ)
 - Review of the Q & A (Accompanying material: Q&A_Vietnam)

(3) Participants (Table 2-9)

10 from Center for Information and Archives of Geology (CIAG), 3 from General Department of

Geology and Minerals of Vietnam (GDGMV), 1 from Center for Geological verification and Technology, 1 from Northern Department for Control of Mineral activities, 2 from Northern Geological Mapping Division, 2 from Geophysical Division, 1 from Geological Division for Radioactive and Rare Elements, 2 from Northeast Geological Division and 4 from Vietnam Institute of Geosciences and Mineral Resources (VIGMR), Total 26 persons. Dr. Adichat Surinkum, Director, CCOP TS, Prof. Tran Van Tri, Vietnam Union of Geological Sciences, and M.Sc. Nguyen Chi Nghia, Dept. of Water Resources Monitoring, NCWRPI were VIP participants.

The list of participants is included in Accompanying material (List of Participants_Vietnam.xls).

Table 2-9 Number of the participants for the Workshop in Vietnam

Country	Number		Organization
	Total	Detail	
Vietnam	26	22	General Department of Geology and Minerals of Vietnam (GDGMV)
			10 Center for Information and Archives of Geology (CIAG)
			3 General Department of Geology and Minerals of Vietnam
			1 Center for Geological verification and Technology
			1 Northern Department for Control of Mineral activities
			2 Northern Geological Mapping Division
			2 Geophysical Division
			1 Geological Division for Radioactive and Rare Elements
			2 Northeast Geological Division
		4	Vietnam Institute of Geosciences and Mineral Resources (VIGMR)

(4) Photo of the Workshop



Upper: Group Photo of the Workshop participants

Lower left: Lecture about Remote Sensing Analysis by Onuma, JICA/SRED

Lower right: Lecture by Dr. Adicaht Surinkum, CCOP

2.9 Myanmar

2.9.1 Information collection

(1) Consultation with Counterpart organizations。

i. JICA Myanmar

Date/Place	Participants	Contents
30 Jun (Mon) 10:00 – 11:00 am JICA office	JICA: Mr. Yamamoto JICA Team: Onuma, Ninomiya, Sah	- Explain the Project and introduce the member - Share the information about security conditions



JICA office in SAKURA Tower (back)



Consultation

ii. Department of Geological Survey and Mineral Exploration, DGSE

Date/Place	Participants	Contents
1 Jul (Tue) 10:00 – 12:00 DGSE meeting room	DGSE: Ye Myint Swe, Myint Soe, Toe Aung Kyaw, Zaw Min Lwin, Kyaw Thet, JICA Team: Onuma, Ninomiya, Sah	- Explain the Project and introduce the member - Recover the answer of the Questionnaire - Confirm the schedule and contents for Workshop - Confirm the schedule of the Invitation to Japan



DGSE in Gems Museum



Consultation

iii. DGSE (consultation 2)

Date/Place	Participants	Contents
2 Jul (Wed) 10:00 am – 15:00 pm DGSE meeting room,	DGSE: Myint Soe, Toe Aung Kyaw, Zaw Min Lwin JICA Team: Onuma, Ninomiya, Sah	- Recover the answer of the •Questionnaire - Explanation from DGSE about database managed by DGSE - Explanation from DGSE about law on mining, investment and preservation of the environment



Consultation

iv. DGSE (consultation 3)

Date/Place	Participants	Contents
5 Jul (Fri) 10:00 – 12:00 DGSE meeting room	DGSE : Myint Soe, Zaw Min Lwin JICA Team: Onuma, Ninomiya, Sah	- Confirm the schedule, contents and venue for Workshop



Preparing the venue for the Workshop

(2) Information collected

Questionnaire (See next page and Accompanying material)

Questionnaire_Myanmar modified

Reference Data (Accompanying material)

Atch01_Training Program and Workshop

Atch02_Project with GTK (Finland)

Atch03_The Myanmar Mining Law

Atch04_The Myanmar Mines Rules

Atch05_FIL English Version_ 29-1-2013_

Atch06_FIL RulesEnglish Versions__31.5.13__Latest_

Atch07_FIL-notification _English_ A4

Atch08_Environmental Conservation Law

Atch09_The Forest Law_1992

JICA Project: Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN

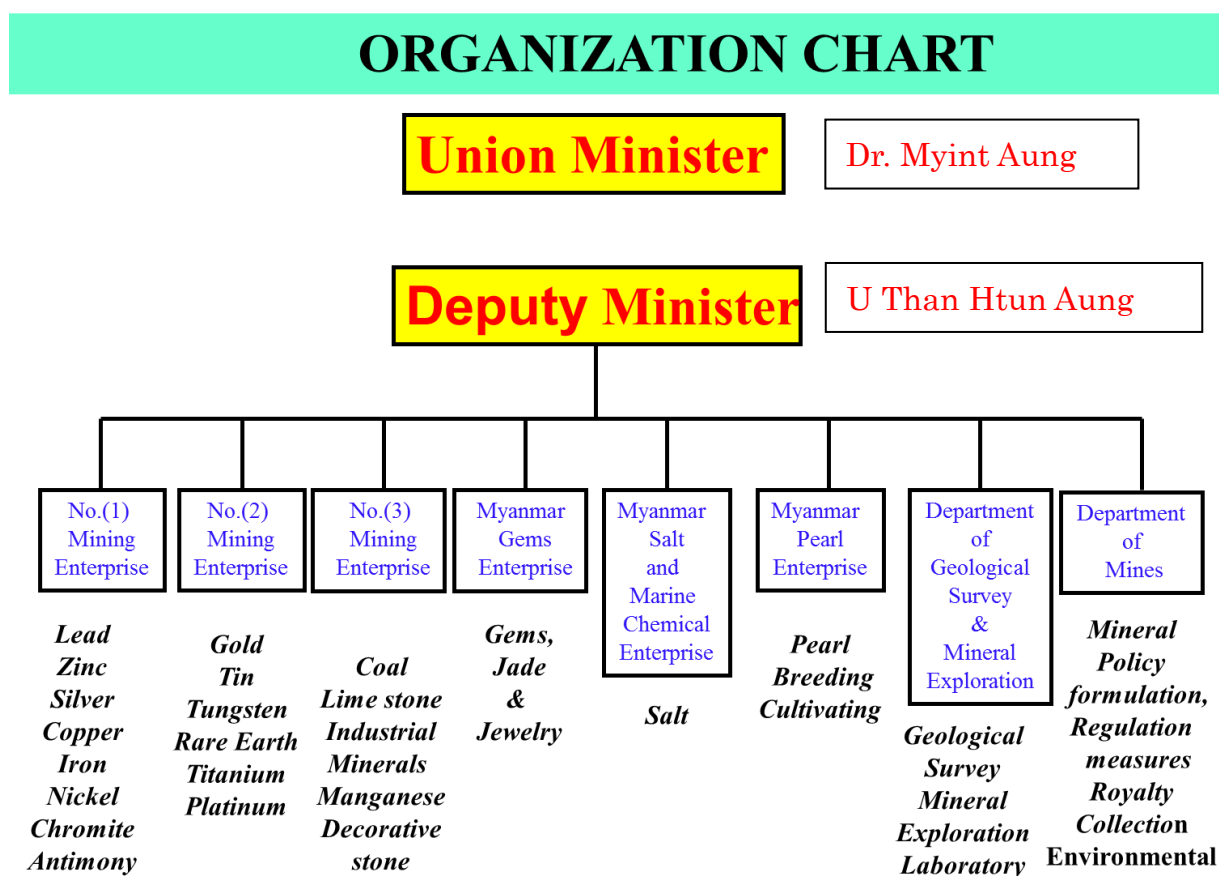
Questionnaire

April 2014
JICA study team

I would appreciate it if you could answer this questionnaire prior to our arrival at your Country and send it to the following addresses by email.

Team leader: Mr. Takumi ONUMA: onuma.takumi@sred.co.jp
Co-leader: Mr. Atsushi NINOMIYA: ninomiya.atsushi@sred.co.jp

1. Could you kindly let us know the organization structure and the number of personnel of Geological Survey Organization and/or Mining Department in your country?
 - Ministry name: [Ministry of Mines](#)
 - Geological Survey Organization name: [Department of Geological Survey and Mineral Exploration](#)
 - Number of personnel in each section: [6 Enterprises and 2 Departments in Ministry of Mines](#)



Descriptions for Enterprises and Department of Ministry of Mines

1. No(1) Mining Enterprise (ME 1) is to undertake mining, production and marketing of Antimony, Copper, Lead, Zinc, Silver, Iron, Titanium, Nickel, Chromite ores.
2. No(2) Mining Enterprise (ME 2) is responsible for mining, production and marketing of Gold, Platinum, Tin, Tungsten, Molybdenum, Niobium, Columbium, Heavy mineral and REE.
3. No(3) Mining Enterprise (ME 3) is responsible for productions, marketing and supply of industrial raw materials such as Barites, Bauxite, Bentonite, Quartz, Feldspar, Gypsum, Limestone, Dolomite, Clay, Manganese, Decorative stones, and Coals.
4. Myanmar Gem Enterprise (MGE) is responsible for mining and marketing of Ruby, Sapphire, assorted Gemstones and Jade.
5. Myanmar Pearl Enterprise (MPE) handles breeding and cultivating of mothers of Pearl, and production of Pearl.
6. Myanmar Salt and Marine Chemical Enterprise (MSMCE) is responsible for production and marketing of common Salt, esporn salt, marine chemical and soda ash.
7. Department of Mines is responsible for administration of mineral policy and planning mineral legislation, mine inspection and safety, mineral conservation and environmental conservation, royalty and tax collection.
8. Department of Geological Survey and Mineral Exploration (DGSE) is responsible for country wide geological mapping, mineral prospecting and mineral exploration and joint venture activities with foreign direct investment.

Establishment of Department of Geological Survey and Mineral Exploration (DGSE)

- In 1937 the Burma Geological Department was formed under GSI
- In 1962 Geological Survey and Mineral Exploration Division was formed under the Petroleum and Mineral Resources Corporation.
- In 1972 Geological Survey and Mineral Exploration Corporation was established separately.

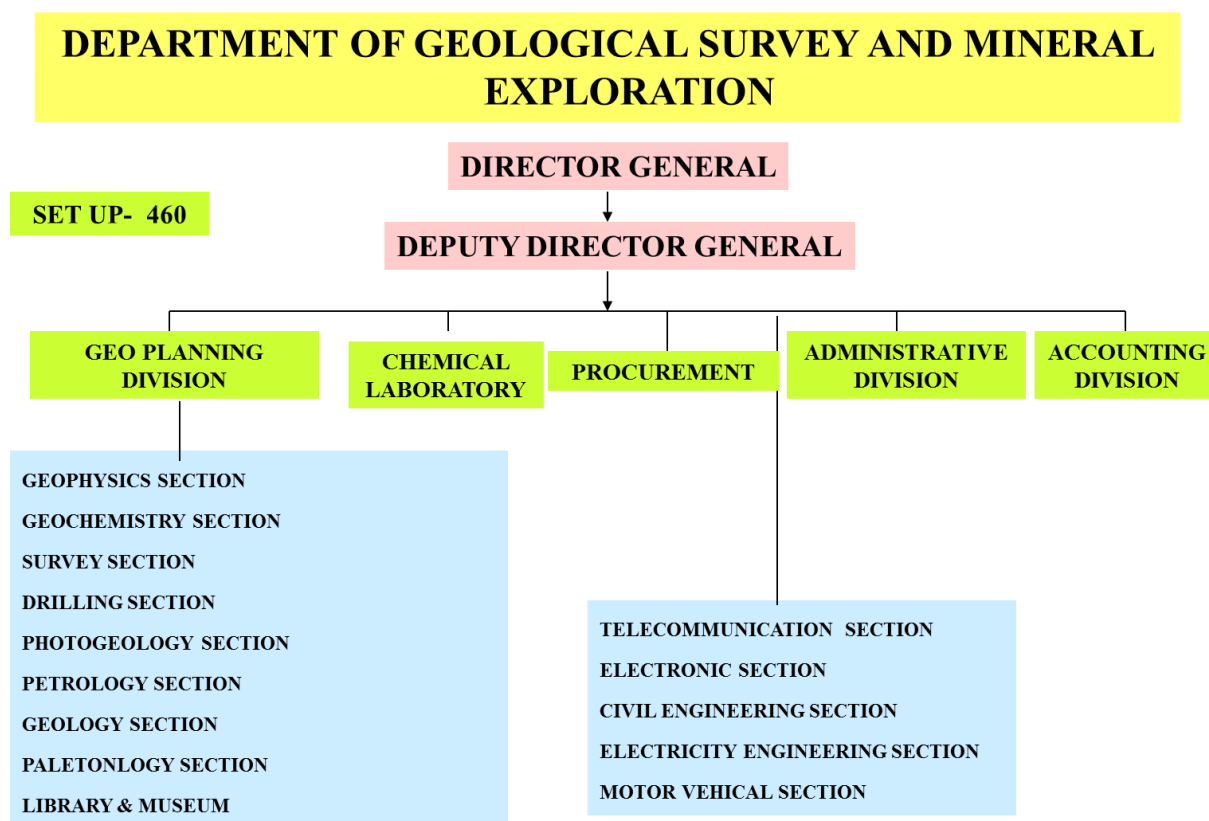
- In 1976 Department of Geological Survey and Mineral Exploration (DGSE) was set up.

Main function of DGSE

DGSE is responsible for country wide geological mapping, mineral prospecting and exploration and joint venture with foreign companies in mineral exploration and feasibility study.

- GEOLOGICAL MAPPING
- MINERAL PROSPECTING
- MINERAL EXPLORATION
 - TOPOGRAPHIC SURVEY
 - DETAIL GEOLOGICAL MAPPING
 - GEOCHEMICAL SURVEY
 - GEOPHYSICAL SURVEY
 - DRILLING
 - DATA ASSESSMENT AND EVALUATION
- LABORATORICAL ANALYSIS
- JOINT VENTURES WITH FOREIGN COMPANIES

Organization Chart: Department of Geological Survey and Mineral Exploration



2. Please let us know the following items in your Organization/Country.

(1) System

- Information gathering

Methodology, example for JICA project 2003 – 2006, 1: 1000000 scale geological map was published in 2008 covering 70 % of whole country. Same methodology is still used.

- Data gathering (existing 1: 253,440, 1: 63,360 and other larger scales of existing geological maps).
- Scanning 1"= 4 mile (1:253,440), 1"=2 mile (1:126,720), 1"=1 mile (1:63,360) Topographic survey maps and geological maps.
- Geocoding of topographic maps and geological maps.
- Digitizing (1:1,000,000 scale geological map of Myanmar, 1:253440, 1:63360 and others.
- Mineral database construction for the mineral occurrences of Myanmar using GIS.
- Image processing on the ASTER Images (acquired in 2003) and other Landsat Imagery scenes.
- Image Interpretation mainly emphasized on the unsurvey areas of the country, mainly for remaining 30 % and correcting and complementing the geological map.
- Updating and modification of existing 1:1,000,000 scale geological map which was published in 1977 and produced updated digital map of Myanmar with the new survey data (2008 JICA Project).

- Information / Data management

(2) Geology

- Existing geological maps
+Scale and area

1"= 4 mile (1:253,440), 1"=2 mile (1:126,720), 1"=1 mile (1:63,360) geological maps, covering 70% of the country

Status of Geological Mapping

- | | |
|-------------------------------------|-----------------------|
| 1. Geological Survey of India (GSI) | - Before Prewar time. |
| 2. Colombo plan Geological mapping | - 1970- 73 |
| 3. UNDP/ GSEP Project Mapping | - 1974- 1978 |
| 4. Shan State Mapping | - 1975-76 |
| 5. BagoYomamapping | - 1978-79 |

- 6. Tanintharyi archipelago mapping - 1980-81
- 7. YakhineYoma mapping - 1981-82
- 8. Mapping of the Kachin, Shan, Sagaing - 1996-2006
- 9. Recent mapping - 1:50,000 scale

- Area of Myanmar – 261227 sq. mile (6763077 sq.km)

- **Compilation and Digital Geological map of Myanmar based on the 1:1M scale (1977) was completed in 2008 with the aid of JICA project and printed in 1: 1 million scale. See 2 (1).**

- It was registered and copy right at the Myanmar registration office in 2008.

- Geological Maps

Mapping completed – 182858 sq.mile (70%) sq.km)

1" = 1 Mile (1:63360) 1" = 2 Mile (1:126720)

1" = 4 Mile (1:253440)

DGSE, UNDP, ECAMS, Colombo Plan, JV Companies

- Regional geological mapping reports (In Myanmar and some in English)

+ Printed maps or digital data

- Printed map in 1977, printed map and digital GIS (shape file) in 2008

- Situation of the seamless geological map implemented by ASEAN Geological Survey Organization

+Blank area of geological map with 1:1M scale

30 % of the country, especially the border and remote frontier areas

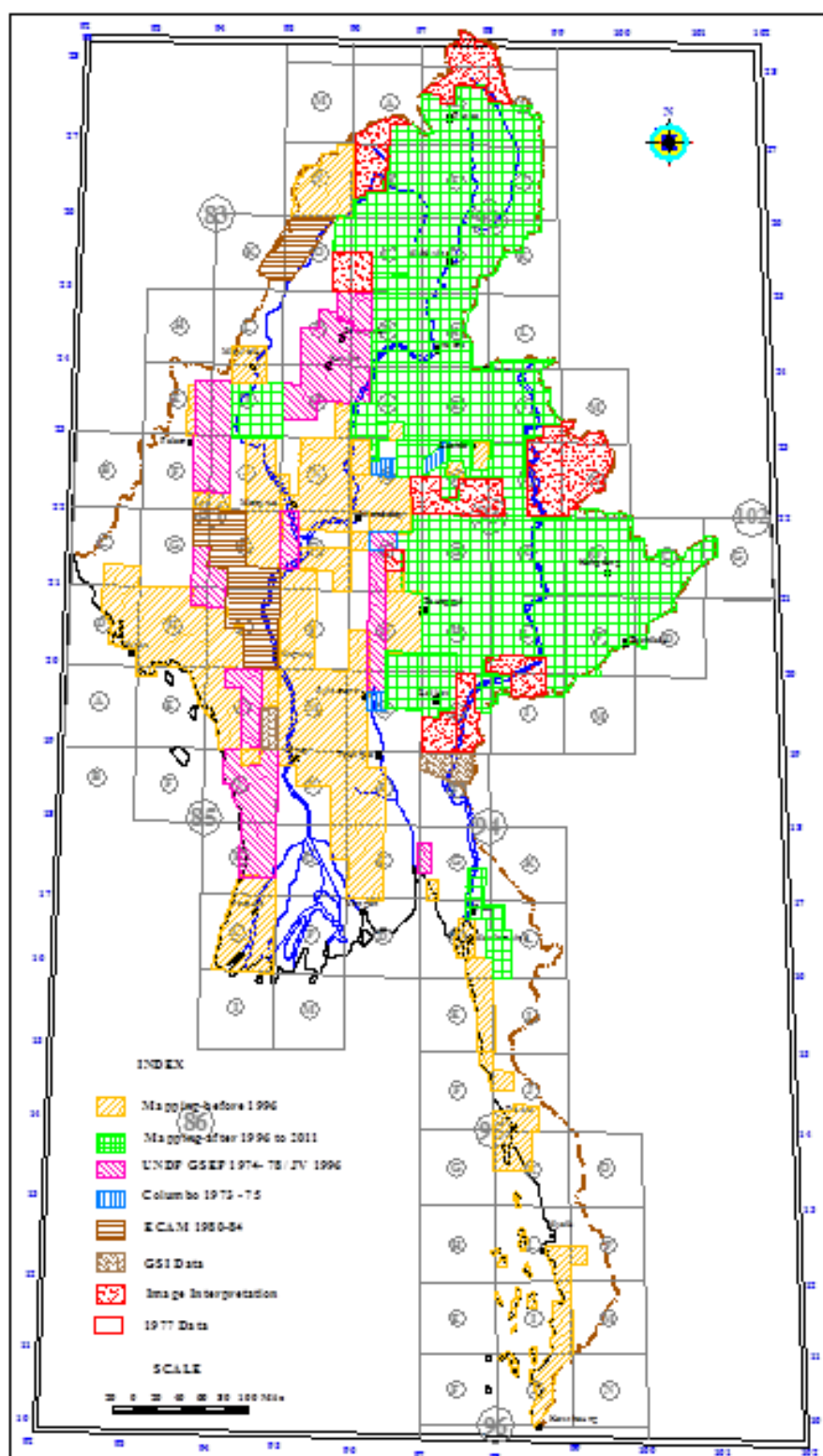
+ Methods to fill up the blank area

Organizing regional geological mapping program in every year to fulfill the remaining area of 30%

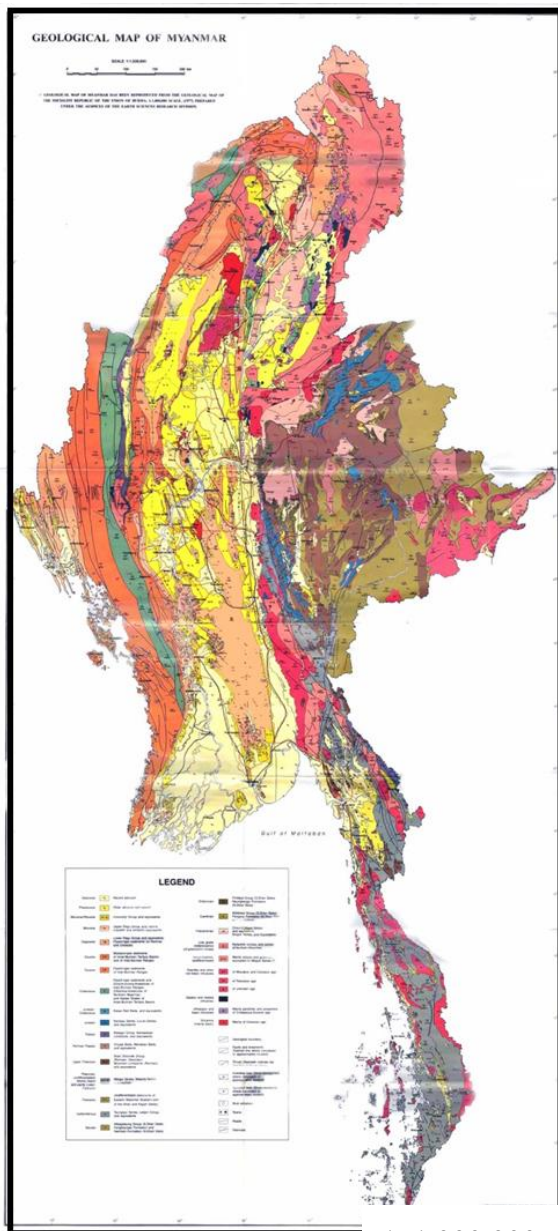
+ Issues in creation of seamless geological map

- Discussion with DMR (Thailand) in 2013

REALIBILITY INDEX MAP

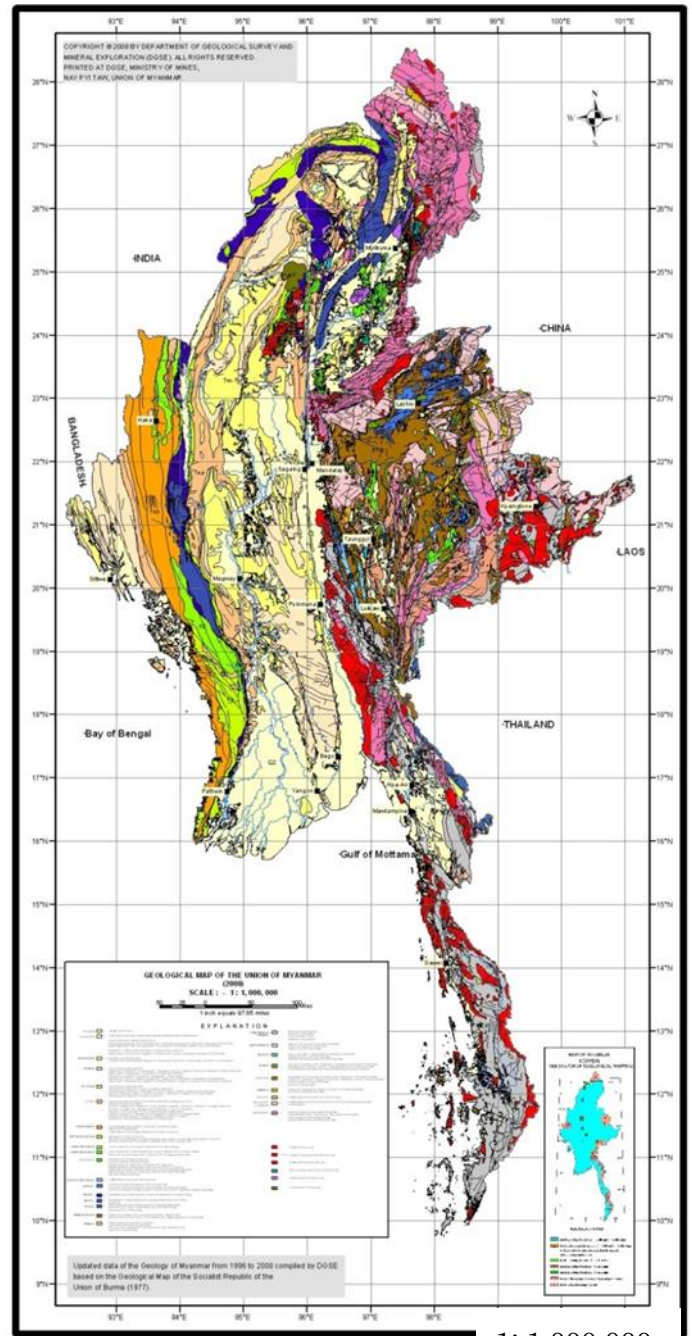


Geological Map of Myanmar (1977)



1: 1,000,000

Geological Map of Myanmar (2008) JICA Project



1: 1,000,000

(3) Topography

- Survey Department, Ministry of Environmental Conservation and Forestry

- Existing topographic maps

+Scale and area

1. Lambert Topographic maps (Published in Prewar Time)
1" = 1 Mile (1:63360) = 903 Sheets
1" = 2 Mile (1:126720) = 93 Sheets
1" = 4 Mile (1:253440) = 93 Sheets
2. UTM Topographic maps covering whole country (Published in 2006)
1:50,000 = 1134 Sheets
1:250,000 = 93 Sheets
3. Aerial Photos (Panchromatic)
1:20000, 1:24000, 1:50000

+ Printed maps or digital data

Printed map - Yes

Digital data - No, only scanned data (JPEG) in DGSE

- In specific areas, some organization (Land Use Department, Forest Department, Urban Survey Department and Water Resource Department) may have digital data (shape file)

- Other relevant data

+Road, river: Yes, copy from other source (Internet), free download

+ Administrations, district boundary: Yes, copy from other source (Internet), free download

(4) Mineral resources data

- Contents of data

- Record of the Mineral Deposits and Occurrences (Yearly Edition) in Myanmar version

- Internal publication annual including location of deposit, mineral commodity, map reference, state, region, township, grade, reserve tonnage, category (potential, probable, possible), recorded by and year

- Printed maps or digital data

- Word file and printed in Myanmar language, English version will come soon.

(5) Geophysical data

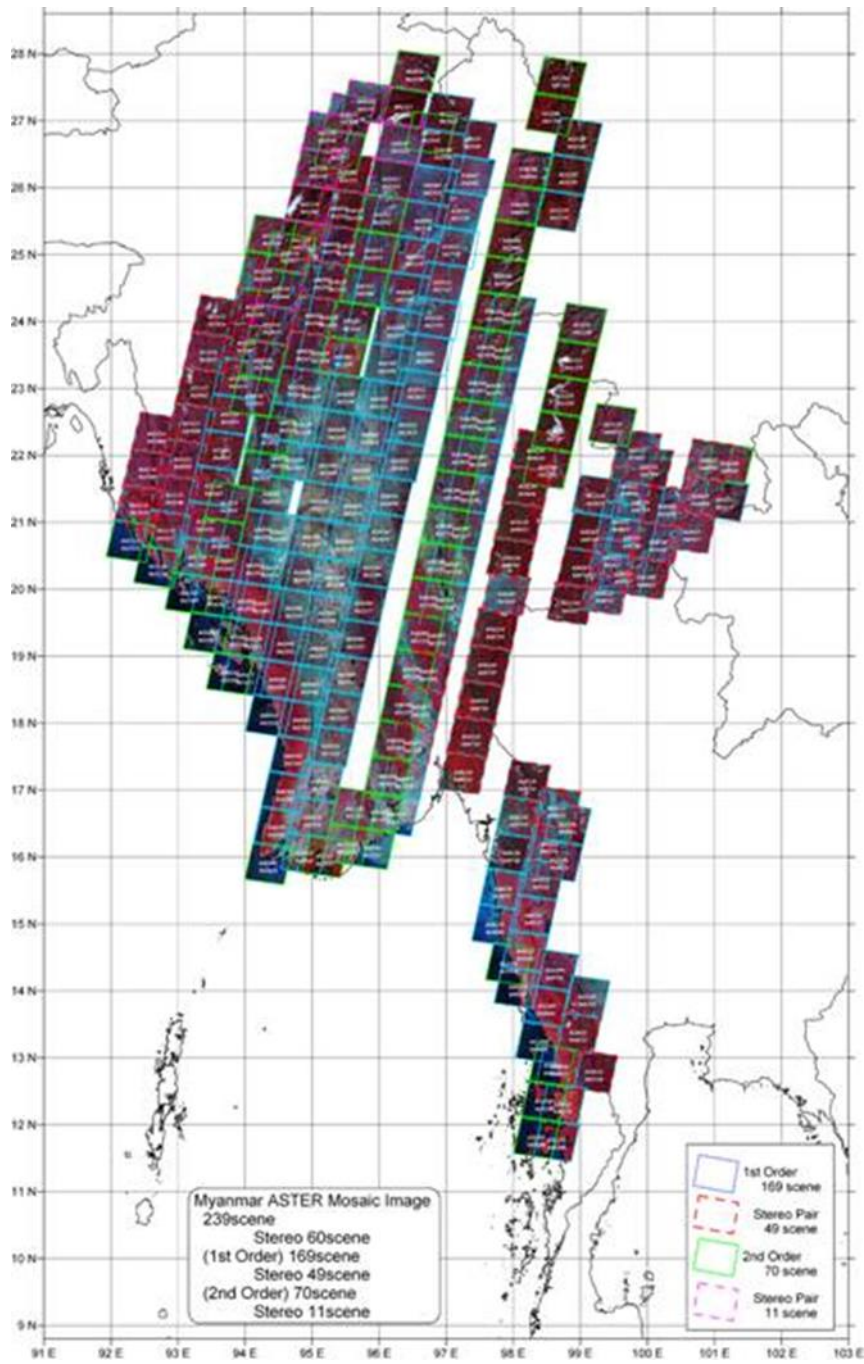
- Gravity, magnetic and radioactive survey

- Only some specific (mineralized) areas, not compiled
 - +Survey date and organization
- Magnetic, IP (induced polarization), SP (self-potential)
 - + Area and map scale
- Different areas (50 – 100), few sq. km targeted area
 - + How is it used?
- Geological interpretation (shape and extension of ore body)

(6) Satellite data

- What kind of satellite data does your Organization have?
- Donated by JICA Project, 2006, DGSE keeps data
 - +Satellite name: ASTER
 - + Area: See ASTER IMAGE INDEX, 80 % of Country
 - + How do you use it?: Geological analyzed with ERMAPPER for image processing and visual interpretation.

ASTER IMAGE INDEX from JICA Project



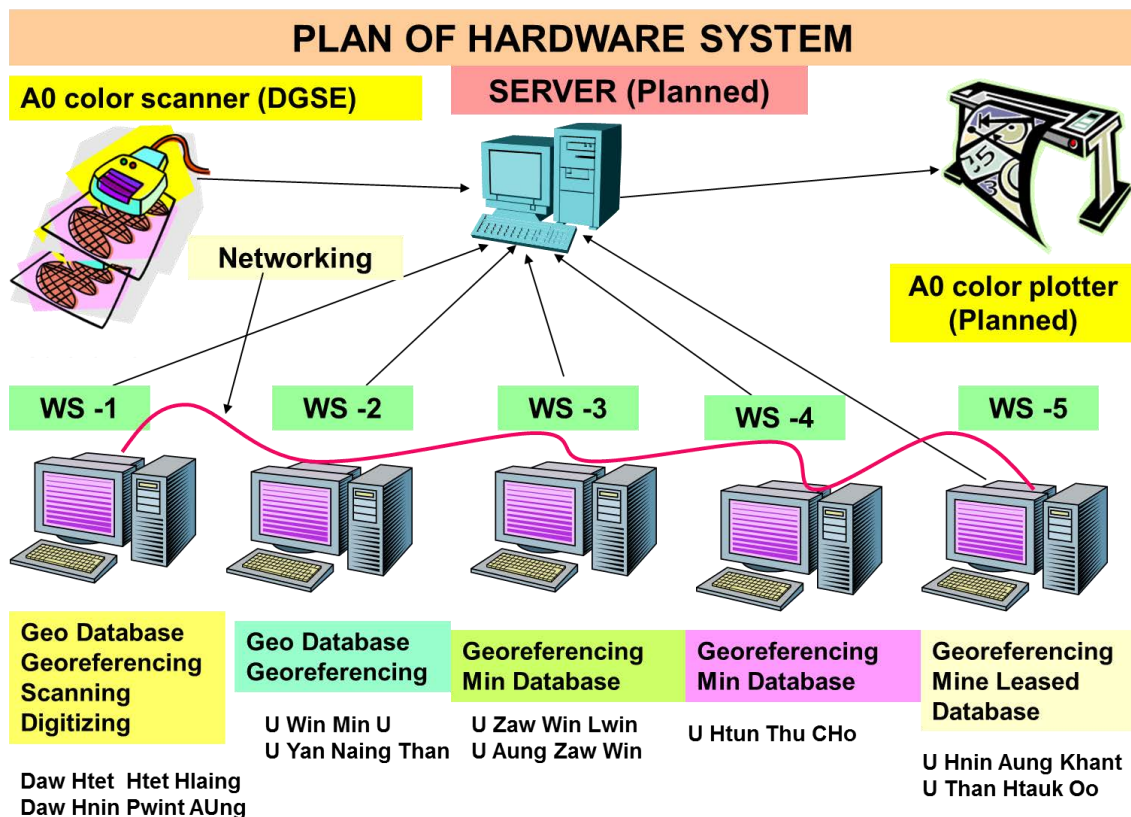
(7) Well data

- Some data especially central part of Myanmar in dry region
- Mainly reports in hard copy, no data base
- More than 100 for drinking (ground water drilling)
 - Does your Organization know any wells to be able to measure the temperature in the hole?
 - +Location, usage, depth: Check the reports
 - + Can someone measure the temperature? : No Not observation well only for drinking especially for local people

3. Please let us know the situation of following items related to the seamless geological database in your Organization.

(1) Hardware for digital data/information

- System of data management
- Currently no such data management system
- In Mar 2014 Project with Geological Survey of Finland (GTK) started, will completed in 2016. With this project DGSE will have following data management system



- Kinds, names and numbers of hardware: 5 PC Acer, I3__(4130)intel core, RAM -8GB
- Condition of their management: Under installation processes and operating in progress

(2) Software

- Usage situation of open source software: No
- Kinds, names and numbers of software for GIS and remote sensing: 5 ARC GIS 10.2. 5 GIS SOFTWARE (LICENSE VERSION)
- Usage situation of GIS and remote sensing: No remote sensing software, for GIS under installation and now operational

(3) Data

- Contents and quality of data
- Data Input: Copying and Scanning of Topographic and Geological maps
- Making excel tables (Mineral Deposit and Mine Leased data)
- Topographic and Geological maps georeferencing (Lambert & UTM)

Progress of the Project with GTK

- GIS Training (completed)
 - Data gathering (In progress)
 - Data Input (In progress)
 - Georeferencing of Lambert Topographic maps, UTM maps and Geological maps (in progress)
 - Data digitizing
 - Data Manipulation
 - Data Integration
 - Data Interpretation
 - Data output- Maps, Tables and Reports
 - Field works training using GIS
 - Geo portal for Ministry of Mines website
- Situation of usage, frequency of updates: Not started
 - Condition of data dissemination: Not started

4. Please let us know the activities that engineers of your Organization have participated in the training for mineral resources, remote sensing and GIS in Japan.

- Name of training, date, place, participants
- Organization of lecturers
- Objectives of training

The Training Program on Mineral Resources Dbase for ASEAN (ENMD)

<http://amdis.bgl.esdm.go.id/index.php?limitstart=60>

	Name of participants	Organization	Duration	Name of Training	Place
1	Mr. Kyaw Swar oo	Department of Mines	11.1.2012 to 20.1.2012	Training Program on Mineral Database for ASEAN (ENMD)	TOKYO
2	Mr. Myo Myint Thein	Office of The Minister	11.1.2012 to 20.1.2012	ditto	TOKYO
3	Mr. Zaw Min Lwin	Department of Geological Survey and Mineral Exploration	11.1.2012 to 20.1.2012	ditto	TOKYO
4	Mr. Kyaw Swar oo	Department of Mines	26.6.2012 to 29.6.2012	Workshop On ASEAN mineral database and information	Indonesia
5	Mr. Zaw Min Lwin	Department of Geological Survey and Mineral Exploration	26.6.2012 to 29.6.2012	ditto	Indonesia
6	Mr. Thar Myat Kyaw	Department of Mines	18.9.2012 to 26.9.2014	The 3rd Training Program on Mineral Database for ASEAN (ENMD)	TOKYO
7	Mr. Zaw Htet	Department of Geological Survey and Mineral Exploration	18.9.2012 to 26.9.2014	ditto	TOKYO
8	Ms. War War Shwe	Department of Mines	18.9.2012 to 26.9.2014	ditto	TOKYO
9.	Ms. Kay Khine Nyein	Myanmar Gems Enterprise	18.9.2012 to 26.9.2014	Ditto	TOKYO

See attachments: Atch01_Training Program and Workshop.pdf

Technical assistant program of JICA

- 1ST PHASE - July 2003 to June 2005(2 Years)

- 2ND PHASE - July 2005 to June 2006 (1year)

- Technology transfer to DGSE on the application of Geographic Information System (GIS) and Remote Sensing techniques.
- Preparation, design and development a modern digital geological map of Myanmar (geological database) using GIS.
- Design and development of a mineral database of Myanmar using GIS
- To develop the Human resources in DGSE.

Training Program with GTK (Finland) is ongoing

See attachment: Atch02_Project with GTK (Finland).ppt

5. Please let us know the following information related to mining sector.

(1) Mining act/legislation

- Date of establishment
- The Myanmar Mines Law (6.9.1994)
- Myanmar Mines Rules (30.12.1996)
- Now Myanmar Mines Law is revising to fulfill the present situation and being submitted already to the Pyithu Luttaw (Parliament)
- How to get it
- Hard copy and PDF

See attachments: Atch03_The Myanmar Mining Law and Atch04_The Myanmar Mines Rules

(2) Tenement

- Which department manages the tenement?
 - Department of Mines
 - What is the management system of tenements?
 - How to apply the tenement
- The investor (Foreign and Local) can apply mineral prospecting, exploration and feasibility study permit directly to the Ministry of Mines with the following documents;
1. Proposal letter address to the Union Minister, the Ministry of Mines, mention the Mineral and area of interest with application form.
 2. Attached map with the area and their coordinates.

3. Endorsement letter from the Embassy of the concerning country
4. Company registration
5. Company profile
6. List of Board of Directors
7. Bank Statement
8. Project Investment
9. Work Plan

(3) Exploration/exploitation information of mineral resources

- Concession Blocks (Exploration) and proposed areas by Foreign Companies for mineral prospecting, exploration and feasibility study are recorded and made database in DGSE
- Proposed areas by Local Myanmar Companies for mineral exploration are recorded and made database in DGSE
- Mine leased areas issued by the Ministry of Mines for Large and small scale mining. (DOM, ME (1), ME (2), ME (3), MGE)

- Does your Organization have this information?
- Have mineral prospecting, exploration and feasibility study proposed area by Foreign Companies and Local Myanmar Companies
- How is it managed?
- Database in GIS system
- Is it available?
- No it is confidential

- Exploration Maps – in different scales (DGSE, UNDP, ECAMS, JV Companies)
- Exploration reports (In Myanmar and some in English)

(4) Policy for foreign investment in mining sector

- Does your Country have the policy for foreign investments who intend to develop mines?
- Myanmar Foreign Investment Law (2 Nov 2012) including mining
 - What is the content?
- Chapter 1. Title and definition, Articles 1 and 2
- Chapter 2. Applicable Business, Articles 3 to 6
- Chapter 3 Aim, Article 7
- Chapter 4 Basic Principles, Article 8
- Chapter 5 Form of Investment, Article 9 to 10

- Chapter 6 Formation of Commission, Article 11
- Chapter 7 Duties and Powers of the Commission, Article 12 to 16
- Chapter 8 Duties and rights of the investor, Article 17 and 18
- Chapter 9 Submission of Permit Proposal, Article 19 to 22
- Chapter 10 Insurance, Article 23
- Chapter 11 Appointment of employees and workers, Article 24 to 26
- Chapter 12 Exemptions and Reliefs, Article 27
- Chapter 13 Guarantees, Article 28 to 30
- Chapter 14 Land Usage, Article 31 to 36
- Chapter 15 Foreign Capital, Article 37 and 38
- Chapter 16 Right to Transfer Foreign Currency, Article 39
- Chapter 17 Matters relating to foreign currency, Article 40 and 41
- Chapter 18 Penalties in respect of management, Article 42
- Chapter 19 Addressing Disputes, Article 43
- Chapter 20 Miscellaneous, Article 44 to 57

Based on this Law there is Rule, Foreign Investment Rules, 31 Jan 2013

Based on this Law there is Myanmar Investment Commission, 31 Jan 2013, who publish “Classification of Type of Economic Activities”.

In this, List of Economic Activities to be allowed only in the form of Joint Venture with Myanmar citizens. List 25, Prospecting, exploration and production of industrial minerals and metallic minerals and List 26, large scale production of minerals

List of Economic Activities Permitted with recommendations of the Relevant Ministry

4. Ministry of Mines

4.1 Works for Mineral Prospecting, Exploration and Feasibility Study

4.2 Large scale production of mineral

4.3 Production and marketing of rare earths, strategic mineral, radioactive mineral. Manufacturing and marketing of gems, jewellery and finish products (statue, curving)

4.5 Exporting mineral of raw material after production of coal and granite stone

See attachments: Atch05_ Foreign Investment Law English Version_ 29-1-2013_, Atch06_ Foreign Investment Law Rules English Versions__31.5.13__Latest_, and Atch07_ Foreign Investment Law-notification _English_ A4

(5) Environmental legislation related to mining

- Does your Country have the legislation to protect environment against mining development?: [Yes](#)
- Name, establishment date
- [Environment Conservation Law, 30 Mar 2012](#)
- [Forest Law, 3 Nov 1992](#)

See attachments: [Atch08_Environmental Conservation Law](#) and [Atch09_The Forest Law 1992](#)

In the case of foreign investment

Based on Foreign Investment Law there is Myanmar Investment Commission, 31 Jan 2013, who publish “Classification of Type of Economic Activities”.

List of Economic activities which required Environmental Impact Access

1 Ministry of Environmental Conservation and Forestry

1.1 Exploration and production of minerals

1.12 Manufacturing of iron, steel and minerals

1.13 Manufacturing of cement

- How to get it
- [Printed hard copy](#)
- [On Webpage](#)

(6) Environmental problem in mining

- Are there any environmental problems as pollution caused by mines?
- [Yes, mainly dust form open pit mining and damage for the surface](#)
 - Are there any resident problems caused by mines?
 - [In Moywa Copper mining some problem with resident.](#)
 - What are they?
- [Land acquisition and compensation](#)
- [Water pollution](#)
 - What are results?
- [Still negotiating](#)
- [Some village accept but others not](#)

(7) Small Scale/ Artisanal Mining

- Does your Organization have the information of small-scale mining?
- [Mine leased areas issued by the Ministry of Mines for Large and small scale](#)

mining. (DOM, ME (1), ME (2), ME (3), MGE)

- Is it available?
- Available in those Departments and Enterprises
 - How does your Country manage/control them?
- Control by Ministry of Mines and implemented by Department of Mines
- Management team headed by DOM and representatives from each department and enterprise

(8) Extractive Industries Transparency Initiative (EITI)

- Did your Country implement EITI?: No
- If not, will your Country plan to implement EITI?: Yes, under preparation

Proposed future cooperation

- Upgrading of Chemical Laboratory facilities in DGSE
- Training on seamless geological mapping and mineral exploration
- Further study of Diploma, MSc and PhD course
- Human resource development and capacity building

2.9.2 Workshop

(1) Venue

The venue was the meeting room of Department of Geological Survey and Mineral Exploration (DGSE).

(2) Program

The program distributed to the participants is shown in the Accompanying material (one-page program Myanmar_140707.xls).

The Workshop in Myanmar was held for 4 days because 11 Jun (Fri) is national holiday.

JICA Team had the session of the Remote Sensing Analysis in the morning of 7 Jun because GSJ Team arrived at Nay Pyi Taw at the noon.

7 Jul (Mon)

Morning

- ✓ Remote Sensing Analysis (Mr. Onuma, JICA/SRED)
 - Satellite Images
 - Exercise

Afternoon

- ✓ Opening
 - Welcome speech by Dr. Ye Myint Swe, Director General, DGSE
 - Greetings by Dr. Okubo (GSJ) and Mr. Onuma (JICA/SRED)
- ✓ Web-GIS demonstration (Dr. Joel, GSJ)
 - Web-GIS (ASEAN Mineral Resources Database Information System) の紹介
- ✓ Groundwater (Dr. Uchida, GSJ)
 - Ground Water Flow System
 - Case Studies of Groundwater Observations
 - Geothermal Heat Pump
 - Web-GIS for Groundwater Database

8 Jul (Tue)

Morning

- ✓ Geodynamics (Dr. Okubo, GSJ)
 - Thermal structure of the Earth
 - Heat transfer

Tectonic evolution

Mid-ocean ridge

Magnetic isochrones

Hot spring

✓ Geophysics (Dr. Okubo, GSJ)

Mirano

Magnetics

Gravity

✓ Mineral Resources (Dr. Ohno, GSJ)

Review of the Questionnaire (Accompanying material: Ohno_q_mm.ppt)

Afternoon

✓ Mineral Resources (Dr. Sanematsu, GSJ)

Ore deposits in Myanmar

✓ Introduction of Geology in Myanmar (Dr. Ye Myint Swe, DGSE)

Mining and Geological maps in Myanmar (Accompanying material :
DG_DGSE_JICA_GSJ&CCOP.ppt)

✓ Seamless Geology (Prof. Wakita, Yamaguchi Univ.)

Correlation of legends over cross-border areas

Unified legend

9 Jul (Wed)

Morning

✓ Free and Open Software and Open Geospatial Consortium (OGC) Standard (Dr. Bandibas, GSJ)

OGC Based Web Services

Web Map Service

Web Map Services Clients

✓ Web-Based Geographic Information System (WebGIS) (Dr. Bandibas, GSJ)

Major Components of a Web GIS system

Web Services Based Information Sharing System

WMS Clients and AIST's Current Information System Using FOSS and OGC

Afternoon

✓ Development of Basic Web-GIS System (Dr. Bandibas, GSJ)

Database Creation

Web Map Service Formulation

10 Jul (Thu)

Morning

✓ Web GIS System Development (Dr. Bandibas, GSJ)

Web Service Formulation for Seamless Geology

Web Service Formulation for Minerals
WMS Client Development
Spatial Database Query
Basic SQL Formulation for Querying POSTGIS Database
Integration of Web GIS System Components

Afternoon

- ✓ CCOP version Web-GIS (Ms Marivic Pulvera UZARRAGA, Mr. Simplicio Caluyong, CCOP CO2 Storage Mapping Program)
- ✓ Group Discussion and Review (Dr. Okubo, GSJ)
Presentation by each group about homework of Web-GIS, Geodynamics, Groundwater
(Accompanying material : Group Discussion_Myanmar)
The presentations is ranked by Dr. Okubo. The groups with upper ranking won prizes.
Review of the Q & A (Accompanying material : Q&A_Myanmar)

(3) Participants

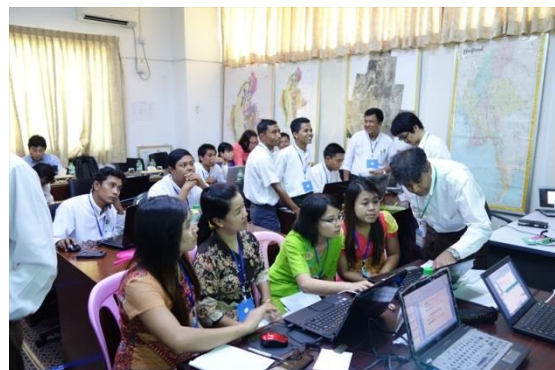
4 from Department of Mines, 3 from No(1) Mining Enterprise, 3 from No(2) Mining Enterprise, 3 from No(3) Mining Enterprise, 9 from Department of Geological Survey and Mineral Exploration, Total 22 participants (Table 2-10).

The list of participants is included in Accompanying material (List of participants_Myanmar.xls).

Table 2-10 Number of the participants for the Workshop in Myanmar

Country	Number		Organization
	Total	Detail	
Myanmar	22	4	Department of Mines
		3	No(1) Mining Enterprise
		3	No(2) Mining Enterprise
		3	No(3) Mining Enterprise
		9	Department of Geological Survey and Mineral Exploration

(4) Photo of the Workshop



Upper: Group Photo of the Workshop participants (back is Gems Museum, Nay Pyi Taw)
Lower left: Lecture by Dr. Uchida, GSJ (Groundwater)
Lower right: Group discussion about Seamless Geology

3. Invitation to Japan

Engineers in charge of web-GIS and geology in the geological survey organizations of eight countries; Philippines, Indonesia, Cambodia, Laos, Vietnam, Myanmar, Malaysia and Thailand, are invited to Japan in order to receive the Workshop. The schedule of this invitation is shown in Table 3-1.

Table 3-1 Schedule of the Invitation to Japan

Date	Contents
3 (Sun) to 4 August (Mon)	Transfer from each country to Narita, Japan.
4 August (Mon)	Move by vehicle from Narita airport to AIST, Tsukuba city. Afternoon: Briefing in Sakura-kan, guesthouse of AIST
5 August (Tue)	Presentation of Country Report by participants of each country Seminar in Sakura-kan, Lecture by JSS
6 August (Wed)	Seminar in Sakura-kan, Lecture by JICA team
7 August (Thu)	Seminar in Sakura-kan, Lecture by JICA team and GSJ staffs
8 August (Fri)	Observation of geological museum and laboratory in GSJ Seminar in Sakura-kan, Lecture by GSJ staffs
9 (Sat) and 10 August (Sun)	Day trip
11 August (Mon) to 14 August (Thu)	Seminar in Sakura-kan, Lecture by GSJ staffs Wrap up and discussion
15 August (Fri)	Move by charter bus to central Tokyo, Visit JOGMEC and SRED
16 August (Sat)	Move by charter bus to Narita airport, return to each country

3.1 Summary of the Workshop in Japan

(1) Title

JICA-GSJ/AIST, Asia Region Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN “Workshop in JAPAN”

(2) Workshop period

From 3 to 16 August, 2014

(3) Number of trainees

16

(4) Venue

Sakura-kan, AIST, Tsukuba

3.2 Contents of the Workshop in Japan

(1) GSJ

- Porphyry-type Cu-Mo Deposits in the World
- Introduction of the Mineral Resources Map of Asia (and basic linux training)
- Seamless Geology (Introduction of Geological maps available)
- Introduction of magnetic data
- Magnetism and gravity interpretation
- Brief review about WebGIS and WebGIS Components
- PostGIS and Simple Features
- SQL and Web Processing Service Formulation
- Demonstration of CCOP's Web-based Spatial Content Management System (SCMS)
- Subduction-type large earthquakes: Their tectonic and diversity mechanisms scope for future prediction
- G-EVER volcanic hazard assessment system and Asia-Pacific region earthquake and volcanic hazard mapping project
- Review of geodynamics and introduction of geothermics and Curie depth analysis
- Exchange opinions

(2) SRED

- Theory, basics and application of remote sensing
- Processing of satellite optical sensor data
- Processing of satellite SAR sensor data and creation of GIS data

(3) Others

- Remote sensing projects in JSS (by JSS)
- Introduction of GRIAS (Geo-Resource Information Archive System) (by JSS)
- Mineral resources exploration (by JOGMEC)

3.3 Lectures of the Workshop in Japan

Lecturers of the Workshop are shown in Table 3-2.

Table 3-2 Lecturers of the Workshop in Japan

Geological Survey of Japan (GSJ), AIST	
Yasukuni OKUBO: Senior Research Scientist	<geology, geophysics>
Yutaka TAKAHASHI: Senior Geologist	<seamless geology>
Joel BANDIBAS: Researcher	<web-GIS>
Yohei UCHIDA: Hydrologist	<groundwater>
Tetsuji OHNO Senior Researcher	<mineral resources, linux>
Shunso ISHIHARA	<mineral resources>
Takemi ISHIHARA	<geophysics>
Shigeo OKUMA	<geophysics>
Shinji TAKARADA	<geology, volcanology>
University of Tsukuba, Earth Evolution Sciences, Faculty of Life and Environment Sciences	
Yuji YAGI: Associate Professor of Geodynamics	
Japan Oil, Gas and Metals National Corporation (JOGMEC)	
Taro KABASHIMA: Deputy Director, Metals Exploration Department	
Japan Space Systems (JSS)	
Kazuyo HIROSE: Director, Research and Development Department	
Masaru FUJITA: Deputy Director, Research and Development Department	

3.4 Participants of the Workshop in Japan

The number of person is two for each country and 16 in total. Mid-career engineers who have the work experience of GIS or geology are selected for this invitation and the JICA team was involved in the selection. The list of participants is indicated on Table 3-3.

Table 3-3 Participants of the Workshop in Japan

Country	Name	Organization	Position
Cambodia	LOEUNG VANMONYRAK	General Department of Mineral Resources	Chief Office
Cambodia	NY PHARORTH	General Department of Mineral Resources	Official of Mineral Exploration Management
Indonesia	INDRA SUKMAYANA	Information Division, Center for Geological Resources	Web Development, databases analysis
Indonesia	DWI ASMORO SUSANTO	Information Division, Center for Geological Resources	Network & Databases Administrator
Laos	TELPVONGSA KUANGNUVONG	Department of Geology and Minerals	Technician
Laos	KETUMALA KEOPASEUTH	Department of Mines	Technical Official
Malaysia	MOHD SHAFIQ FARHAN BIN MOHD ZAINUDIN	Minerals and Geoscience Department	Geologist
Malaysia	YUSARI BIN BASIRAN	Minerals and Geoscience Department	Geologist
Myanmar	AHNT SOE YIN	Department of Mines	Geologist
Myanmar	MYINT SOE	Department of Geological Survey and Mineral Exploration	Director of Geo-planning Section
Philippines	SORIANO NATHANIEL GALARAGA	Mines and Geosciences Bureau Central Office	Science Research Assistant
Philippines	CODNITA NELLIE DANGPAS	Cordillera Administrative Region	Mathematician
Thailand	MONGKOLWIT PRAPONG	Department of Primary Industries and Mines	Mining Engineer and GIS Engineer
Thailand	WONGSOMSAK SOMPOB	Department of Mineral Resources	Geologist, Database administrator
Vietnam	TRAN HONG HAI	Center for Information and Archive of Geology	Director of Center for Information and Archive of Geology
Vietnam	LE TUAN ANH	General Department of Geology and Minerals of VietNam	Chief IT Section, Administrative Office of GDGMV

3.5 Program of the Workshop in Japan

3 Aug (Sun)

Morning

Depart from each countries

Afternoon

Two participants from Philippines arrive at Narita and stay at hotel

4 Aug (Mon)

Morning

Arrive at Narita Airport, move to Tsukuba city

Check-in Sakura-kan, guest house of AIST

Afternoon

Briefing of the Training (Takahashi, GSJ)

Explanation of the Training schedule and contents (Ninomiya, SRED)

5 Aug (Tue)

Morning

Presentation of Country Report, discussion of issues (Takahashi, GSJ: Sato and Yamamoto, JICA)

Afternoon

Remote Sensing Analysis

Preparation of training (Takeda, SRED)

Remote sensing projects in JSS (Fujita, JSS)

Introduction of GRIAS (Geo-Resource Information Archive System) (Hirose, JSS)

6 Aug (Wed)

Morning

Remote Sensing Analysis (Takeda, SRED)

Theory, basics and application of remote sensing

Afternoon

Remote Sensing Analysis (Takeda, SRED)

Processing of satellite optical sensor data

7 Aug (Thu)

Morning

Remote Sensing Analysis (Takeda, SRED)

Processing of satellite SAR sensor data and creation of GIS data

Visit Geological Museum (Takahashi, GSJ)

Afternoon

Mineral Resources

Porphyry-type Cu-Mo Deposits in the World (Ishihara S., GSJ)

Introduction of the Mineral Resources Map of Asia (and basic linux training) (Ohno, GSJ)

8 Aug (Fri)

Morning

Seamless Geology (Takahashi, GSJ)

Afternoon

Groundwater (Uchida, GSJ)

9 Aug (Sat)

Morning

Study Tour: Edo Tokyo Museum

Afternoon

Study Tour: Akihabara

10 Aug (Sun)

Study Tour: Nikko Toshogu shrine

11 Aug (Mon)

Morning

Geophysics

Introduction of magnetic data (Ishihara T., GSJ)

Magnetics and gravity interpretation (Okuma, GSJ)

Review of geodynamics and introduction of geothermics and Curie depth analysis (Okubo, GSJ)

Afternoon

Web-GIS (Bandibas, GSJ)

Brief review about WebGIS and WebGIS Components

Brief review about PostgreSQL/PostGIS Database Creation

Brief review about PostgreSQL/PostGIS Table Creation

Database Population

Brief review about Web Map Service (WMS)

12 Aug (Tue)

Morning

Web-GIS (Bandibas, GSJ)

PostGIS and Simple Features

PostGIS and Spatial Information Processing Functions

Spatial Queries and Sequential Query Language (SQL)

SQL Formulation

SQL Implementation

Afternoon

Web-GIS (Bandibas, GSJ)

SQL and Web Processing Service Formulation

Spatial Query Results Handling and Visualization

OpenLayers and WMS

GetFeatureInfo Implementation

13 Aug (Wed)

Morning

Web-GIS Development (Bandibas, GSJ)

Demonstration of CCOP's Web-based Spatial Content Management System (SCMS)

Demonstration of CCOP's Web GIS Portal Generator

Setting Up of a working Web-based Geographic Information System (WebGIS)

Afternoon

Geohazard

Subduction-type large earthquakes: Their tectonic and diversity mechanisms scope for future prediction (Yagi, Univ. of Tsukuba)

G-EVER volcanic hazard assessment system and Asia-Pacific region earthquake and volcanic hazard mapping project (Takarada, GSJ)

14 Aug (Thu)

Morning

Summary

Group Discussion on Seamless Geology

Afternoon

General Discussion on Essential Problem and Solution

Closing

Farewell Meeting

15 Aug (Fri)

Morning

Move to Atago, Minato-ku, Tokyo

Afternoon

Mineral Resources Exploration (Kabashima, JOGMEC)

Study Tour: Tokyo Tower

16 Aug (Sat)

Morning

Move to Narita Airport and leave Japan

3.6 Examine and arrange issues

- Hear opinion about continuity of basic information mentioned above around international borders
- Discuss common and each issues about upgrading of mineral resources information and ASEAN database
- Hear opinion about common and each issues that require technical supports by Japan
- Arrange issues based on the above results

3.7 Consideration items in the Workshop

J/V companies and JICA study team implement the following items.

Companion for the Workshop in Japan provided by JICA team and distributed to the participants is included in Accompanying materials (Companion for Workshop in Japan.docx).

(a) Reception, logistics

- Arrange airline tickets and Visa
- Pick-up at the airport on arrival and departure
- Arrange accommodation (guesthouse of AIST) and pay its fee
- Subscribe insurance for participants
- Pay allowance, per diem, expenses for participants, whose amounts are defined in JICA's provision
- Arrange transfer in Japan based on the schedule

(b) Implementation of program

- Create schedule and program of the Invitation
- Hold seminar in cooperation with GSJ
- Create data and documents
- Implement the program

(c) Management of program

- Lead participants based on the schedule
- Translate in English as necessary
- Convey information to participants
- Communicate, report and arrange among persons related to the program
- Response initially to emergency and trouble as illness and injury of participants during accompany

3.8 Comments and proposal from the participants

3.8.1 Lectures

(1) Remote Sensing Analysis

(Remote sensing project in JSS, GRIAS, and Processing of satellite image)

The lecture about Remote Sensing Analysis is received very well in the same way of On-site Workshops because this technique can be applied for not only geology and mineral resources but also other fields such as water resources, engineering, and disaster mitigation. The participants put great effort into exercise for the free software (QGIS) which is introduced in the lecture.

On the other hand, the participants requested the financial support for providing the expensive satellite image by JICA.

Some participants misunderstand that Remote Sensing Analysis is very versatile to analyze geology of the remote area in house. After time the lecturer should explain the importance the ground truth measurements in the field and the role of the Remote Sensing Analysis in the mineral exploration.

(2) Mineral Resources

(Porphyry-type Cu-Mo Deposits, and Mineral Resources Map of Asia)

The lecture about Mineral Resources is difficult for the IT engineer. The lecturer should consider the relationship between content of the lecture and specialty of the participants.

(4) Seamless Geology

The lecture about Seamless Geology is received very well. Because it is excellent opportunity for

the participants to discuss Seamless Geology with geologists from the neighboring countries. Some participants offer to support by JICA to set up the international Working Group to discuss seamless geology among ASEAN countries.

(5) Groundwater

This lecture is unmatched to the workshop titled JICA-GSJ/AIST, Asia Region Data Collection Survey on Geological Mapping and Mineral Information System in ASEAN “Workshop in JAPAN” and not so familiar for participants of geologist and IT engineer.

(6) Geophysics

(Magnetism, Gravity, and Geodynamics)

The lecture about Geophysics started from basic theory. It is no time to reach their application and case study.

(7) Geohazard

(Subduction-type large earthquake and G-EVER volcanic hazard assessment system)

It is unmatched for this Workshop because there are no earthquake and volcano in some ASEAN countries.

3.8.2 Discussion, exercise and presentation

(1) Country Report

The presentation of Country Report by the participants gave a good opportunity to exchange the information about geology and mineral resources in each country.

(2) Processing of satellite image

The follow up by the lecturer during exercise of the Processing of satellite image help for the participants to understand processing. Many participants comment to need longer and more detail lecture about processing. They want to exercise to process the satellite image of their own country.

(3) Web-GIS

This is the main theme of this Workshop. The contents is well organized by Dr. Bandibas. However the time is not enough for the participants to learn detail. There was comments from many participants on the continuation of the lecture about Web-GIS.

3.8.3 Study tour

In the weekend during Workshop in Japan (9 and 10 Aug) the participants had a study tour to be exposed to Japanese modern and tradetional culture. The destinations were Edo-Tokyo Museum and Akihabara in 9 Aug. and Nikko Toshogu shrine in 10 Aug.

In the Edo-Tokyo Museum the guide who explain in English helped for participants to understand the Japanese history from Edo to present. The participants were surprised at instauration of the Tokyo after World War II.

The participants had experiences of Cool Japan in Akihabara. They knew that the price of commodity in Japan is expensive again.

The day we visited Nikko Toshogu Shrine was unreasonable rain. The participants were surprised that Japanese people has been maintaining the old architectural structure for 400 years.

The Study tours that the participants were exposed to Japanese culture. Their familiarity for Japan will be expected to make Japan - ASEAN relationship well.

3.8.4 Time frame and contents of the Workshop

The comments on the time frame from the participants are as follows: making time frame of the Workshop longer to learn detail, the workshop in spring or autumn.

The participants desired more exercise having direct relationship with the practical business.

3.8.5 Facilities and life circumstances in and around Sakura-kan, AIST, Tsukuba

The venue for the Workshop in Japan (Sakura-kan, AIST, Tsukuba) has a good reputation amongst the participants. The participants, however, desired to have the Workshop in Tokyo.

3.9 Comments from the participants on the accomplishment of the Workshop in Japan

The main accomplishments for the participants are increasing knowledge about the geology, satellite imagery, satellite image processing, Web-GIS. The Workshop in Japan gave them good opportunity to discuss Seamless Geology with geologists from neighboring countries. The exercises for the Web-GIS and Remote Sensing Analysis is good experiences for the participants. There is comment that communication with other participants and JICA members is also good experience.

3.10 Comments from the participants on the application of the result derived from the Workshop in Japan

Some participants will have the Workshop for their colleagues on the basis of the accomplishment of the Workshop in Japan.

Web-GIS, Seamless Geology, Remote sensing analysis are applicable directly in daily works for the participants. The participants desired to contribute to the ASEAN Mineral Database and Information System project as well as the ASEAN Harmonized Geology Project.

On the other hand, some participants have no idea about application of the Geophysics and Groundwater.

The participants have request the Workshop with contents in more detail.

Photos of the Workshop in Japan



Upper left: Presentation for the Country Report
Upper right: Discussion on the Seamless Geology
Center: Group photo of Workshop participants
Lower left: Exercise for Web-GIS development
Lower right: Group photo in Edo Tokyo Museum

4. The Second On-site Works

Target countries of the Second On-site Works are five; Cambodia, Myanmar, Vietnam, Laos and Thailand. The study team visits them in order, and stays for one week or less in each country and moves on Saturday and/or Sunday (Table 4-1). As the international airport of Myanmar is located in Yangon, it is necessary to move by domestic airplane from Yangon to Nay Pyi Taw, Capital.

Follow the development of ASEAN database. Hear opinions about upgrading of mineral resources information and ASEAN database from above four countries and arrange issues. Upload basic information to ASEAN database in cooperation with GSJ.

Table 4-1 Schedule of the Second On-site Works

Schedule		City, Country
1 st week	31 Aug - 6 Sep	Phnom Penh, Cambodia
2 nd week	7 - 12 Sep	Nay Pyi Taw, Myanmar
3 rd week	13 - 19 Sep	Hanoi, Vietnam
4 th week	20 - 23 Sep	Vientiane, Laos
5 th week	24 - 27 Sep	Bangkok, Thailand

4.1 Activities of the Second On-site Works

Date	Activities
31 Aug	Leave Japan (Ninomiya and Sah)
1 - 2 Sep	Preparation for the 2nd Workshop and consultation for the further possibility of JICA's cooperation in Department of Geology, General Department of Mineral Resources (GDMR), Ministry of Mines and Energy, Cambodia
3 - 5 Sep	The Second Workshop for Web-GIS in Department of Geology by Bandibas (GSJ) and Sah (JICA/PASCO) and Field Excursion for Au mine near Kratie town (Okubo, Takahashi, GSJ, and Ninomiya, JICA/SRED) guided by Mr Sotham (Director, Department of Geology)
6 Sep	Move to Bangkok on the way to Myanmar.
7 Sep	Onuma joined. Arrival at Nay Pyi Taw via Yangon from Bangkok
8 - 10 Sep	Field Excursion in southern Shan State, eastern Myanmar (Okubo, Takahashi, Joel; GSJ, Onuma, Ninomiya; JICA/SRED, Sah; JICA/PASCO). Visit Pb-Zn mine in Bawsaing area, 30km northwest of Taunggyi. Guided by Mr. Phone Myint, Deputy Director, Department of Geological Survey and Mineral Exploration, Ministry of

	Mines
11 - 12 Sep	The Second Workshop in Department of Geological Survey and Mineral Exploration, Ministry of Mines by Bandibas (GSJ). Move to Bangkok (Okubo, Bandibas, Onuma, Sah and Ninomiya) and leave for Japan (Takahashi)
13 Sep	Move to Hanoi from Bangkok
14 Sep	Preparation for the Second Workshop in Center for Information and Archive of Geology (CIAG), Ministry of Natural Resources and Environment
15 - 17 Sep	The Second Workshop for Web-GIS by Bandibas (GSJ). Leave for Japan (Okubo and Bandibas)
18 Sep	Field Excursion on the Nui Phao Mine (Onuma, Ninomiya; JICA/SRED, Sah; JICA/PASCO) guided by Mr. Tran Hong Hai (Director, CIAG)
19 Sep	Arrangement of data in-house
20 Sep	Move to Vientiane from Hanoi (Onuma and Sah) and leave for Japan (Ninomiya)
21 Sep	Arrive at Vientiane (Okubo, Takahashi and Bandibas)
22 - 24 Sep	Second Workshop in Department of Mines, Ministry of Energy and Mines, Laos for Web-GIS by Bandibas (GSJ). Move to Bangkok
25 - 26 Sep	Workshop for Web-GIS in Department of Mineral Resources, Ministry of Natural Resources and Environment, Thailand for Web-GIS by Bandibas (GSJ)
27 Sep	Return to Japan

4.2 Number of participants for the Workshop in each country

Tables 4-2 and 4-3 show the number of total and detail of the participants for Second Workshop in each countries. The participants are detached from various organizations related to not only mineral resources but also disaster or water resources and so on because Web-GIS and remote sensing analysis is useful in the various fields. The position of the participants from Vietnam and Cambodia is unknown. The total number of the participants for the Second Workshops is 120.

Table 4-2 Number of total and detail of the participants for the Second Workshop

Country	Number		Organization
	Total	Detail	
Cambodia	31	22	General Department of Mineral Resources (GDMR)
		9	General Department of Petroleum (GDP)
Myanmar	20	4	Department of Mines
		3	No(1) Mining Enterprise
		3	No(2) Mining Enterprise
		3	No(3) Mining Enterprise
		7	Department of Geological Survey and Mineral Exploration
Vietnam	37	31	General Department of Geology and Minerals of Vietnam (GDGMV)
		9	Center for Information and Archives of Geology (CIAG)
		3	General Department of Geology and Minerals of Vietnam (GDGMV)
		4	INTEGEO Division
		3	Geological Division for Radioactive and Rare Elements
		3	Southern Geological Mapping Division
		2	Northern Geological Mapping Division
		2	Northwest Geological Division
		1	Center for Geological verification and Technology
		1	Northern Department for Control of Mineral activities
		1	Geophysical Division
		1	Mid-Central Geological Division
		1	North Central Geological Division
		2	Center for Water Resources Warning and Forecast, National Center for Water Resources Planning and Investigation (NAWAPI)
		2	Nui Phao Mining Company Limited
		1	Division for Water Resources Planning and Investigation for the Center of Vietnam, NAWAPI
		1	Vietnam Institute of Geosciences and Mineral Resources (VIGMR)
Laos	17	4	Ministry of Natural Resources and Environment (MONRE)
		1	Department of Disaster management and Climate Change (DDMCC)
		2	Department of Geology and Minerals (DGM)
		1	Department of Water Resource
		4	Ministry of Energy and Mines (MEM)
		4	Department of Mines (DoM)
		2	Ministry of Planning and Investment (MPI)
		1	Investment Promotion Department (IPD)
		1	Lao Statistics Bureau (LSB)
		2	Polytechnic College
		1	National University of Laos
		1	ESIA
		1	Civil Engineering
		1	National Geographic Department, Ministry of Home Affairs
		1	NGO
Thailand	15	13	Department of Mineral Resources
		2	Department of Primary Industries and Mines
Total	120		

Table 4-3 Position of the participants for the Second Workshop

Country	No.	Position
Myanmar Total: 20	3	Engineer
	4	Geologist
	1	Admin Officer
	1	Assistant Director
	10	Junior Geologist
	1	Mining Engineer
Laos Total: 17	1	Depty Director
	2	Head Division
	2	Head of department
	9	Officer
	2	Tacnical
	1	Teacher
Thailand Total: 15	1	Computer Officer
	1	Draftman
	2	Engineer
	11	Geologist

4.3 The Second Workshop

The Second Workshops were held in Cambodia, Myanmar, Vietnam, Laos and Thailand in order.

4.3.1 The Second Workshop in Cambodia

(1) Venue

Meeting room at Department of Geology, General Department of Mineral Resources (GDMR), Ministry of Mines and Energy, Cambodia

(2) Program

3 Sep (Wed)

Morning

➤ Web-GIS (Dr. Bandibas, GSJ)

Brief review about Web GIS and WebGIS Components

Brief review about PostgreSQL/PostGIS Database Creation

Brief review about PostGIS and Simple Features

Brief review about PostGIS and Spatial Information Processing Functions

Spatial Queries and Sequential Query Language Formulation (SQL)

Database Population Using Tab Delimited Text and Shape files

Afternoon

➤ Web-GIS (Dr. Bandibas, GSJ)

Brief review about WMS Formulation

Brief review about WMS Clients

Brief review about WMS Visualization Using OpenLayers and Google Earth

4 Sep (Thu)

Morning

➤ Web-GIS (Dr. Bandibas, GSJ)

WebGIS Portal Development Using CCOP's Spatial Content, Management System Template

WebGIS Portal Mineral Data (and Related Information) Content, Addition Using Automated WMS Generator

Customization of the WebGIS Portal

Afternoon

➤ Web-GIS (Dr. Bandibas, GSJ)

Web Processing Service (WPS) Formulation
 Simple PHP scripts to Implement WPS SQLs
 Simple HTML Forms for WPS Implementation
 Visualization of WPS Outputs
 WebGIS Portal Registry Maintenance

5 Sep (Fri)

Morning

- Web-GIS (Dr. Bandibas, GSJ)
 - Web Processing Service (WPS) Formulation
 - Simple PHP scripts to Implement WPS SQLs
 - Simple HTML Forms for WPS Implementation
 - Visualization of WPS Outputs
 - WebGIS Portal Registry Maintenance

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Exercise on: WMS Requests, Simple SQLS, Spatial SQLS, and WPS formulation
 - Wrap Up / Closing ceremony
 - Discussion with GDMR of possible further cooperation activities

(3) Participants

The detail of the participants is 22 from General Department of Mineral Resources (GDMR) and 9 from General Department of Petroleum. Total number of the participants is 31 (Table 4-4).

Table 4-4 Number of the participants for the Second Workshop in Cambodia

Country	Number		Organization
	Total	Detail	
Cambodia	31	22	General Department of Mineral Resources (GDMR)
		9	General Department of Petroleum (GDP)

(4) Photo of the Second Workshop in Cambodia



Upper left: Lecture for Web-GIS by Dr. Bandibas (GSJ)
Upper right: Exercise for Web-GIS development
Lower: Group Photo of Workshop Participants

4.3.2 The Second Workshop in Myanmar

(1) Venue

The venue was the meeting room of Department of Geological Survey and Mineral Exploration (DGSE).

(2) Program

11 Sep (Thu)

Morning

➤ Web-GIS (Dr. Bandibas, GSJ)

Brief review about Web GIS and WebGIS Components

Brief review about PostgreSQL/PostGIS Database Creation

Brief review about PostGIS and Simple Features

Brief review about PostGIS and Spatial Information Processing Functions

Spatial Queries and Sequential Query Language Formulation (SQL)

Afternoon

➤ Web-GIS (Dr. Bandibas, GSJ)

Database Population Using Shape files and Tab Delimited Text

Database Population Using PHP Scripts and Form

Brief review about WMS Formulation

Brief review about WMS Clients

Brief review about WMS Visualization Using OpenLayers and Google Earth

12 Sep (Fri)

Morning

➤ Web-GIS (Dr. Bandibas, GSJ)

WebGIS Portal Development Using CCOP's Spatial Content, Management System Template

WebGIS Portal Mineral Data (and Related Information) Content, Addition Using Automated WMS Generator

Customization of the WebGIS Portal

Afternoon

➤ Web-GIS (Dr. Bandibas, GSJ)

Web Processing Service (WPS) Formulation

Simple PHP scripts to Implement WPS SQLs

Simple HTML Forms for WPS Implementation

Visualization of WPS Outputs

Exercise on: WMS Requests, Simple SQLs, Spatial SQLs, and WPS formulation

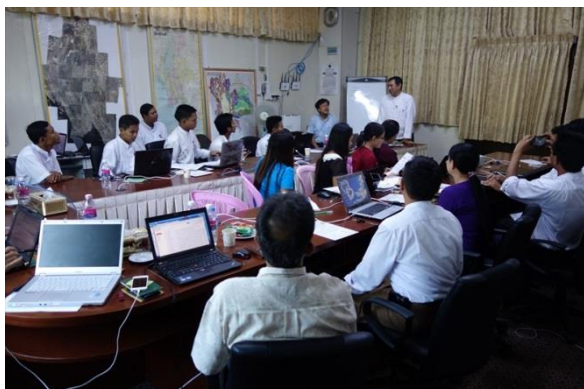
(3) Participants

4 from Department of Mines, 3 from No(1) Mining Enterprise, 3 from No(2) Mining Enterprise, 3 from No(3) Mining Enterprise and 7 from Department of Geological Survey and Mineral Exploration. Total 20 participants (Table 4-5).

Table 4-5 Number of the participants for the Second Workshop in Myanmar

Country	Number		Organization
	Total	Detail	
Myanmar	20	4	Department of Mines
		3	No(1) Mining Enterprise
		3	No(2) Mining Enterprise
		3	No(3) Mining Enterprise
		7	Department of Geological Survey and Mineral Exploration

(4) Photo of the Second Workshop in Myanmar



Upper left: Opening Speech by Dr. Ye Myint Swe (Director General)

Upper right: Lecture for Web-GIS development by Dr. Joel Bandibas (GSJ)

Center left: Presentation about Group Discussion

Center right: Criticism for presentation of group discussion by Dr. Sah (JICA/PASCO)

Lower left: Presentation of certificate

4.3.3 The Second Workshop in Vietnam

(1) Venue

Meeting room at Center for information and Archives of Geology (CIAG).

(2) Program

15 Sep (Mon)

Morning

- Opening
- Welcome speech of the representative of GDGMV
- Opening remark of JICA's project leader
- Overview remark of GSJ trainer
- Group photograph
- Web-GIS (Dr. Bandibas, GSJ)
 - Brief review about Web GIS and WebGIS Components
 - Brief review about PostgreSQL/PostGIS Database Creation
 - Brief review about PostGIS and Simple Features
 - Brief review about PostGIS and Spatial Information Processing Functions
 - Spatial Queries and Sequential Query Language Formulation (SQL)

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Database Population Using Shape files and Tab Delimited Text
 - Database Population Using PHP Scripts and Form
 - Brief review about WMS Formulation
 - Brief review about WMS Clients
 - Brief review about WMS Visualization Using OpenLayers and Google Earth

16 Sep (Tue)

Morning

- Web-GIS (Dr. Bandibas, GSJ)
 - WebGIS Portal Development Using CCOP's Spatial Content, Management System Template
 - WebGIS Portal Mineral Data (and Related Information) Content, Addition Using Automated WMS Generator
 - Customization of the WebGIS Portal

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Web Processing Service (WPS) Formulation

Simple PHP scripts to Implement WPS SQLs
Simple HTML Forms for WPS Implementation
Visualization of WPS Outputs
WebGIS Portal Registry Maintenance

17 Sep (Wed)

Morning

- Web-GIS (Dr. Bandibas, GSJ)
 - Exercises WMS Requests
 - Exercises on simple SQLS
 - Exercises on spatial SQLS
 - Exercises on Web Processing Service Formulation
- Wrap up/Closing Session
- Closing Ceremony (Participants)

(3) Participants

31 from the organizations related to General Department of Geology and Minerals of Vietnam (GDGMV). Detail is 1 from Center for Geological Verification and Technology, 9 from Center for Information and Archives of Geology (CIAG), 3 from General Department of Geology and Minerals of Vietnam, 3 from Geological Division for Radioactive and Rare Elements, 1 from Geophysical Division, 4 from INTEGEO Division, 1 from Mid-Central Geological Division, 1 from North Central Geological Division, 1 from Northern Department for Control of Mineral Activities, 2 from Northern Geological Mapping Division, 2 from Northwest Geological Division, and 3 from Southern Geological Mapping Division. 2 from Center for Water Resources Warning and Forecast, National Center for Water Resources Planning and Investigation (NAWAPI), 1 from Division for Water Resources Planning and Investigation for the Center of Vietnam, NAWAPI, 2 from Nui Phao Mining Company Limited, and 1 from Vietnam Institute of Geosciences and Mineral Resources (VIGMR). Total 37 participants (Table 4-6).

Table 4-6 Number of the participants for the Second Workshop in Vietnam

Country	Number		Organization
	Total	Detail	
Vietnam	37	31	General Department of Geology and Minerals of Vietnam (GDGMV)
			9 Center for Information and Archives of Geology (CIAG)
			3 General Department of Geology and Minerals of Vietnam (GDGMV)
			4 INTEGEO Division
			3 Geological Division for Radioactive and Rare Elements
			3 Southern Geological Mapping Division
			2 Northern Geological Mapping Division
			2 Northwest Geological Division
			1 Center for Geological verification and Technology
			1 Northern Department for Control of Mineral activities
			1 Geophysical Division
			1 Mid-Central Geological Division
			1 North Central Geological Division
		2	Center for Water Resources Warning and Forecast, National Center for Water Resources Planning and Investigation (NAWAPI)
			Nui Phao Mining Company Limited
			1 Division for Water Resources Planning and Investigation for the Center of Vietnam, NAWAPI
			1 Vietnam Institute of Geosciences and Mineral Resources (VIGMR)

(4) Photo of the Second Workshop in Vietnam



Upper left: Welcome Speech by Dr. Do Canh Duong (Deputy Director, GDGMV)

Upper right: Opening Speech by Dr. Okubo (GSJ)

Center: Group photo

Lower left: Lecture for Web-GIS development by Dr. Bandibas (GSJ)

Lower right: Presentation of Group Discussion

4.3.4 The Second Workshop in Laos

(1) Venue

22 Sep: meeting room of The Institution of Renewable Energy and Promotion at Ministry of Energy and Mine

23 Sep: meeting room of the Department of Mines

(2) Program

22 Sep (Mon)

Morning

- Opening
- Welcome speech of the representative of DOM
- Opening remark by GSJ
- Web-GIS (Dr. Bandibas, GSJ)
 - Brief review about Web GIS and WebGIS Components
 - Brief review about PostgreSQL/PostGIS Database Creation
 - Brief review about PostGIS and Simple Features
 - Brief review about PostGIS and Spatial Information Processing Functions
 - Spatial Queries and Sequential Query Language Formulation (SQL)

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Database Population Using Shape files and Tab Delimited Text
 - Database Population Using PHP Scripts and Form
 - Brief review about WMS Formulation
 - Brief review about WMS Clients
 - Brief review about WMS Visualization Using OpenLayers and Google Earth

23 Sep (Tue)

Morning

- Web-GIS (Dr. Bandibas, GSJ)
 - WebGIS Portal Development Using CCOP's Spatial Content, Management System Template
 - WebGIS Portal Mineral Data (and Related Information) Content, Addition Using Automated WMS Generator
 - Customization of the WebGIS Portal

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Web Processing Service (WPS) Formulation

Simple PHP scripts to Implement WPS SQLs

Simple HTML Forms for WPS Implementation

Visualization of WPS Outputs

Exercise on: WMS Requests, Simple SQLS, Spatial SQLS, and WPS formulation

(3) Participants

4 from Ministry of Natural Resources and Environment (MONRE) (1 from Department of Disaster management and Climate Change (DDMCC), 2 from Department of Geology and Minerals (DGM) and 1 from Department of Water Resources (DWR)), 4 from Department of Mines (DoM), Ministry of Energy and Mines (MEM), 2 from Ministry of Planning and Investment (MPI) (1 from Investment Promotion Department (IPD) and 1 from Lao Statistics Bureau (LSB)), 1 from National University of Laos, 2 from Polytech college, 1 from ESIA, 1 from Civil Engineering 1 from National Geographic Department, Ministry of Home Affairs and 1 from NGO. Total 17 participants (Table 4-7).

Table 4-7 Number of the participants for the Second Workshop in Laos

Country	Number		Organization
	Total	Detail	
Laos	17	4	Ministry of Natural Resources and Environment (MONRE)
		1	Department of Disaster management and Climate Change (DDMCC)
		2	Department of Geology and Minerals (DGM)
		1	Department of Water Resource
		4	Ministry of Energy and Mines (MEM)
		4	Department of Mines (DoM)
		2	Ministry of Planning and Investment (MPI)
		1	Investment Promotion Department (IPD)
		1	Lao Statistics Bureau (LSB)
		2	Polytechnic College
		1	National University of Laos
		1	ESIA
		1	Civil Engineering
		1	National Geographic Department, Ministry of Home Affairs
		1	NGO

(4) Photo of the Second Workshop in Laos



Upper left: Opening Speech by Dr. Simone PHICHIT (Director General, Department of Mines)

Upper right: Lecture for Web-GIS development by Dr. Bandibas (GSJ)

Center: Group photo

Lower left: Presentation for group discussion

4.3.5 The Second Workshop in Thailand

(1) Venue

Computer training room with desktop computers that is capable for 20 persons at Department of Mineral Resources

(2) Program

25 Sep (Thu)

Morning

- Opening remark by GSJ
- Web-GIS (Dr. Bandibas, GSJ)
 - Brief review about Web GIS and WebGIS Components
 - Brief review about PostgreSQL/PostGIS Database Creation
 - Brief review about PostGIS and Simple Features
 - Brief review about PostGIS and Spatial Information Processing Functions
 - Spatial Queries and Sequential Query Language Formulation (SQL)

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Database Population Using Shape files and Tab Delimited Text
 - Database Population Using PHP Scripts and Form
 - Brief review about WMS Formulation
 - Brief review about WMS Clients
 - Brief review about WMS Visualization Using OpenLayers and Google Earth

26 Sep (Fri)

Morning

- Web-GIS (Dr. Bandibas, GSJ)
 - WebGIS Portal Development Using CCOP's Spatial Content, Management System Template
 - WebGIS Portal Mineral Data (and Related Information) Content, Addition Using Automated WMS Generator
 - Customization of the WebGIS Portal

Afternoon

- Web-GIS (Dr. Bandibas, GSJ)
 - Web Processing Service (WPS) Formulation
 - Simple PHP scripts to Implement WPS SQLs
 - Simple HTML Forms for WPS Implementation
 - Visualization of WPS Outputs

Exercise on: WMS Requests, Simple SQLS, Spatial SQLS, and WPS formulation

- Closing speech by the representative of DMR
- Closing remark by JICA team leader

(3) Participants

13 from Department of Mineral Resources and 2 from Department of Primary Industries and Mines.
Total 15 participants (Table 4-8).

Table 4-8 Number of the participants for the Second Workshop in Thailand

Country	Number		Organization
	Total	Detail	
Thailand	15	13	Department of Mineral Resources
		2	Department of Primary Industries and Mines

(4) Photo of the Second Workshop in Thailand



Upper left: Opening Speech by Dr. Takahashi (GSJ) and introduction of lecturer Dr. Bandibas (GSJ)
Upper right: Lecture for Web-GIS by Dr. Bandibas (GSJ)
Center: Group Photo
Lower left: Closing Speech by Mr. Sompob (DMR)

4.4 Field Excursion

4.4.1 Field Excursion in Cambodia

In Cambodia, improvement of the database and mining law for the small-scale mining is not enough. We had a field excursion in the area where small-scale mining is active to confirm the method to collect information which devote to the database guided by counterparts.

(1) Schedule

3 Sep: leave Phnom Penh for Kratie

4 Sep: visit Au mine (Xing Yuan Kanng Yeak Co., LTD) and small scale mining

5 Sep: leave Kratie for Phnom Penh

Kratie is located northeastern Phnom Penh. One-line distance between them is about 150 km. Distance from Kratie to Au Mine and small scale mining area, northeastern Kratie is around 45 km (Fig. 5-1).

(2) Participants

Sieng Sotham (Director of Department of Geology)

Seng Laing (Deputy Director of Exploration Management Department)

Im Sim (Head of Geological Research Office, Department of Geology)

Rath Tola (Head of Mineral Resource Office of Mines and Energy Kraches province)

Okubo, Takahashi (GSJ), Ninomiya (JICA/SRED)



Figure 4-1 Locality map of Kratie and Au Mine for Field Excursion

(3) Photos

Field Excursion in Kratie Province, Cambodia: Au Mine (Xing Yuan Kanng Yeak Co., LTD)



Small Scale Mining



Upper left: Au Mine (Xing Yuan Kanng Yeak Co., LTD)

Upper right: Entrance to the gallery

Center left: Taking soil including Au by worker

Center right: Artisanal gravity separation

Lower left: Panning

Lower right: Final product of the panning. Fine grained gold is concentrated.

4.4.2 Field Excursion in Myanmar

In Myanmar, improvement of the database and mining law for the small-scale mining is not enough. We had a field excursion in the area where small-scale mining is active to confirm the method to collect information which devote to the database guided by counterparts.

(1) Schedule

8 Sep: leave Nay Pyi Taw for Taunggyi

9 Sep: visit Bawsaing area (Pb, Zn mine) and Antimony Mine

10 Sep: leave Taunggyi for Nay Pyi Taw

Taunggyi is located northeastern Nay Pyi Taw. One-line distance between them is about 150 km. Distance from Taunggyi to Bawsaing area and Antimony Mine, northwestern Taunggyi is around 40 km (Fig. 5-2).

(2) Participants

Mr. Phone Myint, Deputy Director, Department of Geological Survey and Mineral Exploration (DGME), Ministry of Mines

Mr. Kaung Htet, Assistant geologist, Department of Geological Survey and Mineral Exploration, Ministry of Mines

Okubo, Takahashi, Joel (GSJ)

Onuma, Ninomiya, Sah (JICA/SRED, PASCO)

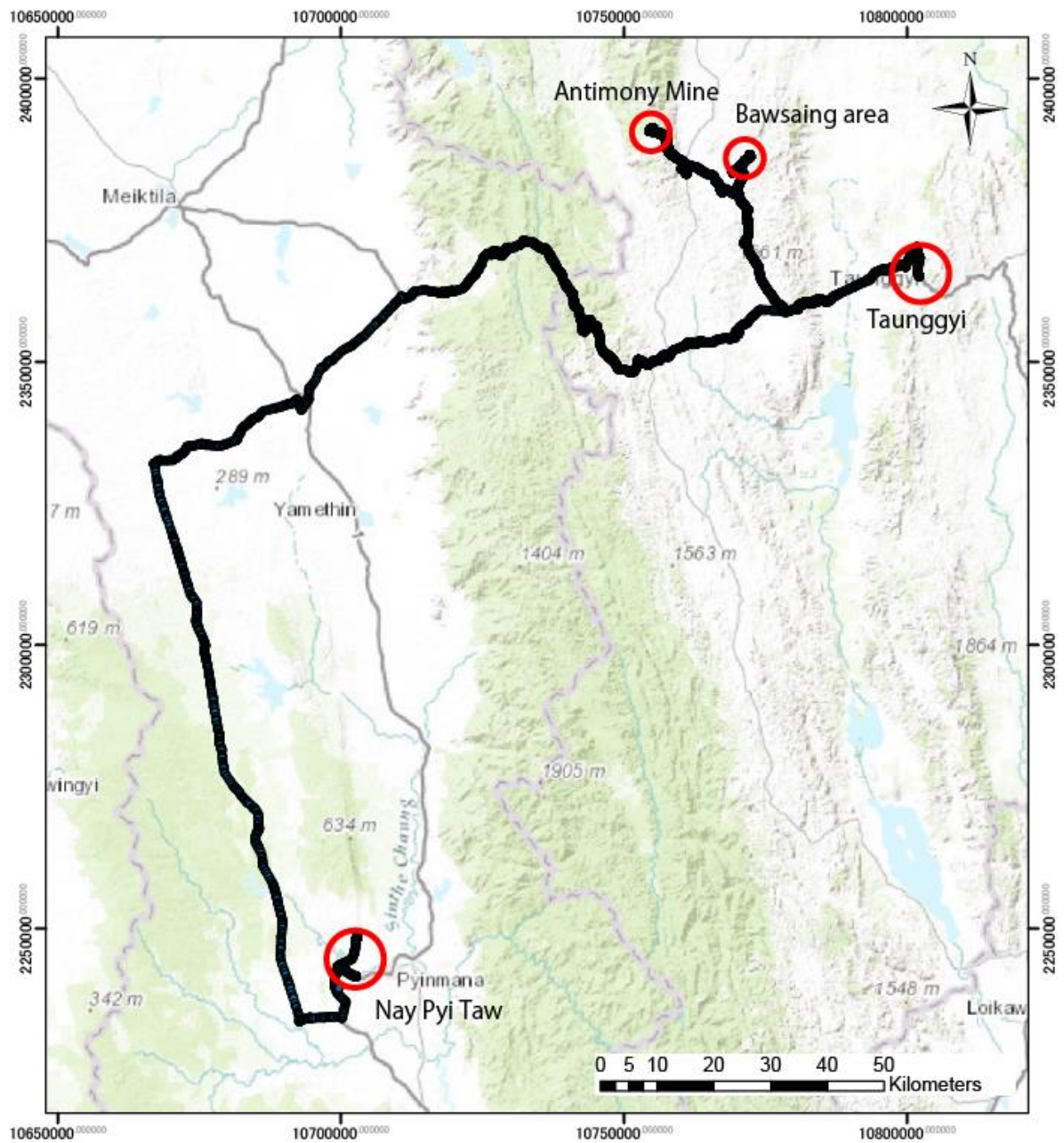


Figure 4-2 Locality map of Taunggyi and areas for the Field Excursion

(3) Photos

Field Excursion in Bawsaing area in Myanmar



Upper left: Pb-Zn Mine in Bawsaing area. Open pit and underground mining

Upper right: Entrance for the gallery

Center left: Ore. Mainly Galena (PbS). Host rock is limestone

Center right: Gravity separation

Lower left: Panning by female workers

Field Excursion for the Antimony Mine in Pindaya area, Myanmar



Upper left: Antimony Mine in Pindaya area. Entrance for the gallery
Upper right: Stibnite vein in the limestone with Mr. Phone Myint
Lower left: Close up of the ore. Mostly stibnite in needle shape
Lower right: Crushed ore

4.4.3 Field Excursion in Vietnam

The staff from Nui Phao Polymetallic Mine who took part in the Second On-site Workshop provided the field excursion in the Mine for us.

(1) Schedule

18 Sep: Hanoi - Nui Phao Polymetallic Mine (W, F-Bi-Au-Cu), one day field excursion

The mine is located in the north of Hanoi. One-line distance between them is about 80 km (Fig. 5-3).

(2) Participants

Mr. Tran Hong Hai, Director, Center for Information and Archives of Geology (CIAG), General Department of Geology and Minerals of Vietnam (GDGMV)

Ms. Tran Thi Thuy Dung, Official, General Department of Geology and Minerals of Vietnam (GDGMV)

Ms. Van Thi Vi, Chief Administrative, CIAG, GDGMV.

Mr. Richard Kitchener, Mining and Geology Manager, Nui Phao Mining Company Ltd.

Mr. Anirut, Senior Mine Geologist, Nui Phao Mining Company Ltd.

Mr. Nguyen Van Nha, Senior Geologist, Nui Phao Mining Company Ltd.

Onuma, Ninomiya, Sah (JICA/SRED, PASCO)

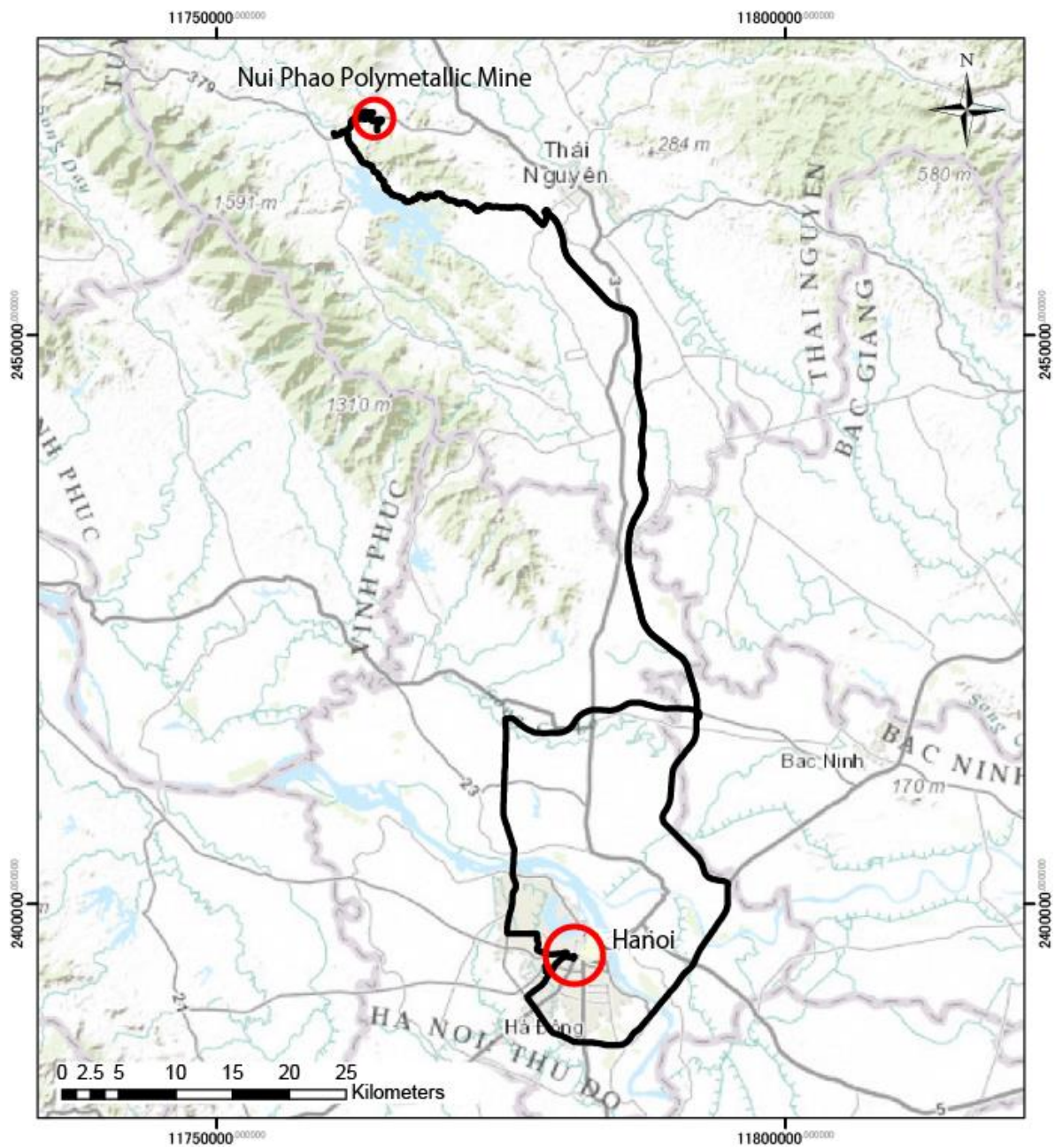
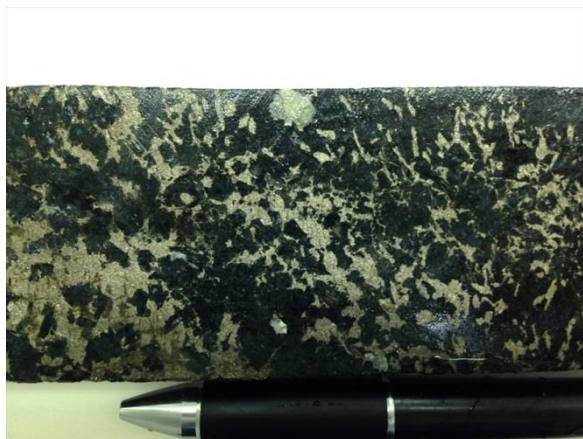


Figure 4-3 Locality map of Nui Phao Polymetallic Mine

(3) Photos

Field Excursion in Nui Phao Polymetallic Mine in Vietnam



Upper left: Group Photo. Staff of Nui Phao Mine and CIAG & GDGMV, and JICA team
Upper right: Open pit. Dark part is ore vein with E-W strike and northern dipping;
Center left: Bottom of the open pit
Center right: Putting ore to crusher
Lower left: Tailings dam
Lower right: Close up of ore. Dark green: amphibole and biotite, golden color: pyrrhotite (FS), white part: sheelite (CaWO_4)

5. Issues and their possible solution in each country

5.1 Cambodia

Current status for the geological mapping

1:1M scale map was compiled among Cambodia, Laos and Vietnam during 1987-1989, titled Geological Map of Cambodia, Laos and Vietnam. In 2013 it is updated and scale is modified to 1:1.5M scale map for Cambodia, Laos and Vietnam.

Issues on the geological mapping

No fund allocated for mapping projects and Lack of knowhow in geological survey for mapping

Problems faced in Cross border geological correlation

Geological correlation in border areas with Laos and Vietnam was done during the implementation of cooperation project in 80s. Geological harmonization along Cambodia-Thailand border was , more or less, done during the CCOP DCGM Phase I Project. However, due to different geological mapping level, more studies must be carried out before geological harmonization can be done.

Possible solutions

The 1/1,000,000 scale geological map of the Three Countries Cambodia, Lao and Vietnam should be used in the ASEAN 1/1M Seamless geological map. Exchange of geological data/information of bordering areas should be done through seminars, conferences...etc. Bilateral cooperation should be set up to solve the problems of geological discrepancies along the borders. Due to lack of knowhow, Cambodia needs trainings to enhance their capacity in mapping, web GIS. (an immediate training on the Application of Remote Sensing in Geological Mapping is a must).

Analysis for the issue and solution

According to Mr. Sotham Sieng, Director of Department of Geology, the priority of the geology and mineral resources is low in Cambodia. He applied the proposal to get international fund, for example JICA many times, his proposal is rejected by Cambodian governments. Although JICA team told him to put his proposal into the Report to submit to JICA, the proposal have not been submitted

yet.

5.2 Indonesia

Current status of the Seamless Geology

Geological map with 1:1M scale: with Malaysia work is going on and will be completed in 2015. With Timor Leste and Papua New Guinea not started yet but planed.

Issues on the database of geology and mineral resources

In Indonesia, the central government had problem getting the data from the mining company because permission for the mining is issued by the local government. Mining companies are obliged to report to the local government gave permission.

Possible solutions

Central government provides guidance and assistance to local governments to have data from the data mining so that data can be entered into the central. Provide technical assistance to local governments related to geological problems, report format, the processing of data mining and mining supervision.

Possible cooperation with JICA in mineral resources sector in Indonesia

- ✓ Web-GIS database development and minerals to continue
- ✓ Mineral potential mapping, remote sensing for mineral, application 3D for mineral exploration
- ✓ The addition of personnel for training in Japan

5.3 Laos

Current status for the geological mapping

Geological map, 1M scale for whole Laos, is published with support by British Geological Survey (BGS) in 1990-1991. This map is revised in 2006-2008 with cooperation of JICA.

1:1M scale map was compiled among Cambodia, Laos and Vietnam during 1987-1989, titled Geological Map of Cambodia, Laos and Vietnam. In 2013 it is updated and scale is modified to

1:1.5M scale map for Cambodia, Laos and Vietnam.

Bilateral geological field survey between Laos and Thailand over cross-border areas is ongoing.

Possible cooperation with JICA

Training technician who responsible geological mapping and GIS because Lao government budget for survey mineral resources and Lao geological expert is not enough.

5.4 Myanmar

Issues on the geological mapping

In Myanmar there are areas where they are hard to have a geological field survey due to security instability around the border area. Report and database for the mineral resources are described in Myanmar language.

Issues on the database of geological and mineral resources

Department of Geological Survey and Mineral Exploration have not their own data server yet. Database has not improved due to poor infrastructure for the internet. Although some staffs have a strong will to develop their IT skill, the training is not enough.

Further possibility for cooperation with JICA

To improve the skill for the staffs, especially young staffs, they need continuous training for Web-GIS, Seamless Geology and Remote Sensing Analysis. Training with higher level of the Remote Sensing Analysis because it has efficacy for the geological mapping in the border area.

5.5 Thailand

Future possibility of JICA's cooperation

Technical assistance by senior experts on Web-GIS, Seamless Geology, and Remote Sensing Analysis.

5.6 Vietnam

Main issues on GDGMV

The shortage of personnel is evidence, the senior geologists have almost retired and the substitution is not equivalent and its capacity is really limited. The methods and technologies applied currently are still very old as in the years of 70s-80s of the previous century. Lack of the new and modern equipment in all geological and mineral activities. The marine geological survey has just started. The government's budget assigned to the basic geological survey and mineral assessment is still limited due to the difficulties of the economy.

What does the GDGMV want to request to JICA:

Capacity building: in this issue the GDGMV would like to have the long term cooperation with JICA for supporting from Japan to Vietnam's geology and mineral capacity building including but not limit in human resource and facilities. Training: training in Vietnam, training abroad (Japan), on-the-job training, in geological/geochemical/geophysical/RS study and focused in marine geology and mineral survey, geological sample analytical capacity as well as data compilation and management compatible with the international and regional standards. Technology transfer in all above-mentioned disciplines. Project in marine geology and minerals and some small projects in technology transfer and training.

5.7 Philippines

Geological map are already digitized for the database with information about mineral resources. Database and mining law for the small scale mining is still preserved to set up. In southwestern Philippines muslim area is blank for the information about geological and mineral resources because governmental staffs are hard to enter.

6. Proposal from JICA team

6.1 Workshop from JICA team

The Workshop, Workshop in Japan and the Second Workshop were quite meaningful for not only the participants but also JICA and GSJ teams. The lectures by the GSJ experts are condensation of the geosciences from the basic to the latest technology and knowledge. The lecture of the Seamless Geology gave a great opportunity to the participants to have discussions with geologists from the countries which contact with each other. It is very outstanding for the participants to have a lecture about Web-GIS and Remote Sensing Analysis because these techniques can be applied for not only mineral resources but also water resources, disaster mitigation, and so on. JICA and GSJ teams could enhance personnel network between ASEAN and Japan in mineral resources sector through the consultations and the Workshops in this Project.

Comments on the Workshops from JICA team are as follows;

- ✓ Theme of the Workshop should be narrowed down to 2 or 3 subjects, only seamless geology, Web-GIS and Remote sensing analysis in this case.
- ✓ Lectures about geology and mineral resources are difficult for IT persons to understand.
- ✓ It would be great if JICA and GSJ teams could make the criteria for the selection of the participant clear and more detail, for example specialty, age, and position.

6.3 Workshop contents in the future

The workshop held in the First On-site Works in cooperation with GSJ inherits the workshop which GSJ had held in the HIDA's training program from 2010 to 2012. The HIDA's training program had the period of 9 days including observation of companies, and was composed of lectures for ASEAN mineral resources database and several fields extracted from earth science fields. The workshop in this Project has similar program, and the period of lectures was 5 days in the First On-site Works and 9 days in the invitation to Japan.

The workshop in Japan, which JICA plans to hold for the mining sectors in ASEAN countries from 2015, should be planned properly on evaluating the contents of past workshop program and considering issues in each country. The lectures of ASEAN seamless geology and WebGIS database with main purpose of this Project are evaluated that there has been an achievement by the number of times and days for those lectures. On the other hand, other lectures only introduced schematically technology and expertise of various fields in a few hours each and gave totally exhaustive impression.

Therefore, it is recommended to improve the workshop contents. More strategic vision in the future workshop is necessary whether to intend to raise the technical level about general geoscience or to strengthen the capacity and lecture specialized advanced technology.

Twenty to thirty engineers and officers had participated in the Workshops of the First or the Second On-site Works in each country, Philippines, Indonesia, Vietnam, Laos, Cambodia Myanmar and Thailand. It is said that the information dissemination about ASEAN mineral resource database and the technology transfer of WebGIS were advanced to some extent in the relevant organizations in each country.

Based on the situation above mentioned and the results of this Project, the workshop contents should be focused on particular technologies in the future workshop, and it is desirable to selected proper engineers (based on expertise and career) and to have contents with high density. If possible, it is desirable to lengthen the period of workshop and to change some of the expertise fields and training contents every year.

Based on the implementation condition and participants responses on the workshop in this Project, the careers of the participants, and requests from the relevant organizations, priority for training of the following expertise is thought to be high.

- (a) Remote sensing: Process and interpretation of Landsat, ASTER, PALSAR and DEM data
- (b) GIS: Methods to create new data, to revise existing data
- (c) Database: Installation, update and management
- (d) Survey methods of mineral resources: Geology, geochemistry, geophysics, drilling and ore reserves calculation

The outline plan of workshop is as follows.

(a) Target countries

Cambodia, Laos, Myanmar, Vietnam, Malaysia, Philippines, Indonesia and Thailand

(All eight countries which were invited to Japan in this Project)

(b) Participants

Engineers specialized in geoscience (mainly geology, including geochemistry, geophysics, resource engineering and remote sensing)

Young generation (around thirty years old is desirable and less than forty at least)

(c) Objectives

To strengthen the capacity of engineers who belong to the organization related to mineral resources exploration and exploitation in the target countries

To construct the relationship in the mineral resources sector between Japan and the target countries

(d) Period

Four weeks

(e) Plan of schedule

- | | |
|--------------------|---|
| - 1st to 2nd day | Arrival at Japan, briefing of workshop |
| - 3rd to 5th day | Lectures: mineral resources (metal and non-metal) and geology, methods of mineral resources exploration |
| - 6th to 7th day | Day off/ site visit |
| - 8th to 12th day | Lectures: remote sensing and GIS (theory and practice) |
| - 13th to 14th day | Day off/ site visit |
| - 15th to 19th day | Lectures: seamless geology, geology and mineral resources database, WebGIS |
| - 20th to 21st day | Day off/ site visit |
| - 22nd to 24th day | Visiting mines, companies and/or institutes |
| - 25th day | Discussion, report of workshop results |
| - 26th day | Return to each country |

(d) Necessary equipment

- PC which each participant use: one each (every participants should bring their laptop PC)
- LAN system to connect the internet (wireless LAN is desirable)
- Projector and screen: two each
- Extension power cable, connector plug, so on
- Satellite data on each country which is necessary to be bought: ASTER and PALSAR

6.4 New project

Assuming future projects in ASEAN countries, the possibility of projects as (i) capacity building, (ii) model survey of mineral resources and (iii) upgrading of laws and regulations is pointed out in consideration of current situation, issues and requests in the mining sector of each country.

6.4.1 Human resource development and capacity building

To perform training related to expertise technology with higher level and advanced technology, and to learn the technology. Targeting fields are as follows. Most items are common in every country, but marine geology excludes landlocked countries.

- (a) Remote sensing
- (b) GIS
- (c) Database and Information Technology(IT)
- (d) Mineral resources (metal and non-metal)
- (e) Geothermal resources
- (f) Geochemistry
- (g) Geophysics
- (h) Marine geology

In case of the project targeting ASEAN countries, the following several plans are proposed.

(1) Training in one country

Select one or several fields above mentioned and conduct training during about two weeks several times. It is assumed to implement in the single year.

For example, mineral resources and methods of resources exploration (including geochemistry and geophysics) in the first time, remote sensing and GIS in the second time, and database and resources evaluation in the third time.

(2) Training in several countries

Visit several countries continuously and conduct training mentioned above (1). It is possible to target different countries in the plural year.

For example, Myanmar and Cambodia in the first year, and Laos and Vietnam in the second year.

(3) Combine technical cooperation program and training

Set training mentioned above to some technical cooperation program.

For example, implement OJT combining digitalization of nationwide geological maps and training of remote sensing and GIS (corresponding to Malawi Project from 2012 to 2013). Plan described in 9.4.2 is similar case.

6.4.2 Model survey of mineral resources

This program is intended to form a part of the human resource development and to perform

capacity building and training of engineers through OJT not by classroom lectures but by implementation of field survey. An example of general and practical program of two years is described below. Geological and geochemical surveys will be carried out in the first phase year and geophysical survey in the second phase year, and seminars will be implemented in the end of each phase.

The contents can be adaptive to every ASEAN countries. However, the priority is as follows.

The first group: Myanmar, Cambodia, Laos

The second group: Vietnam, Philippines, Malaysia, Thailand, Indonesia

(1) Background

There are many young engineers who belong to the relevant organizations in ASEAN countries. However, they are not well trained for mineral exploration, and the organizations in mining sector normally have limited capacity and personnel who has the knowledge of mineral resources exploration. As the mining in many ASEAN countries is expected to be developed further in the future, capacity building in mineral exploration is an urgent matter.

(2) Objectives

- To enhance the capacity of technique for mineral resources exploration in mining sector
- To train geologists through OJT (On-the-Job-Training) by settle of a training area

After the Project, the Government should support that other geologists conduct the geological and geophysical surveys in the same area. It means that the Government can sustainably train staffs by itself.

(3) Contents

(a) Survey area

Settle suitable training area where mineralization of metal resources exists. It is necessary to select the area which relevant organization will be able to conduct the training continuously and sustainably after the JICA project.

(b) Remote sensing analysis

Process ASTER and PALSAR data and extract geological and tectonic information. Conduct ground truthing of analytical results.

(c) Geological mapping

Conduct geological survey and create a geological map

(d) Geochemical survey

Conduct geochemical survey. Serve collected samples to proper laboratory. Make statistical analysis on assay results and create geochemical maps on GIS.

(e) Geophysical survey

Conduct geophysical survey. Analyze survey data and create analytical maps.

(f) GIS database

Create GIS data of the above survey results and create the GIS database.

(g) Evaluation of mineral resources

Summarize the above survey results and evaluate the potential of mineral resources.

(h) Seminar

Evaluate survey contents and results for trainees in the above field surveys; from (2) to (5).

Conduct technology transfer seminars for geological mapping, statistical analysis of assay results, geophysical analysis, remote sensing data analysis, GIS data creation and so on.

Hold reporting to make presentations of study results by trainees.

(4) Schedule and personnel

Activities in the first phase of the Project are (i) preparation, (ii) remote sensing analysis, (iii) geological and geochemical surveys, (iv) GIS and (v) seminar. Activities in the second phase of the Project are (i) geophysical survey, (ii) GIS and (iii) seminar. A model schedule is shown below.

The geological, geochemical and geophysical field works should be conducted in dry and cooler season.

The study team of Japanese side will be composed of five persons in total; three persons including project leader who are in charge of geology, geochemistry, remote sensing and GIS, and two geophysicists. The counterparts in target country will be composed of two to three geologists and two geophysicists.

Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Work			Prep.		Field work						Seminar						Field work						Seminar		
Personnel	Remote sensing		■																						
	Geology/GIS		■		■	■					■	■					■						■	■	
	Geochemistry				■	■					■	■											■	■	
	Geophysics																■	■	■				■	■	

(5) Model training area

The model area should be selected in mineralization area. It should have good accessibility and terrain in order to be surveyed easily, considering that the training should be implemented continuously and sustainably by the target country.

6.4.3 Upgrading of laws and regulations

In this Project, concrete plan of supports about various laws and regulations in the mining sector have not been requested from each country. This reason is thought that the main counterpart organizations of the workshop were geological survey organizations. However, JICA project to manage the mining safety law in Cambodia is going to be began this year, therefore similar requests could be proposed from ASEAN countries in the near future.

There seems to be various problems at present, such as contents are poor, as it is outdated being enacted decades ago, as there is a part not fitting the actual situation, and as the need to enact a new entry is generated. Long-term or short-term experts will be dispatched to conduct those programs.

Accompanying materials

(1) Accompanying materials derived from the First On-site Works

1. Philippines

Information collection

mining and the environment 2-13-12.ppt

Congress Presentation_2014_Final.pptx

Questionnaire

Questionnaire_Philippines.docx

Reference data

JICA survey attachment 1.docx

JICA survey attachment 2.docx

JICA survey attachment 3.docx

MGB - Organizational Structure.docx

MGB-Organizational Diagram.pptx

JICA survey attachment.pdf

Workshop

one-page program_Philippines.xls

asomm indonesia.pptx

Miyazaki_Application of GIS for Disaster Management.pdf

Ohno_q_ph.ppt

Wrap-up

Wrap Up Day 1 to 4.docx

Q&A_Philippines

Day 1 - 28 April 2014 - Q & A_MGB-rev1.docx

Day 2 - 29 April 2014 - Q & A_MGB-rev1.docx

Day 4- 1 May 2014 - Q & A_MGB.docx

Day 4- 1 May 2014 - Q & A_MGB_remote sensing.docx

Day 5- 2 May 2014 - Q & A_MGB .docx

List of participants

List of participants_Philippines.xls

2. Indonesia

Questionnaire

Questionnaire_Center for Geological Resources.docx

Questionnaire_Center for Geological Survey.docx

Questionnaire_Center for Groundwater Resources and Environmental Geology.docx

Questionnaire_Center for Volcanology and Geological Hazard Mitigation.docx

Reference Data

CGR_Mining Act_Lisence

CGR_hardware & software.pdf

CGREG_database groundwater 2014.pptx

CGREG_PROFIL_psdagl-1.ppt

CGS_Outline_PSG_Geological_Map.ppt

CGS_Pres_BI_database.ppt

Geologica Agency_WebGIS_Organization Structure_Oct 2013.pdf

Geological Agency.pptx

Marine Geological Institute (MGI).pdf

Organization Structure_MEMR_2013.pdf

Workshop

one-page program indonesia_final.xls

Ohno_q_id.ppt

Q&A_Indonesia

Day 1- 12 May 2014 - Q & A_ GA Indonesia.docx

Day 2- 13 May 2014 - Q & A_ GA Indonesia.docx

Day 4- 16 May 2014 - Group Discussion & Remote Sensing_ GA Indonesia.docx

List of participants

List of participants_Indonesia.xlsx

3. Cambodia

Questionnaire

Questionnaire_Reviewed_Cambodia.docx

Reference Data

Q_Atch01_Chart.pdf

Q_Atch02_Miining_law.pdf

Q_Atch03_License.pdf

Q_Atch04_Mining_sector.pdf

Q_Atch05_Environ_law.pdf

Flowsheet for appying mineral licenses Cambodia.pdf

Policy Brief-Artisanal and Small-Scale Mining-Eng.pdf

Workshop

one-page program Cambodia_V2.xls

Ohno_q_kh.ppt

Q&A_Cambodia

Day 1- 26 May 2014 - Q & A_ GS Cambodia.docx

Day 2- 27 May 2014 - Q & A_ GS Cambodia.docx

Day 2- 27 May 2014 - Q & A_ GS Cambodia_Uchida.docx

Day 4- 29 May 2014 - Q & A_ GS Cambodia.docx

Group Discussion_Cambodia

Group I.pptx

Group II.pptx

Group III.pptx

Group Discussion.docx

List of participants

List of Participant_Cambodia.docx

4. Laos

Information collection

Department of Mines_Laos_briefing_120316_1.pdf

DGEO_briefing_120316_3.pdf

Questionnaire

Questionnaire_DGM (Department of Geology and Minerals)

Questionnaire_DoM (Department of Mines)

Reference Data

organization structure_DGM

Q_Atch 1_Organization chart_DoM

Q_Atch 2_Law on Minerals (English)

Q_Atch 3_Procedure for Mining License

Q_Atch 4_Tenement UPDATE 14 03 2014 1(rev)

Q_Atch 5_Decree on the Implementation of the Investment Promotion Law_2009

Q_Atch 6_Investment Promotion Law2009

Workshop

one-page program Laos_revised.xls

Ohno_q_la.ppt

Geological and Minerals in Lao PDR_Kuangnuvong Telpvongsa.pptx

Thai-Lao 2013_Romote-sensing Interpretation.pptx

Status of Seamless Geological Mapping at Thai-Laos border Area_discussion.pdf

Group Discussion_Laos

Group 1.pptx

Group 2_1.pptx

Group 2_2.pptx

Group 3.pptx

Q&A_Laos

Day 1- 9 Jun 2014 - Q & A_DoM Laos.docx

Day 2- 10 June 2014 - Q & A_DoM Laos.docx

Day 3- 11 June 2014 - Q & A_DoM Laos.docx

Day 4 and 5- 11 June 2014 - Q & A_DoM Laos.docx

List of participants

one-page program Laos_revised.xls

5. Vietnam

Questionnaire

Questionnaire_Vietnam_finalized.docx

Reference Data

Atch01_Vietnam_CENTER INFORMATION STORAGE AND GEOLOGY_Vietnam.pdf

Atch02_Vietnam_Vitnam's 2010 Mineral Law.pdf

Atch03_Vietnam_LAW On environmental protection_Vietnam.pdf

Workshop

one-page program VietnamUpdated140628.xls

GeoMapVN_presentation by Mr. HAI.ppt

Ohno_q_vn.ppt

Group Disucussion_Vietnam

Group 1 Wrap_Up in vietnam.ppt

Group 2 Presentation

Group 3 Final Presentation.ppt

Q&A_Vietnam

Day 1- 23Jun 2014 - Q & A_CIAG_Vietnam.docx

Day 2- 24Jun 2014 - Q & A_CIAG_Vietnam.docx

List of participants

List of Paticipants_Vietnam.xls

6. Myanmar

Questionnaire

Questionnaire_Myanmar modified

Reference Data

Atch01_Training Program and Workshop

Atch02_Project with GTK (Finland)

Atch03_The Myanmar Mining Law

Atch04_The Myanmar Mines Rules

Atch05_FIL English Version_ 29-1-2013_

Atch06_FIL RulesEnglish Versions__31.5.13__Latest_

Atch07_FIL-notification _English_ A4

Atch08_Environmental Conservation Law

Atch09_The Forest Law_1992

Workshop

one-page program Myanmar_140707.xls

Ohno_q_mm.ppt

Group Discussion_Myanmar

Group-1.pptx

Group-1_xml version.docx

Group-2.pptx

Group-3_4.pptx

Group-5.pptx

Group-6.pptx

Q&A_Myanmar

Day 1- 7 Jul 2014 - Q & A_Myanmar_edit1.docx

Day 2- 8 Jul 2014 - Q & A_Myanmar_edit1.docx

List of participants

List of participants_Myanmar.xls

7. Summary of six countries

Summary of Questionnaire

(2) Accompanying materials derived from the Workshop in Japan

List of Participants

Program

Country Report

Comments from the participants

(3) Accompanying materials derived from the Second On-site Works

List of participants and Program

1. Cambodia

2. Myanmar

3. Vietnam

4. Laos

5. Thailand