

Department of Disaster Prevention  
and Mitigation, Ministry of Interior  
Ministry of Education  
The Kingdom of Thailand

# **The Project on Capacity Development in Disaster Management In Thailand**

## **Final Report**

**September 2008**

**Japan International Cooperation Agency**

**EARTH SYSTEM SCIENCE CO.,LTD.**

**IDEA Consultants, Inc.**

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- A. PDM0, PDM1, PDM2
- B. Minutes of Meetings
- C. Input from Japanese Side and Thai Side
- D. Collected Material List

**Appendix II (Digital Format in the Attached DVD)**

- 1-1 Hazard Map Preparing Manual
- 1-2 Guide Book for GIS Data Base
- 1-3 Updating Manual
- 2-1 White Paper
- 3-1 e-learning material
- 4-1 CBDRM Facilitator Guide
- 4-2 CBDRM Community Guide
- 5-1 Side Reader (Landslide)
- 5-2 Teachers Guide (Landslide)
- 5-3 Side Reader (Flood)
- 5-4 Teachers Guide (Flood)
- 5-5 Side Reader (Tsunami)
- 5-6 Teachers Guide (Tsunami)
- 6 Gender Report
- 7. Media Broadcasted
- 8. Weekly Report
- 9. Picture



**Location Map**

## ABBREVIATIONS

A	ADPC	Asian Disaster Preparedness Center
	ADRC	Asian Disaster Reduction Center
	AIT	Asian Institute of Technology
C	C/P	Counterpart
	CBDRM	Community Based Disaster Risk Management
D	DIG	Disaster Imagination Game
	DTRAC	Disaster Tracking Recovery Assistance Center
	DMR	Department of Mineral Resource
	DWR	Department of Water Resources
G	GIS	Geographic Information System
	GISTDA	Geo-Informatics and Space Technology Development Agency
M	MOA	Ministry of Agriculture
	MOE	Ministry of Education
	OBEC	Office of the Basic Education Commission
	ESAO	Educational Service Area Office)
	MOI	Ministry of Interior
	DDPM	Department of Disaster Prevention and Mitigation
	DPMA	Disaster Prevention and Mitigation Academy
	DPMRC	Disaster Prevention and Mitigation Regional Centre
	DPMPO	Disaster Prevention and Mitigation Provincial Office
	MOL	Ministry of Skills and Development in Ministry of Labor
	MSDH	Department of Gender in Ministry of Social Development and Human Security
J	JAXA	Japan Aerospace Exploration Agency
	JICA	Japan International Cooperation Agency
O	ODA	Official Development Assistance
	OTOS	One Tambon One Search and Rescue Team
P	PDM	Project Design Matrix
	PO	Plan of Operation
R	R/D	Record of Discussion
	RESTEC	Remote Sensing Technology Center of Japan
	RID	Royal Irrigation Department
S	SNAP	Strategic National Action Plan on Disaster Risk Reduction
T	TMD	Thai Meteorological Department
	TICA	Thailand International Development Cooperation Agency
V	VDPM	Village Disaster Prevention Management Committee

## **1-1 Introduction**

In response to the proposals of the Government of the Kingdom of Thailand, the Government of Japan has decided to cooperate on the Japan Thailand Technical Cooperation Project on Capacity Development in Disaster Management in Thailand (hereinafter referred to as “the Project”) in accordance with the Agreement on Technical Cooperation between the Government of Japan and the Government of the Kingdom of Thailand signed on November 5, 1981 and the Note Verbal on the Project by Embassy of Japan No. 208/17 dated 2, May 2005 and by Thailand International Development Cooperation Agency of Ministry of Foreign Affairs No.0210/12418 dated 13 May 2005.

Based on the decision above, Japan International Cooperation Agency (hereinafter referred to as JICA), the execution agency responsible for the implementation of the technical cooperation program of the Government of Japan, will cooperate with the authorities concerned of the Government of the Kingdom of Thailand for the Project.

JICA and the Thai authorities concerned had a series of discussions on the framework of the Project. As a result of the discussions, JICA and Department of Disaster Prevention and Mitigation, Ministry of Interior (hereinafter referred to as “DDPM”) and the Ministry of Education (hereinafter referred to as “MOE”), the Thai implementing agencies of the Project, agreed on the matters referred to in the document “Record of Discussions” and “Minutes of Meeting”.

Accordingly based on the agreement above, JICA dispatched an expert team headed by Dr. Nakamura Satoshi on August 29, 2006. The expert team submitted an “Inception Report” to DDPM and MOE and explained it to the Joint Coordination Committee on August 30, 2006. The Expert team and Thai authorities concerned had a series of discussions on the contents of the Project. As a result of the discussions, the outline of the Project agreed on the matters referred to in the document “Minutes of Meetings on Inception Report for the Project on Capacity Development in Disaster Management in Thailand”.

The expert team has conducted many activities such as discussions, site reconnaissance, collection of information, workshops and preparation materials under the cooperation of the staffs of related agencies and community people in Phase 1 from September 2006 to March 2007.

Continuously, activities have been executed for phase 1 from May 2007 to October 2007, phase 3 activities from November 2007 to March 2008 and phase 4 from April to August 2008.

## 1-2. Objectives / output of the Project

<Overall Goal>

To enhance the capacity for disaster risk management against future disasters at central, provincial, district and community levels.

<Project Purpose>

- Capacity of DDPM is enhanced as a principal national government agency to carry out the tasks and responsibilities of disaster management.
- People's capacity for disaster management is improved through the enhancement of national and local educational services, as well as strengthening the regional organizations of DDPM and MOE.

<Output of the Project and Task Force>

Output of the project and its responsible task force is tabulated in Table 1-1.

**Table 1-1 Output of the Project and Task Force**

	Output of the Project	Task Force Name
1	A system which collects, accumulates and utilizes information on disaster and disaster risk management is established in DDPM.	TF1 : Disaster Management Plan TF2 : Hazard map
2	Relationship and communication between DDPM and other related organizations are strengthened through publishing a White Paper and formulating a National Disaster Prevention and Mitigation Plan.	TF1 : Disaster Management Plan TF2 : Hazard map
3	The system for enhancing the capacity of DDPM staff on natural disaster management is strengthened.	TF5 : Training
4	Capacities of DDPM staff and village people are enhanced to promote disaster management activities at village level.	TF3 : Early Warning system TF4 : Evacuation Drill (TF1 : Disaster Management Plan)
5	Capacities of MOE staff and teachers at model schools are enhanced to promote education for disaster preparedness at schools.	TF6 : Education

## 1-3 Organization of Task Force and meetings

Organization of the task force is tabulated in Table 1-4.

**Table 1-2 Organization of the Task Force**

Project Director	
Project Manager (DDPM)	Project Manager (MOE)
Task Force Coordination Unit	
TF1	DDPM, MOE, DMR, DOLA, DOPA, RID, TMD, WRD, Red Cross, DRC
TF2	DDPM, MOE, DMR, DOLA, DOPA, GISTDA, RID, TMD, WRD
TF3	DDPM, NDWC, MOE, DMR, DOLA, DOPA, RID, TMD, WRD
TF4	DDPM, MOE, DMR, DOLA, DOPA, RTP, TRC, NDWC, RID, TMD, WRD, DRC
TF5	DDPM, MOE, DMR, DOLA, DOPA, RID, TMD, WRD
TF6	MOE, DDPM, DMR, DOLA, DOPA, RID, TMD

**Table 1-3 Main Meeting of Joint Coordination Committee and Task Force**

Date	Type of Meeting	Outline of the Meeting
Aug 31, 2006	JCC	Explanation of Inception Report Schedule of the Project
Oct. 24, 2006	TF2	Policy and program of the activity
Nov. 8, 2006	TF5	Policy and program of the activity
Nov. 24, 2006	TF6	Policy and program of the activity
Dec. 14, 2006	TF2	Principle of Hazard map preparation Request for the material
Dec. 20, 2006	TF6	Confirmation of the Program of the Activity
Dec. 21, 2006	TF1	Policy and program of the activity
Jan. 4, 2007	TF1, 3,4 (PCM)	Contents of the program, revision of PDM
Jan. 30, 2007	TF3,4	Situation of Pilot project Policy and program of the activity
Feb. 10, 2007	TF5	Policy and contents of teaching material
Feb. 15, 2007	TF1	Report of 1st year activities Policy of 2nd year activities
Mar. 7, 2007	JCC	Explanation of progress report Report of 1st year activities Policy of 2nd year activities Approval of revised PDM
June 12, 2007	TF6	Report of 1st year activities Policy of 2nd year activities

		C/P training
July 1, 2007	TF2	Outline of Hazard map and GID data base
Oct. 24, 2007	TF2	Unification of coordinates Utilization of hazard map and data base
Nov. 14, 2007	TF1	White paper contents and assignment
Nov. 28, 2007	JCC	Progress and output of the project Revision of the PDM
Dec. 15, 2007	TF5	e-learning material contents
June 19, 2008	JCC	Evaluation report Progress and output of the project
July 4, 2008	TF1	Approval of the white paper

#### **1-4 Summary of the Activity and Output**

Outline of the project output is tabulated in Table 1-4.

#### **1-5 Project Design Matrix (PDM)**

PDM0 was revised to PDM 1 on February 2007 based on the PCM meetings and several discussions. PDM1 was approved in the JCC meeting on March 2007.

PDM1 was revised to PDM2 on November 29 mainly based on the discussion among counterparts, the JICA expert team and the JICA head office mission. PDM2 was approved in the JCC meeting on November 29, 2007.

These three PDM are attached in Appendix A

#### **1-6 Operational Schedule**

The actual operation schedule is shown in Table 1-5.

#### **1-7 Input from Japanese Side and Thai Side**

Actual input for the Project is summarized in Appendix C.

**Table 1-4 Main Achievement**

Output	Main Achievement
<p>A system which enables the collection, accumulation and utilization of information on disaster and disaster risk management is established in DDPM</p>	<p>A GIS database was developed in the Information Technology Centre of DDPM with close cooperation and data provision from relevant organizations and agencies, namely the Department of Mineral Resources (DMR), the Department of Water Resources (DWR), the Thai Meteorological Department (TMD), and the Geo-Informatics and Space Technology Development Agency (GISTDA). The discussions in Task Force 2 highlighted the important role of hazard maps in formulating a disaster prevention plan in the future. Hazard maps at provincial and community levels were also developed in two the pilot sites. To utilize the database and hazard maps properly, 'Manual for developing provincial hazard maps' and 'Guide book for the utilization of hazard maps and GIS database' were also developed as originally planned. CPs are on their own initiative planning to conduct seminars for regional and provincial officers to demonstrate the use of the database and hazard maps in daily operations in accordance with these technical materials. However, a lack in the number of engineers who have mastered GIS technology may hinder the effective utilization of the GIS database in formulating disaster prevention and mitigation plans nationwide.</p>
<p>Relationship and communication between DDPM and other relevant organizations are strengthened through publishing a White Paper and formulating a National Disaster Prevention and Mitigation Plan</p>	<p>Some activities under Output 2, have been delayed. This delay was brought about through difficulties in collaboration among the relevant organizations and agencies in the disaster management sector, especially at the beginning of the Project. However, the White Paper will be published by August 2008 due to combined efforts of both Thai C/Ps and Japanese experts. There is a plan to publish the White Paper annually by the National Disaster Policy Division in DDPM.</p> <p>Since the National Disaster Prevention and Mitigation Act was approved in November 2007, the Project has supported DDPM in the formulation of the National Disaster Prevention and Mitigation Plan and the Provincial Disaster Prevention and Mitigation Plan. This activity has been affected by external conditions such as the policy change in regard to the National Disaster Prevention and Mitigation Plan.</p> <p>In the middle of the Project, the concept of gender integration on disaster management was introduced by the Project, which had not been reflected in the PDM. At the time of the terminal evaluation, it seems that it will take more time for DDPM to adopt the concept of gender into their operation. A working group has been set up under the Personnel division for information sharing among related agencies, namely, the Department of Gender in Ministry of Social Development and Human Security (MSDH), the Royal Department of Irrigation in Ministry of Agriculture(MOA) and the Department of Skills and Development in Ministry of Labor(MOL).</p>
<p>The system for enhancing capacity of DDPM staff on natural disaster management is strengthened.</p>	<p>Under the collaboration among the working group for e-learning systems, e-learning materials have been developed properly to improve knowledge on natural disasters, such as floods, landslides, earthquakes and tsunamis. A utilization plan for e-learning was formulated as planned. According to the plan, materials will be distributed nation-wide, not only to the DDPM, but also to other departments and agencies by the end of the project period. At the same time, a questionnaire survey will be conducted to investigate the needs of end-users, which will be reflected in further improvement of e-learning materials.</p> <p>A working group was organized in DDPM to formulate a master plan for DPMA. A chapter on natural disasters, which is one part of DPMA's master plan, was prepared with knowledge sharing among C/Ps and Japanese Experts, and subsequently submitted to DPMA.</p>

<p>Capacities of DDPM staff and village people are enhanced to promote disaster management activities at village level.</p>	<p>DDPM staff and village people providing disaster prevention services in pilot sites have improved their knowledge and practice on natural disaster prevention through participation in the activities carried out by the Project. 'Manuals for CBDRM' and 'Facilitator's guide' were developed for the DDPM, DPMPO staffs and village chiefs to carry out CBDRM activities and expand its activities to other villages in disaster-prone areas. Templates for the disaster prevention and mitigation plan have been formulated at three levels, which cover province, district and Tambon, and will be distributed with said CBDRM materials. Interviews undertaken on DDPM staff involved in activities under Output 4 confirmed that they gained not only the basic concepts, but the know-how to carry out the CBDRM and the experience in the activities in pilot sites.</p> <p>Based on the community hazard map and disaster preparedness plans, the Village Disaster Prevention and Mitigation Committees in two pilot sites were organized in Nong Rieng and Nam Hoo villages, respectively. Since a participatory approach was adopted in the village disaster prevention plan, villagers have well recognized the countermeasures for natural disaster and necessity of having a disaster prevention system, such as Village Disaster Prevention and Mitigation Committee.</p> <p>During the field interview with villagers conducted by the evaluation team, the difficulty in decision making for an evacuation was pointed out due a lack of analytical skills in regard to early warning.</p>
<p>Capacities of MOE staff and teachers at model schools are enhanced to promote education for disaster preparedness at schools.</p>	<p>Throughout the Project duration, the planning and formulation process of a supplementary reading and a teacher's guide book have been prepared by many participants, namely OBEC, ESAO, the three model schools . These materials will be distributed to all public schools as originally planned, and MOE is additionally planning to distribute them to all private schools as well. The final workshop will be conducted by teachers at a model school at the beginning of July 2008. Neighboring school teachers, relevant education officers and DDPM staff were invited to the workshop with the aim of disseminating the concept and practice of disaster preparedness education. The action plan on disaster preparedness education will be formulated during the workshop at schools. However, interviews undertaken with teachers confirmed support of MOE for school should be strengthened to continue conducting disaster preparedness education at their schools.</p>

Table 1-5 Actual Operation Schedule

REVISED DETAIL PLAN OF OPERATION (PO2, Revised November 2007)

No.	activity	year / month	2006					2007					2008														
			8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
0	Set up Taskforces																										
1-1	Collect and review related information (past major disasters, countermeasures, projects)																										
1-2	Prepare hazard maps of Chumporn and Mae Hong Sorn province for disaster management																										
1-3	Prepare manual for developing provincial hazard map																										
1-4	Prepare community hazard maps at pilot areas (flood, landslide)																										
1-4-1	Develop base map for community hazard maps based on the provincial hazard maps																										
1-4-2	Verify base maps based on the site inspection																										
1-4-3	Reflect necessary information such as evacuation places and disaster vulnerable spots into base maps based on community based disaster management activities																										
1-5	Develop GIS Database for disaster management																										
1-5-1	Collect informational materials and hazard maps prepared by other agencies																										
1-5-2	Accumulate collected information into GIS database																										
1-5-3	Document procedure for updating GIS database																										
1-6	Prepare guidebook for utilization of hazard map and GIS database																										
2-1	Compile and publish White Paper																										
2-1-1	Discuss the role and contents of White Paper																										
2-1-2	Draft each chapter																										
2-1-3	Review the draft and publish White Paper																										
2-2	Formulate outline of National Disaster Prevention and Mitigation Plan																										
3-1	Establish e-learning course on natural disaster management																										
3-1-1	Prepare draft of e-learning materials																										
3-1-2	Review and revise draft of e-learning materials																										
3-1-3	Prepare utilization plan of e-learning materials																										
3-1-4	Distribute materials and execute e-learning																										
3-2	Formulate master plan of DPMA on natural disaster																										
4-1	Select three pilot sites: one each for tsunami, flood and landslide																										
4-2	Implement DIG and evacuation drill at selected pilot sites																										
4-3	Establish community-based early warning system at selected pilot sites																										
4-4	Develop a manual on CBRDM at community																										
4-5	Develop a facilitator's guide on CBRDM for DDPM staff																										
4-6	Formulate village level disaster preparedness plan at two pilot sites (flood, landslide)																										
4-7	Develop template of provincial, district and tambon disaster prevention and mitigation plan																										
5-1	Study the current situation of education for disaster preparedness in Thailand and introduce experience as well as the best practice of Japan																										
5-1-1	Collect information on education for disaster prevention in Thailand																										
5-1-2	Hold workshops to introduce the experience in Japan																										
5-1-3	Conduct counterpart training in Japan																										
5-2	Review the current structure of organizations for the community empowerment focusing on education for disaster preparedness																										
5-3	Develop side readers and teacher's guide for primary and secondary schools																										
5-3-1	Prepare side readers and the teacher's guides (tsunami, landslide and flood) for primary and secondary schools																										
5-3-2	Distribute side readers and teacher's guides (tsunami, landslide and flood) for primary and secondary schools																										
5-4	Develop training program for teachers on disaster preparedness																										
5-5	Select 3 model schools and 6 associate model schools for education on disaster preparedness																										
5-6	Conduct workshops and lectures for raising the awareness (including DIG) in each model school																										
5-7	Formulate action plan to promote disaster preparedness at schools																										
	Phase		Phase1					Phase2					Phase3														
	Report		Δ																								
			IC/R																								



## **2. Activity and Achievement of Each Output**

### **2-1 Hazard Map and GIS Data Base**

System which collects, accumulates and utilizes information on disaster and disaster risk management is established in DDPM

#### **2-1-1 Understanding of the current situation in Thailand**

##### **1) Disaster Information and Utilization by Related Organizations**

Several agencies / organizations in Thailand have conducted disaster management activities such as hazard mapping and early warning for natural disasters. The JICA expert team and DDPM counterparts have studied this information with the cooperation of Task Force 2. The present major activities by such agencies are summarized in Table 2-1-1 and Table 2-1-2

Each agency and organization has been conducting such activities on an individual basis until now. They understand that the DDPM must have responsibility to integrate and organize such activities and disaster management in Thailand and concluded that they will provide information and technical assistance to DDPM through the Task Force 2 meeting.

**Table 2-1-1 Activities of related agencies**

<b>Agency</b>	<b>Abbr.</b>	<b>Major activities</b>
Thai Meteorological Department	TMD	<ul style="list-style-type: none"> <li>• Meteorological observation (major cities)</li> <li>• Warning of heavy rain and wild storms based on observation</li> <li>• Public information of meteorological data at post-disaster.</li> </ul>
Royal Irrigation Department	RID	<ul style="list-style-type: none"> <li>• Hydrologic and hydraulic observation of major rivers</li> <li>• Forecast of water levels at observation stations based on runoff analysis</li> <li>• Warning of floods through Web sites</li> </ul>
Department of Mineral Resources	DMR	<ul style="list-style-type: none"> <li>• Hazard mapping for landslides based on geological / topographical data</li> <li>• Field survey at post-disaster. Transmission of disaster information</li> <li>• Early warning for landslides using local networks</li> </ul>
Department of Water Resources	DWR	<ul style="list-style-type: none"> <li>• Hazard mapping for landslides and floods</li> <li>• Telemeter system for watershed management at mountain regions</li> <li>• Assistance for recovery of water resources after disasters</li> </ul>
Land Development Department	LDD	<ul style="list-style-type: none"> <li>• Hazard mapping for landslides</li> </ul>
Geo-informatics and Space Technology Development Agency	GISTD A	<ul style="list-style-type: none"> <li>• Remote sensing analysis of wide variety of natural disasters</li> <li>• Public information on analyzed map by remote sensing</li> </ul>

**Table 2-1-2 Implementing agencies for each task**

<b>Tasks</b>	<b>Agencies</b>	
Meteorological and hydrologic observation	<ul style="list-style-type: none"> <li>• TMD:</li> <li>• RID:</li> <li>• DWR:</li> </ul>	Observation station at major cities for metrological data Observation station at major rivers for river management Observation station at mountain region for watershed management
Hazard mapping	<ul style="list-style-type: none"> <li>• TMD</li> <li>• RID</li> <li>• DMR</li> <li>• DWR</li> <li>• LDD</li> </ul>	Hazard mapping as each individual project Flood forecasting (no hazard map) Landslide hazard map for each provincial Landslide and flood hazard maps Landslide hazard maps?
Early warning	<ul style="list-style-type: none"> <li>• TMD</li> <li>• RID</li> <li>• DWR</li> </ul>	Public information on weather forecasting and warning to agencies Flood forecasting trough Web-site and to local governments Individual early warning system using telemeter system
Community disaster management act.	<ul style="list-style-type: none"> <li>• DMR</li> <li>• DWR</li> </ul>	Individual activities using local networks? unspecified
Public Information at post-disaster	<ul style="list-style-type: none"> <li>• TMD</li> <li>• DMR</li> <li>• GISTDA</li> <li>• DDPM</li> </ul>	Meteorological information though various media Disaster information based on technical field survey Satellite image and affected area information Official information to government

**2) Disaster Information and Utilization by DDPM**

Three types of databases have been developed or started in DDPM as shown in Table 2-1-3. The disaster data accumulation and reporting to the government that was conducted by the Disaster Mitigation Directing Center is one of the most important tasks of DDPM. The information network system has been working well and the past five years disaster records have been accumulated. However from the viewpoint of “utilization”, the implementation is not specific and there are not enough plans using such records.

**Table 2-1-3 Existing Database in DDPM**

<b>Bureaus</b>	<b>Activities</b>
Disaster Mitigation Directing Center	<ul style="list-style-type: none"> <li>• Emergency reports of newly occurred disasters to DDPM head office from Regional DPM offices. It must be explained and updated continuously during the disaster period by FAX.</li> <li>• Collected data is accumulated into Excel format and submitted as weekly, monthly and yearly reports to the Cabinet and related agencies. Those reports are also open to the public through DDPM Web-site.</li> <li>• The information network system has been working well. Past five years disaster records have been accumulated..</li> </ul>
Information Technology Center	<ul style="list-style-type: none"> <li>• MIS system, which is a web-database system, was installed in the project of DDPM and Chulalongkorn University. Installing to the Regional DPM office has already been done and it has been in operation since Sep. 2007.</li> <li>• It is obligated for regional and provincial DPM offices to update data after a disaster.</li> </ul>

	<ul style="list-style-type: none"> <li>• Data collection is working well at present. However there is lack of uniformity on updating contents and frequencies.</li> <li>• Because of insufficiency of server capacity control, it has not gone public at present.</li> </ul>
Research and Development Sub-Bureau	<ul style="list-style-type: none"> <li>• This bureau is in charge of the“Database Committee”, which includes the above two bureaus as members. The main purpose is utilization for a disaster management plan.</li> <li>• Since it is in the data collection stage, detail management and operation has been unconfirmed.</li> </ul>

### 3) Task and activity in the project

For effective utilization using accumulated disaster information, it is essential to conduct substantial activities under the cooperation of related agencies.

First the JICA expert team and Task Force 2 members concluded that development of a provincial scale hazard map, in which high risk communities and villages can be visually identified, is necessary for the provincial / regional disaster management plan. Preparing the hazard map needs the cooperation of related agencies. It could be expected to strengthen the relationship with each agency.

Furthermore, utilization of such a developed hazard map, such as extraction of risk communities and implementing into the community, was discussed at the Task Force 2 meeting. The outlines of activities are summarized in the 3 items below..

- ① Provincial level hazard mapping and technical transfer
- ② Data collection from related agencies and development of GIS database
- ③ Technical assistance on utilization of a hazard map and GIS database

#### 2-1-2 Activity and Achievement

##### 1) Collect, review and monitor related information

Data collection has been carried out by DDPM counterparts and the JICA expert team under the cooperation of Task Force 2 organizations. Task Force meetings were held to ask for the collection of the information and discuss the activity for this output. Furthermore three Japanese experts of flood, landslides(geo-hazard) and tsunami conducted the collection of information and site reconnaissance with the cooperation of counterparts from DDPM and related agencies. The major agencies and organizations reporting are shown in Table 2-1-4.

**Table 2-1-4 Major agencies for hearing**

Class	Agencies	Major task of each agencies
Administrative Agencies	<ul style="list-style-type: none"> <li>• RID</li> <li>• DMR</li> <li>• DWR</li> <li>• ETSD</li> <li>• GISTDA</li> </ul>	Irrigation / River management Development of mineral resource / Disaster investigation Watershed / water resource management Surveying / Products on geographical issues Satellite data analysis / remote sensing / distribution of satellite image
Research institute and others	<ul style="list-style-type: none"> <li>• AIT</li> <li>• ESRI</li> <li>• JAXA</li> </ul>	Research on information networks Distribution of GIS software / consulting on GIS solution Utilization of satellite data / distribution of satellite image

**2) Prepare Provincial Hazard Map**

Developing a provincial scale hazard map is essential for DDPM and local governments to conduct regional disaster management activities. In the project the JICA expert team and DDPM counterpart prepared a hazard map on floods at Chumporn province and debris / mud flow at Mae Hong Son province.

On the other hand, some agencies such as the Department of Mineral Resources and Land Development Department have already developed hazard maps based on their own targets. The existing hazard maps in Thailand are summarized in Table 2-1-5.

**Table 2-1-5 Hazard Maps Developed in Various Agencies**

Agencies	Type of Disaster	Method	Remarks
DDPM	Mudslide, Flood	Layer Analysis By GIS	* It is a statistical assessment method by several weighted geo-information layers e.g. geology, slope, land use and precipitation. * While this method is effective to assess the in-situ stability in the mountain region, it is unsuitable for risk assessment of protection area at a distance from the disaster source, such as debris flow.
DMR	Landslide, Flashflood		
DWR	Mudslide, Flood		
LDD	Mudslide, Flood		
GISTDA	Flood, Tsunami etc.	Satellite Image Analysis	* Extraction of disaster affected areas (especially floods) using satellite image analysis. * It is merely historical data, however, the accumulation of such data could be used for hazard maps
RID	Flood	Hydrologic Analysis	* Estimated water levels analyzed by runoff and inconstant flow analysis at the main rivers are given to the public through the RID web-site. * The map is limited to the basin of the rivers observed by RID.

Most of the hazard maps shown in the above table employed the GIS layer analysis method. The layer analysis method by GIS is a statistical assessment method by superposition of several weighted geo-information layers e.g. geology, slope, land use and precipitation. This method is one of the most popular analysis methods by using GIS.

However, although this method is effective to assess the in-situ stability such as in the mountain area, it is unsuitable to assess the disaster prone area for risk assessment such as debris flow. For example the “Master Plan for Flood, Windstorm and Mudslide Hazards Prevention, Mitigation and Recovery Services in Emergency Period (5-Year Master Plan)”, points out that the number of risk villages extracted on hazard maps by each organizations are completely different, besides most of the affected areas in the 2005 disaster at Mae Hong Son province are not designated as risk areas.

RID monitors and predicts water levels of some major rivers in Thailand. This data is opened to the public. This information is actively utilized for disaster management in Thailand.

Through the above findings and discussion between DDPM, Task Force 2 and the JICA expert team, it is concluded that the development of a unified and comprehensive hazard map which can be utilized for disaster prone area assessment is essential for Thailand.

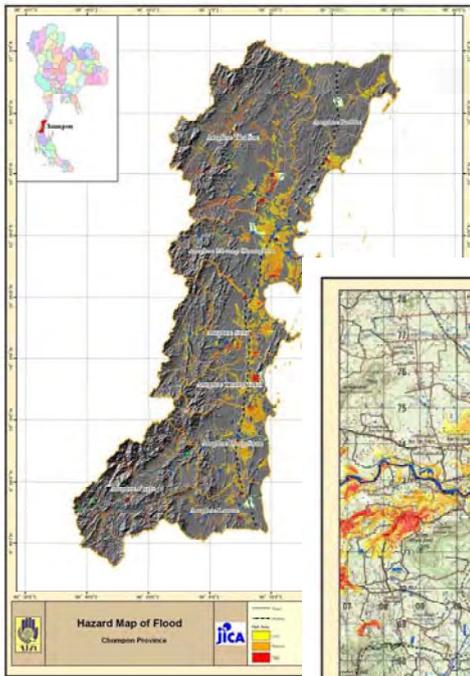
The policy of the hazard map development was discussed and confirmed as follows:

1. The hazard map must be evenly prepared in the whole area of Thailand regardless of the available data at each location.
2. The hazard map must be a base map for the community level hazard map.
3. The hazard map must show the risk of residential areas, but not mountain areas.
4. The hazard map must be in accordance with historical affected areas.

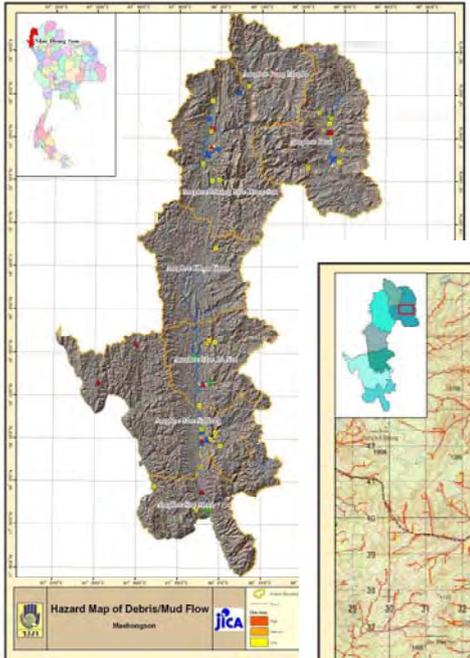
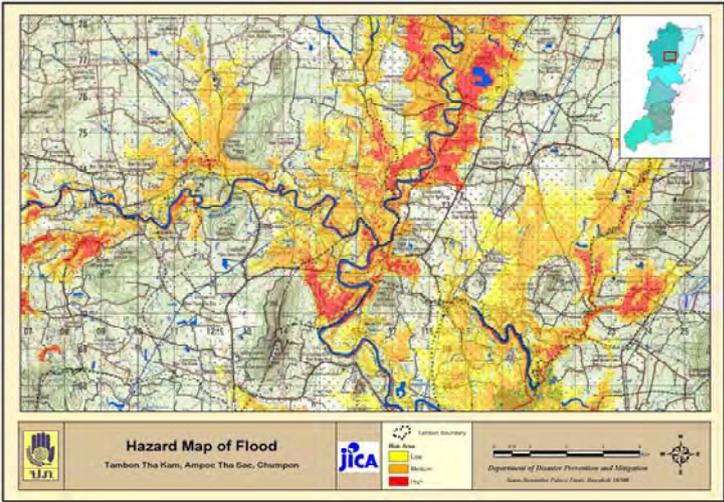
For risk area analysis the GIS spatial analysis method which requires less experience of scientific knowledge and specialized techniques is employed. For this analysis, a high-spec desk-top computer, GIS software (Arc GIS including Spatial Analyst) and DEM (Digital Elevation Model) from Royal Thai Survey Department were purchased from the JICA budget. The summary of analysis methods is shown in Table 2-1-6. The example of provincial hazard maps is shown in Fig 2-1-1.

**Table 2-1-6 Summary of procedure of analysis**

Type of Hazard Map	Methodology
Hazard Map for Flood	<ul style="list-style-type: none"> <li>• Extract stream with watershed more than 100 km<sup>2</sup>.</li> <li>• Extract river levels from lowest elevation of DEM along the river.</li> <li>• Analyze inundation area at each river section by uplifting water levels every one meter,</li> <li>• Assess risk level based on the each inundation depth.</li> </ul>
Hazard Map for Debris / Mud Flow	<ul style="list-style-type: none"> <li>• Extract debris flow risk stream (source) which has a stream bed more than 15 degrees and a watershed more than 5 ha.</li> <li>• Classify the risk stream based on discharge amount.</li> <li>• Analyze “Cost Path Distance” from each risk stream using cost of discharge amount, spread cost, stream bank height, surface slope and aspects.</li> <li>• Assess risk level compared with historical affected areas.</li> </ul>



**FLOOD HAZARD MAP  
In Chumpon Province**



**DEBRIS/MUD FLOW HAZARD MAP  
In MaeHongSon Province**

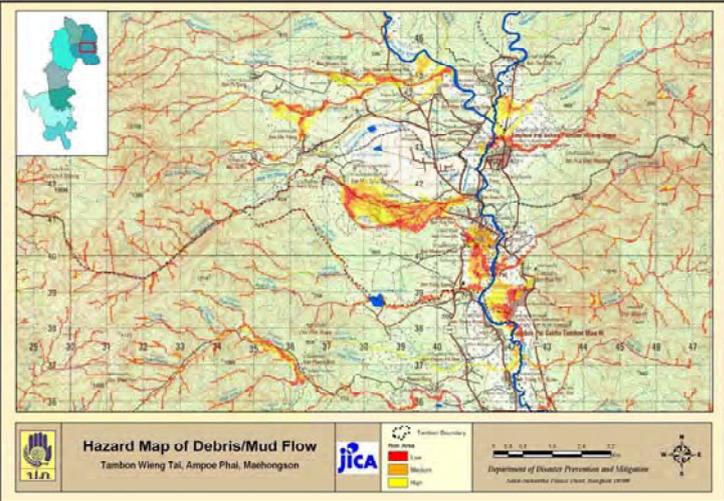


Figure 2-1-1 Example of Hazard Map

### 3) Prepare Manual for Developing Provincial Hazard Map

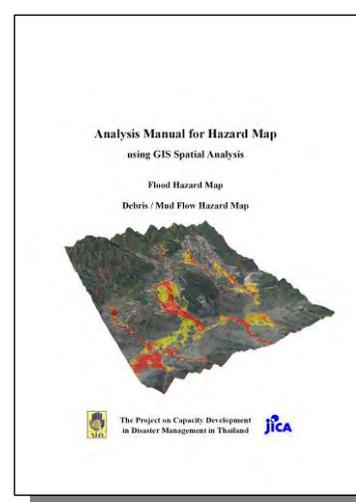
The activity concerning developing a provincial scale hazard map has been conducted with the Disaster Prevention Measure Bureau in DDPM as a counterpart. The Disaster Prevention Measure Bureau is one of the responsible bureaus for Task Force 2. Since GIS hazard mapping requires some basic skill of GIS analysis, the technical discussion and assistance was given to a few staff of this bureau that have experience of GIS analysis.

Therefore the JICA expert team and DDPM counterpart 1) prepared a manual for hazard mapping, besides 2) held training courses for GIS analysis and hazard mapping for dissemination to DDPM.

#### **a) Analysis manual for hazard map**

The manual for hazard mapping was prepared by the JICA expert team and DDPM counterparts. Based on the problem of the existing hazard map and the concept of the new hazard map, it was composed of a step-by-step procedure using extensive figures. All the staff that has less experience of GIS analysis could produce a hazard map using this manual. The manual will be revised by DDPM counterparts and distributed to regional offices.

The methodology of hazard mapping analysis is based on the concept that it must be evenly prepared regardless of the available data at each location. Thus it has not enough accuracy for a large scale map. For such a large scale hazard map, it is necessary for analysis using the hydrologic method.



#### **b) Training on GIS / Hazard mapping**

Most of the counterparts of the Disaster Prevention Measure Bureau are civil engineers. However they have no experience of GIS analysis. Thus an intensive training course for basic GIS analysis skill and outline of hazard mapping was held in a two weeks curriculum shown in Table 2-1-7. More than 10 staff of DDPM attended the training course through the curriculum. All the participants had strong motivation on GIS analysis and hazard maps. Despite the limited time, the minimum amount of technical transfer to prepare hazard maps has been carried out.

**Table 2-1-7 Training schedule on GIS / hazard mapping**

Date	Contents		Participant
6 / May	<ul style="list-style-type: none"><li>• Introduction</li><li>• Lesson1</li><li>• Lesson2</li></ul>	Outline and basic knowledge of GIS Data structure of GIS and layout methods Process of GIS attribution table and output	13
7 / May	<ul style="list-style-type: none"><li>• Lesson3</li></ul>	Basic skills of vector layer analysis (1)	13
8 / May	<ul style="list-style-type: none"><li>• Lesson3</li><li>• Lesson5</li></ul>	Basic skills of vector layer analysis (2) Geo-references using satellite image	11
12 / May	<ul style="list-style-type: none"><li>• Lesson4</li></ul>	Basic skills of raster layer analysis	14
13 / May	<ul style="list-style-type: none"><li>• Lesson7</li></ul>	Basic hydrologic analysis using GIS spatial analyst	12
14 / May	<ul style="list-style-type: none"><li>• Lesson6</li></ul>	Vectorization of scanned paper base maps	11
15 / May	<ul style="list-style-type: none"><li>• Hazard Mapping</li></ul>	Hazard map analysis for flood	9
16 / May	<ul style="list-style-type: none"><li>• Hazard Mapping</li></ul>	Hazard map analysis for debris flow	8

**c) Prepare Community Hazard Maps at Pilot Areas**

Two types of community level hazard maps have been produced in the project. One is the hazard map based on the engineering reconnaissance of the JICA experts, analysis of the disaster record and interview of local residents considering “Past maximum events”. This hazard map was utilized for CBDRM activity at our pilot sites. Another is based on the provincial scale hazard map analyzed by GIS spatial analysis methods mentioned above.

As stated above, the GIS analyzed provincial hazard map has not quite enough accuracy for a large scale map such as community level. However, we believe that it could be used for a community level base map if it can be properly modified through the CBDRM activities.

The satellite image map was employed for the base map of the community hazard map. Basically, since most local residents have no chance to use a topographical map, it isn't easy to identify their houses, evacuation routes and evacuation centers. The high resolution satellite image map can help them identify such information on the hazard map.

The examples of community level hazard maps (by field mapping and by GIS analysis) are shown in Fig 2-1-2.

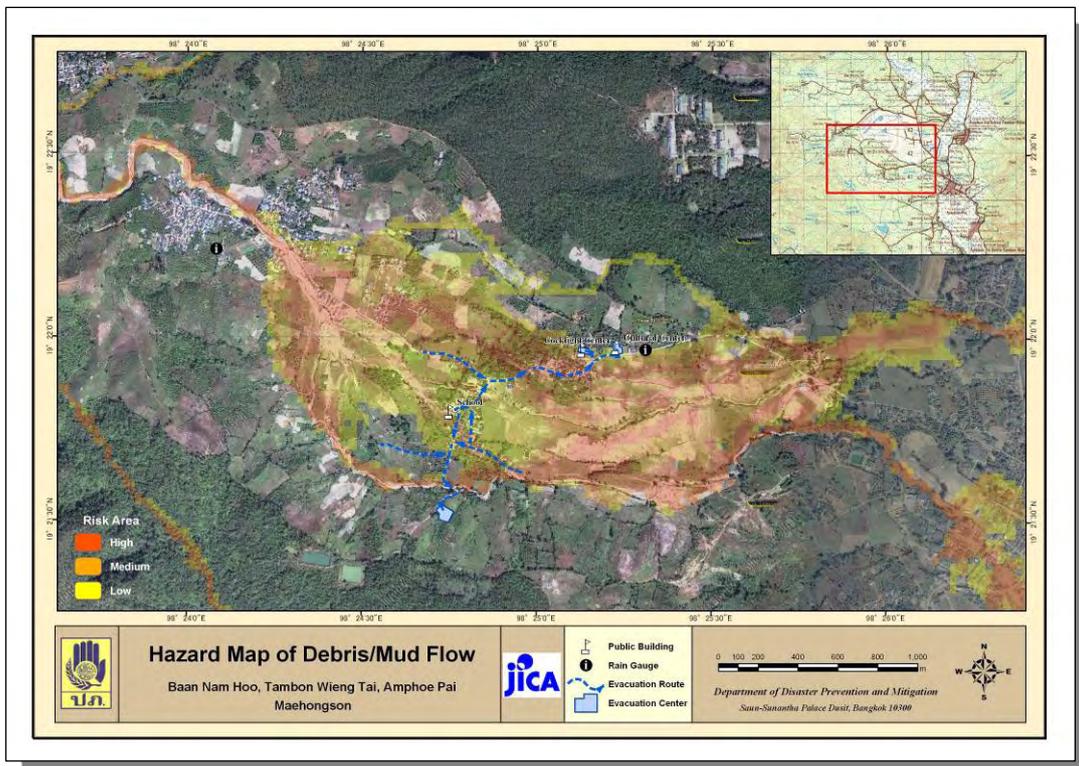
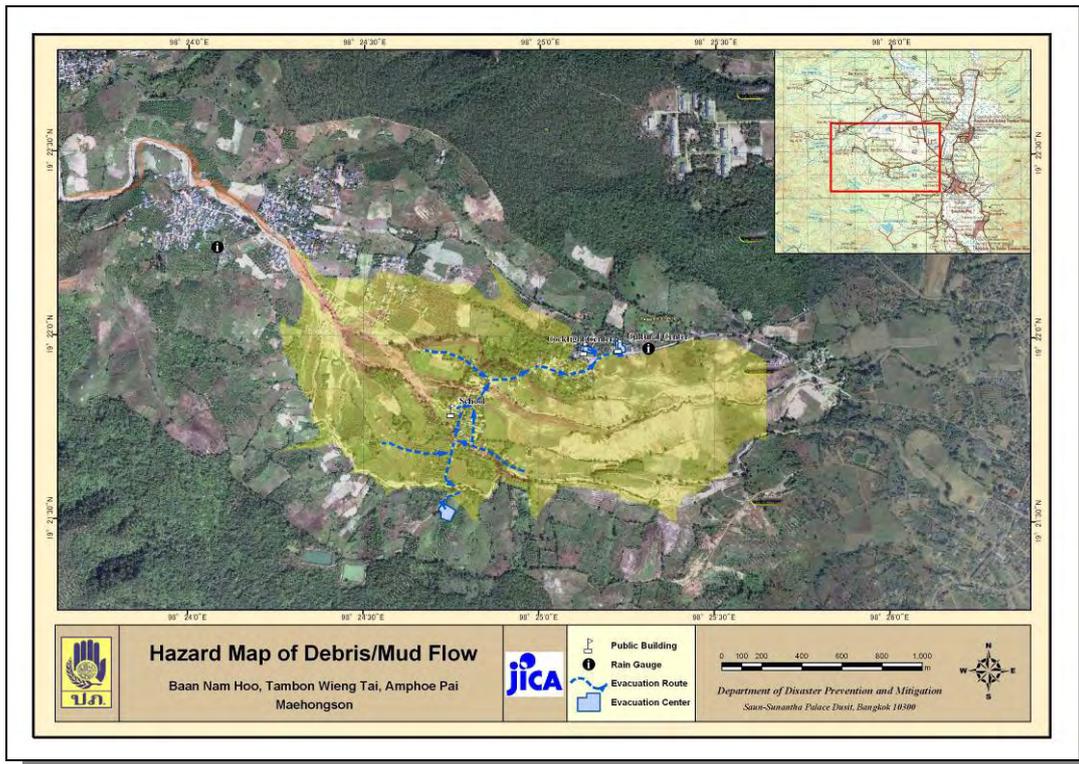


Fig 2-1-2 Hazard maps by field mapping (above) and by GIS analysis (below)

## 5) Develop GIS Database for Disaster Management

An integrated GIS database system is essential for DDPM to accumulate data concerning disaster management from related agencies and to utilize it effectively. While DDPM has already had or planned the disaster database, there are some problems as shown below.

- ① The purpose of the existing database is limited to accumulate the disaster record collected by DDPM. The data from other agencies is not accumulated in this database.
- ② There is no unified format information in the existing database. For the utilization of database by central and local administrations, it is essential to accumulate information not only from disaster records but also a variety of information such as rainfall, water level, hazard maps, etc. in a unified format.

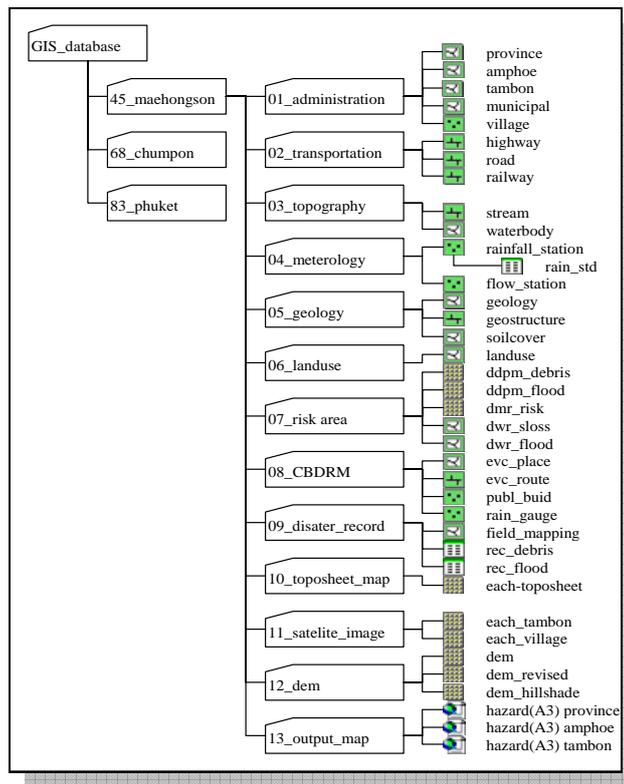
Therefore, a comprehensive and unified GIS database is essential for disaster management in Thailand. This database has to include information such as historical disaster data, disaster management data, natural and social infrastructure on our prepared hazard maps.

The GIS database is developed based on the hazard map data and Arc GIS unified format. Based on the discussion and agreement of the Task Force 2 meetings, WGS 84 is employed for the coordinate system.

The data collection has been done by the DDPM counterparts and JICA expert team under the cooperation of Task Force 2 organizations. Task Force meetings were held to ask for the collection of the information and discuss the activities for this output. The collected information for GIS database and hazard map is tabulated in Table 2-1-8 and the database structure is shown in Fig 2-1-3.

**Table 2-1-8 Collected Information for GIS database and hazard map**

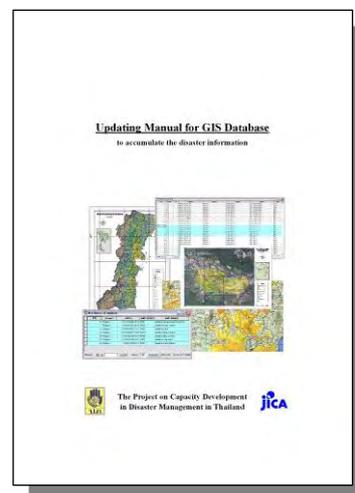
Agencies	Type of Data
DDPM & Rajaphad Univ.	Administrative data, Forest/Geology/Nature/ Infrastructural data
Dept. of Public Works and Town & Country Planning	Administrative data
Dept. of Provincial Administration	Administrative data, Infrastructural data, Land use data
Dept. of Local Administration	Land use data
Dept. of Mineral Resources	Landslide hazard map
Dept. of Water Resources	Administrative data, Infrastructural data, Land use data, Flood hazard map
Royal Forest Dept.	Forestland data
Royal Thai Survey Dept.	Topographical data, DEM
Dept. of Environmental Quality Promotion	Administrative data, Nature/Infrastructural data, Land use data, Heritage data
Dept. of National Statistics	Social statistics data



**Fig 2-1-3 Developed database structure**

The accumulated GIS data such as meteorological data and historical disaster data from related organizations must be updated regularly and continuously by DDPM. The JICA expert team and DDPM counterpart preparing an “Updating Manual for GIS Database” as shown on the right.

The first information in the manual--data necessary for disaster risk management will be suggested. Second, data sharing between the DDPM head office and regional and provincial DPM offices based on their capability of GIS skills. Third, a detailed procedure to collect and update the information is explained focusing on data creation and data editing using GIS.



## 6) Prepare Guidebook for Utilization of Hazard Map and GIS Data Base

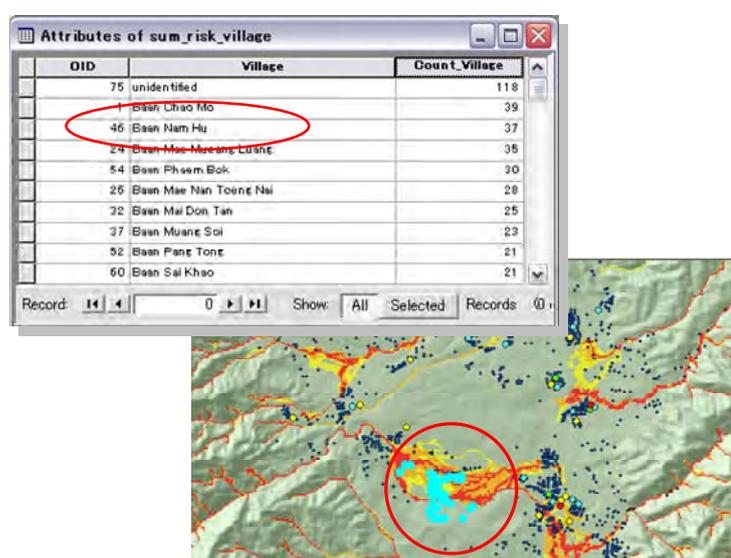
Despite a well-working disaster information system which has been conducted by DDPM, the accumulated disaster information has not been utilized effectively for a regional disaster management plan due to absence of a detailed hazard map at provincial and community levels.

DDPM and the JICA expert team prepared a “Guidebook for Disaster Risk Management based on Hazard Map & GIS database”. In this guidebook, 1) extraction of high risk community for regional disaster risk management and 2) utilization for CBDRM & updating field data are explained using detailed procedures.

#### **a) Extraction of high risk community**

One of the major purposes of disaster risk assessment at provincial level must be to identify the high priority community for disaster prevention and mitigation measures based on the number of residents, the vulnerability of public facilities and the economic loss caused by destruction of infrastructures.

In the guidebook, the procedure to recognize such vulnerable data to assess high risk communities is explained. Then assessment by spatial superposition with a hazard map is introduced. An example of extraction of high risk communities in Amphoe Pai is shown in Fig 2-1-4. The left upper table in this figure shows risk villages in descending order. Baan Nam Hoo which is one of the pilot sites of this project has the second risk level in Amphoe Pai.



**Fig 2-1-4 Example of extraction of high risk communities**

#### **b) Utilization for CBDRM & updating field data**

Promotion of CBDRM activity is one of the most important accountabilities of the local government. The action plan for the CBDRM will be designed through disaster risk assessment and the high priority communities. In the guidebook the outline and procedure

of utilization for the CBDRM and updating the field data by local government are suggested. The flow chart is shown in Fig 2-1-5.

**Step1. Design of CBDRM action plan**

The DPM provincial office designs the CBDRM action plan with the provincial governor based on a Provincial Disaster Management Plan and the disaster risk assessment by GIS database as shown in the guidebook..

**Step2. Proved Base Map for CBDRM activity**

The Provincial DPM office requires the necessity of a base map for CBDRM activity to DPM Regional Center. Based on requests from the provincial office, DPM Regional Center immediately provides the analyzed hazard map of requested regions with a satellite image photograph.

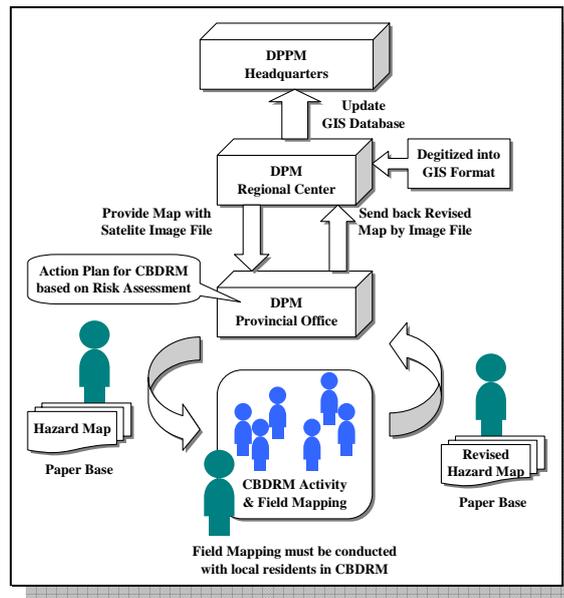
**Step3. Conduct CBDRM and field mapping**

The Provincial DPM office sends staff with the provided hazard map and satellite image photograph in paper-base to guide CBDRM at the selected high risk community base on the manual and facilitator guide of CBDRM. The DPM officers discuss with residents and revise the hazard map with the residents through a field investigation through the CBDRM.

**Step4. Update result of field mapping**

The result of the field investigation by CBDRM should be updated into the GIS database. First, a Provincial DPM officer prepares the field investigation map with some comments and pictures and sends it to the Regional DPM office by fax. Then based on their reported map, the Regional DPM office edits the present GIS format hazard map and sends it to the DDPM head office. DDPM checks the data and updates it into the GIS database.

The above procedure was explained to the regional and provincial DPM offices at the training in the DDPM head office. In the training, the staff from the provincial office of Chumporn and Mae Hong Son and administrative regional office of each province participated. The training course was held for one week.



**Fig 2-1-5 Flowchart in outline of utilization and updating GIS database**

### **2-1-3 Evaluation of the Achievement**

#### **1) Prefectural Level Hazard Map and Technical Transfer**

As described above, a prefectural level hazard map, community level hazard map, GIS data base and its manual were completed successfully under the cooperation of JICA experts and DDPM counterparts. The technique of hazard map and GIS data base preparation / utilization was transferred to the DDPM counterparts successfully. As shown in Table 2-1-9, the hazard map workshop targeting DDPM staff was highly appreciated by attendants. Further, the relationship between DDPM and other organizations was strengthened through the collection of disaster information. The capacity of DDPM was fully enhanced through this project.

The completed hazard map and GIS data base received high appreciation from related agencies / organizations in Thailand and international. DDPM counterparts and some of the staff who attended the hazard map workshop started to transfer and expand their knowledge and technology achieved in this project. Further, DDPM counterparts presented the output of this project in the meeting of the Mekong Committee and started to consider a plan for expansion of hazard maps and GIS database.

It can be said that the purpose of the project in this field was successfully achieved.

**Table 2-1-9 Questionnaire of GIS/hazard mapping training**

<b>Questionnaire</b>	<b>Answer</b>	<b>Count</b>
1. How do you feel about this workshop? Are you satisfied or not?	Satisfied	8
	Unsatisfied	0
2. What points made you impressed?	Ability and quality of instructor	4
	Instructional method	4
	Training material and contents of text	3
3. What points made you disappointed if any?	Not enough time for training	3
	English communication	1
4. Can you apply the knowledge which you acquired in this workshop to your present work?	Can apply to present work	5
	Can apply to hazard mapping	2
	Yes, but not enough	1
5. What kinds of training courses will you expect to JICA expert team in near future?	More detail GIS analysis techniques	4
	More detail hazard mapping	3
	Field training (accordance to analysis)	2
	Long term training	1
	Apply to prevention measures	1
	GIS analysis for earthquakes	1
	Installing of rain gauge data	1
Statistical analysis using GIS	1	

#### **2-1-4 Recommendations**

The following activities shall be continued by DDPM.

1) Preparation of Prefectural level hazard map

A prefectural level hazard map shall be prepared in all prefectures in Thailand according to the manual created in this project. Based on the hazard map, disaster prone villages / towns shall be selected according to the guidebook prepared in this project under the cooperation of each prefectural office. Based on this information, a pilot prefecture shall be selected.

2) Enhance disaster management capacity of regional and prefecture offices

Disaster management capacity of pilot of DDPM shall be enhanced through hazard map preparation according to the guidebook.

3) Continue and strengthen cooperation with other related agencies

Activity of the Task Force for this activity shall be continued and strengthen the relationship between DDPM and other agencies through renewal of the data / information.

**Table 2-1-11 Recommended Activities**

<b>Items</b>	<b>Contents</b>
1. Install provincial hazard map	Install and distribute the provincial hazard map into all provinces. Assess high risk communities using hazard maps and GIS database
2. Capacity building of regional and provincial DPM offices	Extract pilot provinces to install the hazard map utilization plan. Enhance the capacity of regional and provincial DPM offices.
3. Continuous cooperation with related agencies	Continue the activity of Task Force with related agencies. Update and revise GIS database under the cooperation of the agencies.

## **2-2 White Paper and National Disaster Plan**

Relationship and communication between DDPM and other related organizations are strengthened through publishing White Paper and formulating National Disaster Prevention and Mitigation Plan

### **2-2-1 Understanding of the current situation in Thailand**

#### **1) National Disaster Management Plan**

The Thailand government has realized the importance of natural disaster management. This can be seen in the statement by Dr. Thaksin Shinawatra, the former prime minister to the parliament on Mar 23, 2005 with 9 policies. In these 9 policies, the following 4 policies referred to natural disaster issues.

Policy No. 4 : On natural resources and environmental management describing “prevention and warning measures against natural hazards such as flood, drought, earthquake and climate change, as well as mitigation measures should be undertaken to relieve people’s suffering

Policy No.6 : On laws and good governance describing “ Information technology should be applied to efficient planning and decision making”

Policy No. 7 : On democracy and civil society describing “a center for finding missing people and identification of unidentified bodies”

Policy No. 8 : On state security describing “readiness for encountering catastrophes both by humans and nature should be formulated by giving importance to the establishment of a National Disaster Warning System, crisis management and preparedness for immediate response to relieve hazards and restore normalcy immediately”.

A number of plans and guidelines related to disaster management were established such as “The 9<sup>th</sup> Natural Economic and Social Development Plan (2002 – 2006)”, “National Preparedness Plan 1992”, “Strategic plan, Ministry of Interior 2004 – 2008” and “National Civil Defense Plan”.

The National Civil Defense Plan 2005 had been developed after the bureaucratic reform in 2002. Originally, the national civil defense plan had to be revised every 3 years. However, “National Disaster Prevention and Mitigation Act” was approved on November 2007. In this act, it is stipulated that “National Disaster Prevention and Mitigation Plan” has to be established. It is scheduled that this plan will be prepared within two years. The “National Civil Defense Plan 2005” will be effective until completion of the “National Disaster Prevention and Mitigation Plan” plan and The “National Civil Defense Plan 2008” will not be prepared.

The preparation of the “National Disaster Prevention and Mitigation Plan” has been commenced

under the initiative of DDPM. The contents of the new plan are not clear at this time.

## **2) Organizations concerned with natural disaster management**

### **1) DDPM**

Pursuant to bureaucratic administration regulation act B.E. 2545 (2002), the ministerial restructuring act which has been in effect since October 3, 2002 Government Organization Establishment Royal Decree, Department of Disaster Prevention and Mitigation has come into existence. The vision, target, duty and responsibilities are as follows.

#### <Vision>

DDPM is the principal government agency designated to shoulder the task and responsibility on disasters so as to preserve Thailand as a habitable and secure country.

#### <Target>

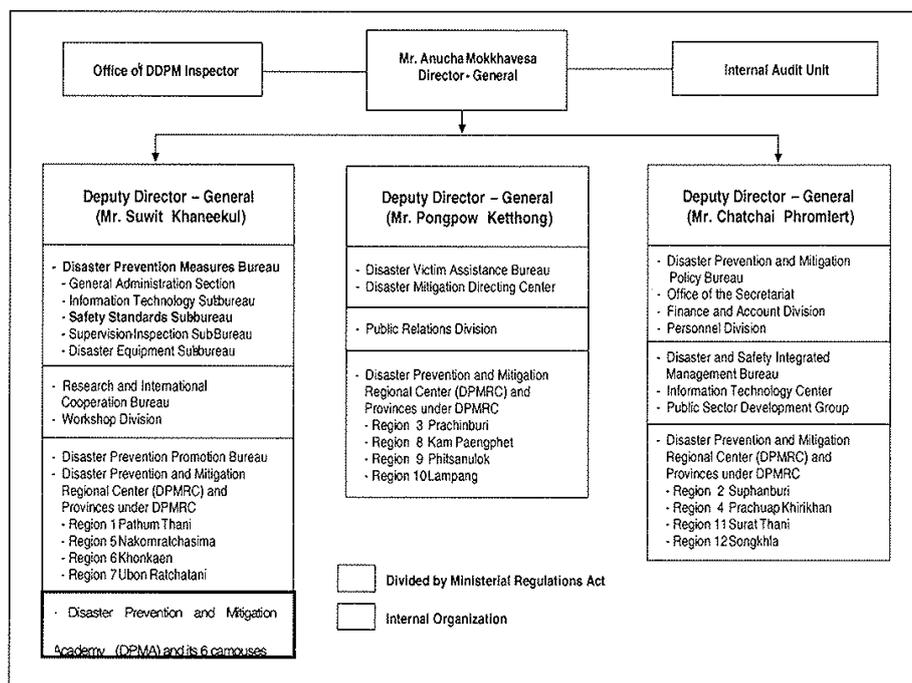
The people will be systematically, rapidly, thoroughly and equitably protected by the Department's disaster prevention, mitigation/ rehabilitation, and civil defense activities.

#### <Duty and Responsibilities>

1. Formulate policy, guidelines and set up criteria for disaster management
2. Study, analyze, research and develop prevention, warning and disaster mitigation systems.
3. Develop information technology systems for disaster prevention, warning and mitigation. Mobilize people's participation in establishing disaster prevention and mitigation
5. Create people's awareness and preparedness in disaster prevention and mitigation
6. Arranging the training and exercise in disaster prevention and mitigation, rehabilitation of devastated areas and in assisting the victims as stated by law.
7. Promote, support and carry out disaster prevention and mitigation activities, provide assistance to the victims and rehabilitate devastated areas.
8. Direct and coordinate the operation of assisting the victims and rehabilitate the areas devastated by large-scale or high magnitude disasters.
9. Coordinate the assistance with the organizations both internal and international in disaster prevention mitigation and rehabilitation.
10. Perform other functions stated in by the laws as the Department's tasks or as assigned by the Ministry of Interior or the Cabinet.

#### <Organization, Manpower and Budget>

The organization chart and manpower as of October 1<sup>st</sup>, 2007 is shown in Figure 2-2-1. Total budget of DDPM in 2007 is THB 2,184,972,800.



**Fig. 2-2-1 Organization Chart of DDPM**

**Table 2-2-1 Manpower of DDPM**

	Head Quarters	Regional Centers	Provincial Offices	Academy and Campuses	Total
Government Official (Permanent)	480	559	791	77	1,778
Government Official (Temporary : 1 year)	182	14	373	42	611
Other Employee	109	1,328	5341	38	2,006
<b>Total</b>	<b>771</b>	<b>1,772</b>	<b>1,659</b>	<b>157</b>	<b>4,395</b>

b) Committees

There are two important committees for disaster prevention. The “National Safety Council of Thailand” is appointed according to the regulations of the Office of the Prime Minister on National Disaster Prevention 1995 chaired by the Prime Minister or designated Deputy Prime Minister. Its main functions are to propose policies and practice guidelines, suggest comments, cooperate with international agencies, support and follow-up training and carry out all disaster related tasks.

“The National Civil Defense Committee” is appointed by the civil defense act of 1979 chaired by the Minister of Interior. Its main functions are to formulate policies, prepare master plans for prevention, monitoring and evaluation, formulate systems, appoint subcommittee and issue and

order for clarification.

c) Other related agencies

According to the National Civil Defense Plan 2005, more than 26 agencies designated to have direct responsibility in disaster management, which are in government level and independent agencies and private agencies. The outline of each organization is tabulated in Table 2-2-3 and a diagram of the disaster management system is shown in Figure 2-2-1 below.

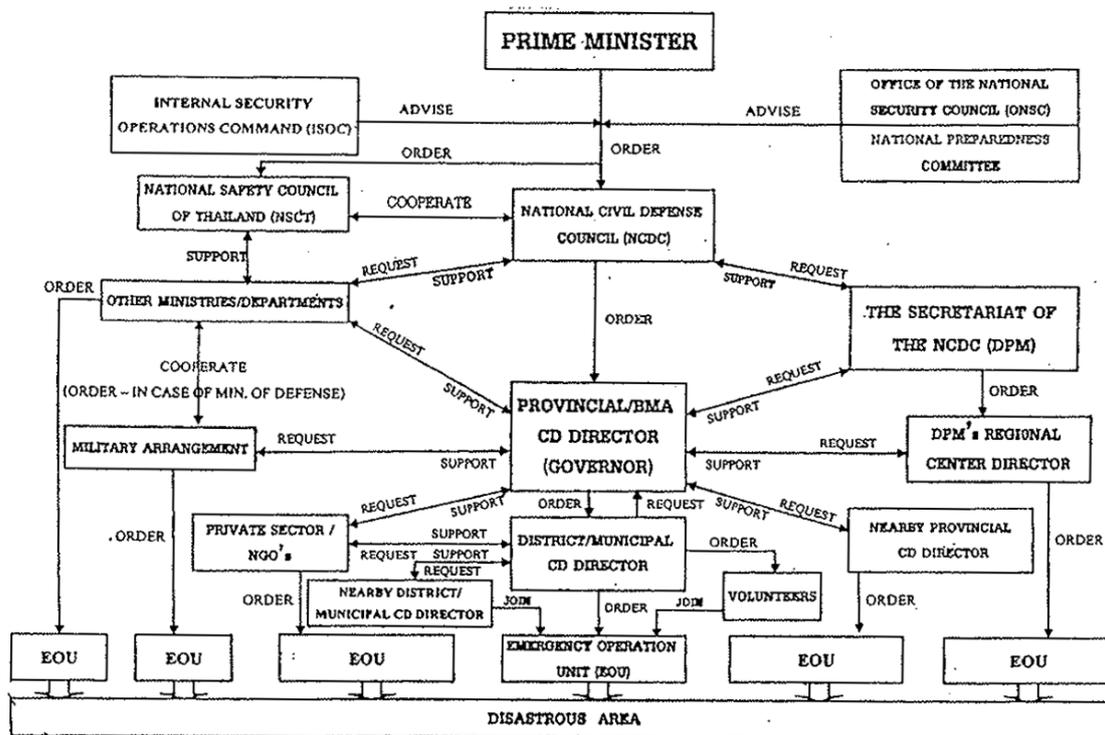


Fig. 2-2-1 Diagram of Disaster Management System in Thailand

**Table 2-2-2 Tasks of Different Agencies for Natural Disasters in Thailand**

Ministry	Department/Agency	Prevention and mitigation procedures	Disaster preparedness procedures	Emergency management procedures	Post-disaster management procedures
Ministry of Education	Office of The Basic Education Commission Office of The Higher Education Commission Office of The Private Education Commission All schools, University and Institute	<ul style="list-style-type: none"> <li>Inspect and monitor the disaster-prone educational institutions</li> <li>Arrange a curriculum about disaster, evacuation and assistance in educational institutions</li> </ul>	<ul style="list-style-type: none"> <li>Support the training and Join in Civil defense drills</li> </ul>	<ul style="list-style-type: none"> <li>Send students to assist in the disaster management as necessary</li> </ul>	<ul style="list-style-type: none"> <li>Provide educational equipment to the victims (youths)</li> <li>Repair and reconstruct school buildings to be used in the initial stage and provide educational equipment</li> <li>Hold educational activities in evacuation areas</li> <li>Provide vocational trainings to victims</li> </ul>
Ministry of Labour		<ul style="list-style-type: none"> <li>Inspect tools for disaster prevention</li> <li>Survey and make a list of workers with technical knowledge</li> <li>Educate and train workers in enterprises on hazard prevention</li> </ul>	<ul style="list-style-type: none"> <li>Prepare tools and equipment for hazard prevention</li> <li>Prepare workers with technical knowledge</li> </ul>		<ul style="list-style-type: none"> <li>Provide vocational trainings to the victims</li> </ul>
Ministry of Transport	Department of Land Transport Marine Department The Department of Aviation Bangkok Mass Transit Authority	<ul style="list-style-type: none"> <li>Provide a basic knowledge on disaster, evacuation and rescue assistance</li> </ul>	<ul style="list-style-type: none"> <li>Join in civil defense drills</li> </ul>	<ul style="list-style-type: none"> <li>Provide vehicles, staff and transport equipment as well as fuel</li> </ul>	
	The State Railway of Thailand			<ul style="list-style-type: none"> <li>Repair railways</li> </ul>	<ul style="list-style-type: none"> <li>Repair railways to be used as normal or better than normal</li> </ul>
	The Department of Highways Department of Rural Roads		<ul style="list-style-type: none"> <li>Join in civil defence drills</li> </ul>	<ul style="list-style-type: none"> <li>Provide temporary routes</li> <li>Repair and fix roads and bridges to be used temporarily</li> <li>Provide adequate consumer goods</li> </ul>	<ul style="list-style-type: none"> <li>Repair roads and bridges to be used as normal or better than normal</li> </ul>
Ministry of Commerce	Department of Internal Trade		<ul style="list-style-type: none"> <li>Prepare fuel and lubrication oil in case of emergency</li> </ul>	<ul style="list-style-type: none"> <li>Provide adequate consumer goods</li> </ul>	<ul style="list-style-type: none"> <li>Control the prices of goods during the shortage</li> <li>Organize the good distribution system</li> </ul>
	Department of Insurance	<ul style="list-style-type: none"> <li>Issue laws and regulation on insurance in disaster-prone areas</li> </ul>			
Ministry of Information and Communication Technology	The Meteorological Department	<ul style="list-style-type: none"> <li>Process the data on climate, rainfall, earthquake and windspeed</li> <li>Issue a disaster warning</li> <li>Map the disaster-prone areas</li> <li>Join in preparing windstorm prevention plans</li> </ul>	<ul style="list-style-type: none"> <li>Provide staff for 24-hour disaster monitoring</li> <li>Issue a disaster warning in case of crisis</li> </ul>	<ul style="list-style-type: none"> <li>Closely monitor the disaster situation</li> </ul>	<ul style="list-style-type: none"> <li>Support data on damage assessment</li> </ul>
Ministry of Agriculture and Cooperatives	Royal Irrigation Department	<ul style="list-style-type: none"> <li>Prepare disaster forecast and warning systems in flood-prone areas</li> <li>Prepare water retention areas to prevent flood</li> <li>Analyse flood occurrence and issue a flood warning</li> <li>Map flood-prone-areas in cooperation with Department of Water Resources</li> <li>Join in preparation for flood prevention plans</li> </ul>	<ul style="list-style-type: none"> <li>Provide staff for disaster monitoring during emergency</li> <li>Water management</li> <li>Conduct civil defence drills</li> <li>Prepare tools and equipment</li> <li>Dredge the canals to get rid of flow obstructions</li> </ul>	<ul style="list-style-type: none"> <li>Provide personnel, tools and equipment for disaster prevention</li> <li>Water management</li> <li>Repair and strengthen dams, irrigation canals and structures to avoid damages due to structure break</li> <li>Follow up the flood situation continuously, timely and thoroughly</li> </ul>	<ul style="list-style-type: none"> <li>Repair reservoirs and irrigation structures in order that they can be used as better than usual</li> <li>Provide water for domestic and agricultural purposes in disaster-prone areas</li> <li>Drain the floodwater from the lowland</li> <li>Assess the floodpeak</li> </ul>
	Department of Livestock Development		<ul style="list-style-type: none"> <li>Provide adequate animal feeds</li> </ul>		<ul style="list-style-type: none"> <li>Provide the victims with animal strains and necessary production factors in order to earn their livings in case of emergency</li> <li>Control and prevent animal epidemics</li> </ul>
	Department of Fisheries				<ul style="list-style-type: none"> <li>Provide the victims with aquaculture strains and necessary production factors</li> <li>Control and prevent animal epidemic</li> </ul>
	Department of Agricultural Extension				<ul style="list-style-type: none"> <li>Provide production factors and cultivation device to rehabilitate agriculture</li> </ul>

Source : JICA Study Team Revised "Master Plan for flood, windstorm and mudslide hazards prevention, mitigation and recovery services in emergency period, Dec. 2005"

Ministry	Department/Agency	Prevention and mitigation procedures	Disaster preparedness procedures	Emergency management procedures	Post-disaster management procedures
	Royal Forest Department	<ul style="list-style-type: none"> <li>Control deforestation especially in flood-and mudslide-prone areas</li> <li>Promote reforestation in deteriorated forests to lessen the severity</li> </ul>		<ul style="list-style-type: none"> <li>Provide support and facilitate the assistance to victims</li> </ul>	
	Land Development Department	<ul style="list-style-type: none"> <li>Study and research into causes and mudslide prevention plans in mudslide-prone areas</li> <li>Support data in preparation for risk maps</li> </ul>			<ul style="list-style-type: none"> <li>Rehabilitate soil conditions in disaster-hit areas</li> </ul>
Ministry of Foreign Affairs	Department of Technical and Economic Cooperation	<ul style="list-style-type: none"> <li>Coordinate with international agencies/institutions/organizations in requesting for technical assistance and knowledge</li> </ul>		<ul style="list-style-type: none"> <li>Request for international assistance in case of disaster occurrence</li> </ul>	<ul style="list-style-type: none"> <li>Contract with international agencies to support in post-disaster rehabilitation</li> </ul>
Ministry of Industry		<ul style="list-style-type: none"> <li>Educate people on occupations</li> </ul>		<ul style="list-style-type: none"> <li>Prepare resources, tools, equipment and materials for production</li> </ul>	<ul style="list-style-type: none"> <li>Promote and support occupations for the victims</li> </ul>
Ministry of Natural Resources and Environment	Department of Water Resources	<ul style="list-style-type: none"> <li>Join in preparation for flood prevention plans</li> <li>Prepare tools for disaster forecast and warning in disaster-prone areas</li> <li>Cooperate with Royal Irrigation Department in preparation for flood risk maps</li> <li>Analyse flood events and issue a flood warning to DDDPM</li> <li>Study and research on flood occurrence</li> </ul>	<ul style="list-style-type: none"> <li>Join in civil defence drills</li> <li>Provide staff for disaster monitoring and warning in case of crisis</li> </ul>	<ul style="list-style-type: none"> <li>Follow up and report the situation</li> </ul>	<ul style="list-style-type: none"> <li>Provide staff, tools and equipment in repairing water sources in disaster-hit areas</li> </ul>
	Department of Mineral Resources	<ul style="list-style-type: none"> <li>Join in preparing mudslide prevention plans</li> <li>Prepare and update risk maps</li> <li>Analyse mudslide occurrence and issue a warning to DDDPM</li> </ul>	<ul style="list-style-type: none"> <li>Provide monitoring and warning personnel in case of crisis</li> </ul>	<ul style="list-style-type: none"> <li>Follow up the situation of mudslide occurrence</li> <li>Support a technical assistance</li> </ul>	<ul style="list-style-type: none"> <li>Survey the disaster-hit areas and analyse its causes</li> </ul>
Ministry of Energy	Department of Energy Business	<ul style="list-style-type: none"> <li>Survey and collect data on fuel and energy sources in the country</li> </ul>		<ul style="list-style-type: none"> <li>Provide and produce fuel and energy to meet the demand</li> </ul>	
Ministry of Public Health		<ul style="list-style-type: none"> <li>Survey and collect medical and public health data</li> <li>Educate people on basic medical care in order to take care of themselves</li> <li>Provide with ambulance system</li> </ul>	<ul style="list-style-type: none"> <li>Cooperate and mobilize medical and public health resources</li> <li>Organize a network system to support the operation</li> </ul>	<ul style="list-style-type: none"> <li>Provide a medical treatment, hygiene, sanitation and disease prevention to the victims</li> <li>Help the injuries at the scene</li> </ul>	<ul style="list-style-type: none"> <li>Treat the injuries until they are discharged from the hospitals</li> <li>Provide a mental health treatment to the victims</li> <li>Summarize and report the operation</li> </ul>
Ministry of Information and Communication Technology	TOT Public Company Limited CAT Telecom Public Company Limited	<ul style="list-style-type: none"> <li>Join in communication system plans both in normal and emergency situations</li> <li>Collect data, statistics and damages to be used as data for planning</li> <li>Support the establishment of regional/provincial communication centers</li> </ul>	<ul style="list-style-type: none"> <li>Support the preparation of tools and communication preparedness</li> </ul>	<ul style="list-style-type: none"> <li>Support the establishment of communication center to be equipped with the main system e.g. fixed line, mobile phones, facsimile, walkie-talkie, internet and secondary system e.g. mobile phone, satellite and mobile communication vehicle</li> </ul>	
Geo-Informatics and Space Technology Development Agency (Public Organization)		<ul style="list-style-type: none"> <li>Prepare satellite images in disaster-prone areas for data analysis</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate with other agencies in receiving satellite images in disaster-prone areas</li> </ul>	<ul style="list-style-type: none"> <li>Analyse and process the data on satellite images and assess the initial damage to request for an assistance</li> </ul>	<ul style="list-style-type: none"> <li>Provide satellite images in disaster-prone areas to requesting agencies for damage assessment and other necessary works</li> </ul>
Office of the Prime Minister	The Bureau of the Budget	<ul style="list-style-type: none"> <li>Provide the budget to different agencies</li> </ul>	<ul style="list-style-type: none"> <li>Support the budget for disaster preparedness</li> </ul>	<ul style="list-style-type: none"> <li>Support the budget for emergency management</li> </ul>	<ul style="list-style-type: none"> <li>Prepare rehabilitation budget and provide the budget to different agencies</li> </ul>
	The Public Relations Department	<ul style="list-style-type: none"> <li>Disseminate warning news from DDDPM to the agencies concerned and public</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate and publicize the news to agencies concerned for disaster preparedness</li> <li>Join in evacuation drills in disaster-prone areas</li> </ul>	<ul style="list-style-type: none"> <li>Publicize the disaster news in order to request for public disaster prevention</li> <li>Create an understanding and enhance the morale during disaster occurrence</li> <li>Disseminate the news and facts during disaster occurrence to avoid public panic and confusion</li> </ul>	<ul style="list-style-type: none"> <li>Publicize the operation and summarize the assistance of different agencies to the people</li> </ul>
	Office of the National Economic and Social Development Board	<ul style="list-style-type: none"> <li>Join in preparation for disaster preparedness</li> <li>Join in improving operation plans and problem solution</li> </ul>			<ul style="list-style-type: none"> <li>Assess the economic and social impacts due large-scale disasters</li> <li>Evaluate the performance of management</li> <li>Improve assistance plans</li> <li>Summarize the results of operation</li> </ul>

Ministry	Department/Agency	Prevention and mitigation procedures	Disaster preparedness procedures	Emergency management procedures	Post-disaster management procedures
	Royal Thai Police		<ul style="list-style-type: none"> <li>Evaluate the situation, prepare manpower and direct the operation</li> <li>Support other agencies</li> </ul>	<ul style="list-style-type: none"> <li>Arrange the traffic system in disaster-prone areas</li> <li>Maintain peace and order in disaster-prone areas</li> <li>Provide a mobile medical team and medicines</li> <li>Provide a medical treatment to victims</li> </ul>	<ul style="list-style-type: none"> <li>Help the victims e.g. body identification</li> <li>Investigate the victim's evidence and proper</li> </ul>
	The National Disaster Warning Center	<ul style="list-style-type: none"> <li>Develop the disaster warning system</li> <li>Link and exchange the information among local and international agencies concerned</li> <li>Monitor the situations and disaster</li> <li>Analysis obstacles to national disaster management and warning system</li> <li>Set advanced disaster databased for decision on giving disaster warning/accurate and rapid warning</li> </ul>	<ul style="list-style-type: none"> <li>Monitor the situations closely</li> <li>Act as a national coordination and disaster warning center</li> <li>Inform to DDPM immedietly</li> <li>warning and disseminate the severity and ending of disasters via mass media and warning tower</li> </ul>	<ul style="list-style-type: none"> <li>Monitor the situations closely</li> <li>Publicize/inform/report the situations</li> <li>Regularly inform DDPM about disaster news and situations</li> <li>Disseminate updated disaster situation to DDPM</li> </ul>	<ul style="list-style-type: none"> <li>Summarize the operation situations</li> <li>Monitor and evaluate the operation of agenc concerned</li> <li>Establish assistance coordination center</li> <li>Disseminate the ending of disaster</li> </ul>
Ministry of Social Development and Human Security	Department of Social Development and Welfare Community Organizations Development Institute	<ul style="list-style-type: none"> <li>Prepare socio-economic and mental health rehabilitation plans for the victims</li> <li>Strengthen the social development network</li> </ul>	<ul style="list-style-type: none"> <li>Provide assistance preparedness</li> </ul>		<ul style="list-style-type: none"> <li>Provide assistance to victims in emergency period</li> <li>Provide shelters</li> <li>Provide mental health assistance</li> <li>Relieve the victims</li> <li>Educational funds</li> <li>Occupational funds</li> <li>Provide employment and occupations</li> </ul>
Ministry of Culture					<ul style="list-style-type: none"> <li>Repair and restore temples and religious places to be used in the initial stage</li> </ul>
-	Thai Red Cross Society	<ul style="list-style-type: none"> <li>Prepare and supply blood, medicine and medical supplies</li> <li>Provide training programmes on disaster preparedness, public health and first aid for officers, members, volunteers and public</li> </ul>	<ul style="list-style-type: none"> <li>Prepare consumer goods</li> </ul>	<ul style="list-style-type: none"> <li>Initially assist the victims in medical services, consumer goods and others</li> <li>Request for international assistance</li> </ul>	<ul style="list-style-type: none"> <li>Cooperate with international organizations in organization rehabilitation and donations</li> </ul>
-	Rajaprajanukroh Foundation	<ul style="list-style-type: none"> <li>Provide volunteers</li> </ul>	<ul style="list-style-type: none"> <li>Receive donations of cash and supplies</li> </ul>	<ul style="list-style-type: none"> <li>Provide consumer goods and food supplies</li> </ul>	<ul style="list-style-type: none"> <li>Assist the victims</li> </ul>
-	Central Civil Defense Volunteer Centre	<ul style="list-style-type: none"> <li>Seek and train volunteers</li> <li>Inform people about first aid during disaster</li> </ul>	<ul style="list-style-type: none"> <li>Get ready with personnel and equipment required</li> </ul>	<ul style="list-style-type: none"> <li>Support the Civil Defence Commanding Unit</li> </ul>	<ul style="list-style-type: none"> <li>Rehabilitate the disaster-prone areas</li> </ul>
-	NGOs and foundations	<ul style="list-style-type: none"> <li>Dispatch personnel to join in disaster drill and disaster management training</li> </ul>	<ul style="list-style-type: none"> <li>Prepare for operation (personnel/ vehicles/equipment)</li> </ul>	<ul style="list-style-type: none"> <li>Participate in the task designated by the Civil Defense Director</li> <li>Support other agencies as requested</li> </ul>	<ul style="list-style-type: none"> <li>Support and distribute donation supplies</li> </ul>
Ministry of Defense	Office of Supreme Commander Royal Thai Army Royal Thai Navy Royal Thai Airforce	<ul style="list-style-type: none"> <li>Join in civil defense drills</li> </ul>	<ul style="list-style-type: none"> <li>Prepare personnel, machines and tools for communication as requested</li> </ul>	<ul style="list-style-type: none"> <li>Provide personnel, machines and equipment for communication</li> <li>Provide security services</li> </ul>	<ul style="list-style-type: none"> <li>Provide rehabilitation services for victims as requested</li> </ul>
Ministry of Interior	Province	<ul style="list-style-type: none"> <li>Prepare integrated disaster prevention and mitigation plans</li> <li>Verify and select disaster prevention and mitigation projects</li> <li>Prepare safe shelters and evacuation routes</li> <li>Support the Civil Defense Secretariat</li> </ul>	<ul style="list-style-type: none"> <li>Issue a disaster warning</li> <li>Conduct civil defense drills in disaster-prone areas</li> <li>Set up a ad hoc directing centre</li> <li>Declare disaster-prone area and prepare evacuation plans if necessary</li> </ul>	<ul style="list-style-type: none"> <li>Direct the operation (in case of small-scale disaster, and coordinate with agencies concerned act as emergency operation unit</li> <li>Act as emergency operation unit</li> <li>Closely monitor the situations</li> <li>Request for assistance if beyond control</li> </ul>	<ul style="list-style-type: none"> <li>Provide all assistance to the victims</li> <li>Cooperate in rehabilitation of disaster-prone areas</li> <li>Assess the damage and report to agencies concerned</li> </ul>
	District	<ul style="list-style-type: none"> <li>Prepare district civil defense plans</li> <li>Prepare safe shelter and evacuation routes</li> <li>Support the Civil Defence Secretariat</li> </ul>	<ul style="list-style-type: none"> <li>Conduct civil defense drill</li> <li>Issue a disaster warning</li> </ul>	<ul style="list-style-type: none"> <li>Direct the operation (in case of small-scale disaster) and coordinate with agencies concerned</li> <li>Act as emergency operation unit</li> <li>Closely monitor the situations</li> <li>Request for assistance if beyond control</li> </ul>	<ul style="list-style-type: none"> <li>Provide all assistance to the victims</li> <li>Cooperate in rehabilitation of disaster-prone areas</li> <li>Assess the damage and report to agencies concerned</li> </ul>

Ministry	Department/Agency	Prevention and mitigation procedures	Disaster preparedness procedures	Emergency management procedures	Post-disaster management procedures
	Municipality	<ul style="list-style-type: none"> <li>• Prepare municipal civil defence plans</li> <li>• Provide safe shelters and evacuation routes</li> <li>• Prepare budget for disaster prevention and mitigation</li> <li>• Prepare personnel/machines to support the Civil Defence Secretariat in monitoring disasters</li> </ul>	<ul style="list-style-type: none"> <li>• Join in civil defence drills</li> <li>• Issue a warning to people</li> <li>• Monitor the situation and report to agencies concerned</li> </ul>	<ul style="list-style-type: none"> <li>• Direct/instruct the operation and coordinate with agencies concerned (in case of small-scale disasters)</li> <li>• Follow up and report the situation to agencies concerned</li> <li>• Request for an assistance if the situation is beyond control</li> </ul>	<ul style="list-style-type: none"> <li>• Provide all assistance to the victims</li> <li>• Rehabilitate the areas</li> <li>• Report the damage to agencies concerned</li> </ul>
	Sub-district	<ul style="list-style-type: none"> <li>• Prepare operation plans</li> <li>• Provide safe shelters and evacuation routes</li> <li>• Prepare personnel/tools/equipment for disaster prevention and mitigation</li> <li>• Support the Civil Defence Secretariat in disaster prevention and mitigation</li> </ul>	<ul style="list-style-type: none"> <li>• Issue a warning to people</li> <li>• Test the warning system and evacuation drills</li> <li>• Closely monitor the situation and report to agencies concerned</li> </ul>	<ul style="list-style-type: none"> <li>• Cooperate with various agencies in disaster management and assistance request</li> <li>• Closely monitor the situation and report to agencies concerned</li> </ul>	<ul style="list-style-type: none"> <li>• Provide all assistance to the victims</li> <li>• Rehabilitate disaster-hit areas</li> <li>• Assess the damage and report to agencies concerned accordingly</li> </ul>
	Department of Public Works and Town & Country Planning	<ul style="list-style-type: none"> <li>• Construct dykes to prevent flood in the community</li> <li>• Supervise the construction of buildings in urban areas and prepare urban plans</li> <li>• Prepare a construction plan of urban drainage system</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct civil defence drills</li> <li>• Conduct a research and development on personnel, tools and equipment</li> </ul>		<ul style="list-style-type: none"> <li>• Assess all damages</li> <li>• Repair and fix dykes and drainage system in order that they can be used as usual or better than usual</li> </ul>
	The Electricity Generating Public Co., Ltd. The Metropolitan Electricity Authority Provincial Electricity Authority		<ul style="list-style-type: none"> <li>• Prevent dangers which may arise (power cut in the areas where disaster are expected)</li> <li>• Manage the water in reservoirs</li> </ul>	<ul style="list-style-type: none"> <li>• Install temporary light system in disaster-hit areas</li> <li>• Prevent dangers which may arise from electrical current</li> <li>• Manage the water in reservoirs</li> </ul>	<ul style="list-style-type: none"> <li>• Install lighting system in evacuation areas</li> <li>• Rehabilitate the power system</li> </ul>
	The Metropolitan Waterworks Authority The Provincial Waterworks Authority Other waterworks			<ul style="list-style-type: none"> <li>• Provide water for domestic use in disaster-hit areas</li> <li>• Install a temporary water supply system in disaster-hit areas</li> </ul>	<ul style="list-style-type: none"> <li>• Install a water supply system in evacuation areas</li> <li>• Restore the water supply system</li> </ul>
	Department of Disaster Prevention and Mitigation	<ul style="list-style-type: none"> <li>• Formulate disaster policies, guidelines and master plan</li> <li>• Follow-up and evaluate the operation</li> <li>• Coordinate with agencies concerned (local/international)</li> <li>• Analyse/research/formulate safety measures</li> <li>• Provide tools, equipment and machines</li> <li>• Publicize and educate the public on disasters</li> <li>• Systematize and develop information technology and information linkage/information exchange among agencies</li> <li>• Systematize and develop the communication</li> <li>• Collect data, statistics and occurring damages</li> <li>• Encourage the private sector/and people in general to participate in disaster prevention and mitigation</li> </ul>	<ul style="list-style-type: none"> <li>• Train and develop the staff and the public on disaster management</li> <li>• Monitor and coordinate in disaster warning as well as follow up and report on the situation</li> <li>• Issue a disaster warning to disaster-hit provinces and areas</li> <li>• Make preparations for an assistance (personnel/tools/machines/equipment)</li> <li>• Coordinate with related agencies</li> <li>• Carry out civil defense drills</li> </ul>	<ul style="list-style-type: none"> <li>• Provide basic first aid to the people</li> <li>• Coordinate with agencies for assistance</li> <li>• Dispatch Special Response Team from the center to lead the operation</li> <li>• Send machines/tools equipment to assist in the operation</li> <li>• Provide disaster supplies kits and medicine to the affected areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the damage and collect its data</li> <li>• Rehabilitate the infrastructure in case of emergency</li> <li>• Rehabilitate the disaster-prone areas</li> <li>• Coordinate with various agencies in assisting the victims</li> </ul>
	Bangkok	<ul style="list-style-type: none"> <li>• Study disaster prevention and mitigation</li> <li>• Provide safe shelters and evacuation routes</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare tools, machines and equipment</li> <li>• Issue a warning to people</li> </ul>	<ul style="list-style-type: none"> <li>• Direct the disaster management in Bangkok</li> <li>• Coordinate with agencies concerned</li> <li>• Act as an emergency operation unit</li> <li>• Monitor the situation closely</li> <li>• Request for an assistance if the situation is beyond control</li> </ul>	<ul style="list-style-type: none"> <li>• Provide all assistance to the victims</li> <li>• Rehabilitate disaster-hit areas</li> <li>• Assess the damage and report to agencies concerned accordingly</li> </ul>

### 3) Annual Report

DDPM publishes an annual report for each year. The annual report 2005 is composed of the contents shown in Table 2-2-3 and consists of 59 pages.

**Table 2-2-3 Contents of Existing DDPM Annual Report 2005**

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| <ol style="list-style-type: none"><li>1. Outline of DDPM</li><li>2. Annual Report<ul style="list-style-type: none"><li>- Result of activity</li><li>- Organization development</li><li>- Disaster Management (national planning, annual evaluation, evaluation master plan, hand book of evacuation, Prevention and warning system, Evacuation drill, Coordination and response, Disaster command center, Improvement of law, Research and development, Relief activity</li><li>- Materials</li><li>- Reduction of Road Accidents</li><li>- Assistance for the victims of Tsunami</li><li>- Machine and support to local administrations</li><li>- Performance indicator</li></ul></li></ol> |
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The situation of the publication of an annual report or comprehensive report by other agencies was not investigated.

### **2-2-2 Activity and Output of the Project**

#### **1) Publish White Paper organizing related organizations for natural disasters**

A white paper has been completed in July 2008 in cooperation between the JICA expert team, DDPM working group and task force member organizations. The progress of the white paper preparation is summarized below.

#### **<Activity of White Paper Preparation>**

- September – December, 2006

The current situation was surveyed by existing material, interviews, etc.. It was confirmed that there is no white paper which describes the comprehensive situation of disaster management in Thailand.

A Japanese white paper was introduced in the Task force meetings and it was agreed to

prepare a white paper for Thailand.

- January to September, 2007

The details of the white paper were discussed in a task force meeting and working group meetings.

- October to December, 2007

A series of discussions and meetings was held in this phase to prepare a white paper for natural disaster management in Thailand. The purpose of the “white paper” was confirmed in the meetings as follows.

- to facilitate understanding the total situation of natural disaster management in Thailand
- to facilitate inter-organization cooperation between DDPM and related organizations
- to summarize and analyze the total situation of natural disasters in Thailand

- January to March, 2008

A manuscript of the paper was prepared.

April to August, 2008

The manuscript of the paper was collected, analyzed and edited. The draft of the white paper was completed on June 2008 and was approved by a task force meeting in July.

#### **<Contents of the White Paper>**

The volume of the white paper exceeds more than 400 pages. It describes the comprehensive situation of disaster management in Thailand. The main contents and assignment of the manuscript is shown in Table 2-2-4.

**Table 2-1 Contents of White Paper and Collected Information / Document**

Contents		Responsible organization	Submitted Information
1	Climate, Landscape and Disaster Vulnerability of Thailand		
	1-1 Climate	TMD	TMD
	1-2 Landscape	DMR	DMR
	1-3 Vulnerability	DDPM (Research Bureau)	DDPM
2	Disaster Management in Thailand		
	2-1 Structure of natural Disaster Management of Thailand	DDPM (Policy Bureau)	TMD TRC DMR NDWC DNP DPAE DDPM RID
	2-2 Structure of Each Organization		
	2-3 Roles and responsibilities of Natural Disaster management Organizations		
3	Disaster Annual Report		
	3-1 Flood and Land Slide	DDPM (Directing Center)	DDPM (Directing Center)
	3-2 Drought		
	3-3 Forest Fire	DNP	DNP
	3-4 Wind Storm	DDPM (Directing Center)	DDPM (Directing Center)
	3-5 Tsunami		
	3-6 Earthquake		
4	World Disaster	JICA	JICA
5	Disaster Management in Thailand (Activity of Each Organizations)		
	5-1 Budget for 2007 year	DDPM (Policy Bureau)	TMD TRC DMR NDWC DNP DPAE DDPM RID
	5-2 Plan for 2008 year		
	5-3 Disaster management Activity		
	5-4 Highlight Disaster Review		
6	International Cooperation on Disaster Management	DDPM (International Bureau)	TMD TRD DMR DNP DPAE DDPM

## **2) National Disaster Management Plan**

The “National Disaster Prevention and Mitigation Act” has been effective since November 2007. It is stipulated in this act to prepare “National Disaster Prevention and Mitigation Plan” within two years. The JICA expert team supported the preparation of this plan through providing materials, introducing Japanese examples and holding small workshops.

### **2-2-3 Evaluation of the Achievement**

#### **1) Publish White Paper to organize related organizations for natural disasters**

The white paper was published under the cooperation of Task Force Member organizations, DDPM working group and the JICA expert team. The white paper is the first publication which describes the comprehensive situation of disaster management in Thailand. The draft of the white paper was introduced in the workshop held on July 21 2008. Many positive responses have been received about the white paper publication.

The capacity of DDPM staff and the relationship between related organizations in disaster management field in Thailand was strongly enhanced through preparation of the white paper. It can be evaluated that the expected objectives have been achieved.

#### **2) National Plan**

The JICA expert team supported the preparation of a “National Disaster Prevention and Mitigation Plan” through providing materials, introducing Japanese examples and holding small workshops. This support shall be utilized to formulate the plan from here on. It can be evaluated that the expected objectives have been achieved.

### **2-2-4 Recommendations**

The white paper was completed and received a good response. However, substantial preparation of the paper was commenced at the end of 2007 and it took time to collect all the documents submitted. It was too short to conduct sufficient analysis and editing. It is important for the white paper to propose / recommend natural disaster management in Thailand based on thorough analysis of all materials. The white paper published in this project lacks in this point. It is desirable to continue the publication of the white paper for each year and it is further essential to propose / recommend natural disaster management issues in Thailand based on the analysis and cooperation of every related organization.

Substantial cooperation could not be done in this project. However the material provided from

the JICA expert team shall be utilized in the preparation of the Plan. It is desirable to utilize these materials and to formulate a plan which is practical and suitable for the situation in Thailand.

## 2-3 e-Learning Materials for Natural Disasters

System for enhancing capacity of DDPM staff on natural disaster management is strengthened

### 2-3-1 Understanding the current situation in Thailand

DPMA (Disaster Prevention and Mitigation Academy) was established on October 2004, by the approval of the Minister of the Interior, Department of Disaster Prevention and Mitigation in Bang Poon Pathum Thani province. The DPMA takes responsibility of increasing the capability and potential to government officials and the public in the area of disaster prevention and mitigation in the country.

DDPM has extended its technical service by setting up 6 more campuses namely Chiang Mai Campus (in Chiang Mai Province), Khon Kaen Campus (in Khon Kaen Province), Prachinburi Campus (in Prachinburi Province), Phitsanulok Campus (in Phitsanulok Province), Phuket Campus (in Phuket Province) and Song Kla Campus.

Currently DPMA conducts 5 fields of training as follows.

**Table 2-3-1 DPMA Training Course**

- |   |
|---|
| <p><b>1. Fire Fighting : Basic and Advanced Level, DPM Instructor Course</b></p> <p><b>2. Building Collapse : Search and Rescue</b></p> <p><b>3. Hazard Emergency Management</b></p> <ul style="list-style-type: none"><li>- Basic Hazard Emergency Management for Multiplied Trainer</li><li>- Development and Revision of Provincial Hazard Emergency Operation Plan<br/>Hazard Emergency Operation Plan</li></ul> <p><b>4. Civil Defence</b></p> <ul style="list-style-type: none"><li>- Civil Defence Volunteer Training</li><li>- Civil Defence Volunteer Refreshing</li><li>- Director of Civil Defence Volunteer Center Training</li><li>- Civil Defence Volunteer Role – Model Trainer</li></ul> <p><b>5. Disaster Management</b></p> <ul style="list-style-type: none"><li>- Civil Defence Plan Management Trainer</li><li>- Disaster Management for Executives</li><li>- Disaster Management Practitioners</li><li>- Safety Driving Instructor</li><li>- Community Base Disaster Risk Management Trainer</li><li>- Emergency Medical Assistance Emergency Medical Service</li></ul> |
|---|

However, there is no training course, textbook, materials and trainers for the natural disaster management field. It is recognized to enhance the training capacity for the natural management disaster field is essential and a matter of urgency.

DPMA has “DPMA Development Plan for 5 years (2005 – 2010) for the direction of DPMA development. However, there has been no master plan for DPMA until now. One working group was established in DPMA to develop a master plan and started this activity.

### **2-3-2 Activity and Output**

#### **1) Natural Disaster Management Training Material**

A series of discussions has been held to achieve output in this field. It concluded that the improvement / establishment of natural disaster training material / system is an essential and urgent matter for the development of DDPM and DPMA. However, it is recognized that there is not enough manpower to conduct lectures and training in the natural disaster management field. Therefore it concluded that to develop e-learning materials for natural disaster is the best way to enhance the capacity of DDPM staff and other related persons (staff of related agencies, community responsible people, etc.).

The above policy was concluded in March 2007 and the contents of the e-learning material were concluded in July 2007. The e-learning material was prepared by DDPM working group staff under the cooperation of the JICA expert team. The manuscript was completed in November 2007 and the final draft of the e-learning material was completed in March 2008. This material was burned into a CD-Rom and distributed to all Thailand organizations / people concerned with disaster management. The steps of the e-learning material preparation are summarized below.

- 1) Proposal for e-learning from the JICA expert
- 2) Discussion and agreement for the contents, assignment for the material preparation
- 3) Providing materials and examples from the JICA expert
- 4) Preparation of the manuscript by DDPM working group and the JICA expert
- 5) Deliberation of the manuscript
- 6) Completion of the manuscript
- 7) Digitalizing for e-learning material
- 8) Deliberation of the e-learning material
- 9) Burning into CD-Rom and Distribution

Considering understanding and interest, the use of many figures, photos and videos are included in the e-learning material. Further, by using Java script technique, a self-scoring system for the questions in each chapter is included in the material.

The contents of the e-learning material are shown in Table 2-3-1. The actual e-learning material in digital format is attached as Appendix \*\* in this report. Further, an example of the e-learning material is shown in Figure 2-3-1.

The e-learning material was burned into 2,000 CD-ROMs using the JICA project budget. These CDs were distributed throughout Thailand as shown in Table 2-3-2.

**Table 2-3-1 Contents of e-Learning Material for Natural Disaster Management**

<p><u>1 Natural Disaster in Thailand</u>  1-1 History of Natural Disaster in Thailand  1-2 Climate and Landscape of Thailand  1-3 Tropical Cyclones  1.4 Earthquake  1.5 Flood  1.6 Thunderstorm and Tropical Storm  1.7 Landslide  1.8 Wave Strom  1.9 Forest Fire  1.10 Drought  1.11 Natural Disaster in each part of Thailand  1.12 List of Tropical Cyclone  &lt;Test for Natural Disaster in Thailand&gt;</p>	<p><u>2. Flood</u>  - General Information  - Flood statistics in Thailand  - Flood events in Thailand  - Type of flood  - Preparedness for Flood  - Flood prevention and the damage reduction  - Suggestions for People  - Organization Network for flood prevention and mitigation  &lt;Test for Flood Disaster Management&gt;</p>
<p><u>3. Community-Based Disaster Risk Management (CBDRM)</u>  - What is CBDRM?  - Why do communities need CBDRM?  - How do we prepare community?  - CBDRM definition  - Disaster Management Emphasis  - Kind of CBDRM  - Attention of CBDRM  - CBDRM Process  - DIG activities  &lt;Test for CBDRM&gt;</p>	<p><u>4. Geo-hazard (Landslide)</u>  - Causes and Factors of Landslide  - Landslide Prevention  - Water monitoring Materials  - Landslide Monitoring Procedure  - Landslide event in Thailand  &lt;Test for Geo-hazard&gt;</p>
<p><u>5. Earthquake</u>  - Figure of Earth  - Faults and Earthquakes  - Magnitude and Seismic Intensity  - Earthquake Damage  - Earthquakes in Thailand  -Preparedness for Earthquake  - Picture of Various Earthquake in the World  &lt; Test for Earthquake&gt;</p>	<p><u>6. Tsunami</u>  - Tsunami definition  - Cause of Tsunami  - Tsunami facts  - How should you do when Tsunami is coming?  - Why should Thailand prepare for Tsunami ?  - Five things to do and 5 things not to do for being safe from Tsunami  - Tsunami Signal  &lt;Test for Tsunami&gt;</p>
<p>Final Question</p>	

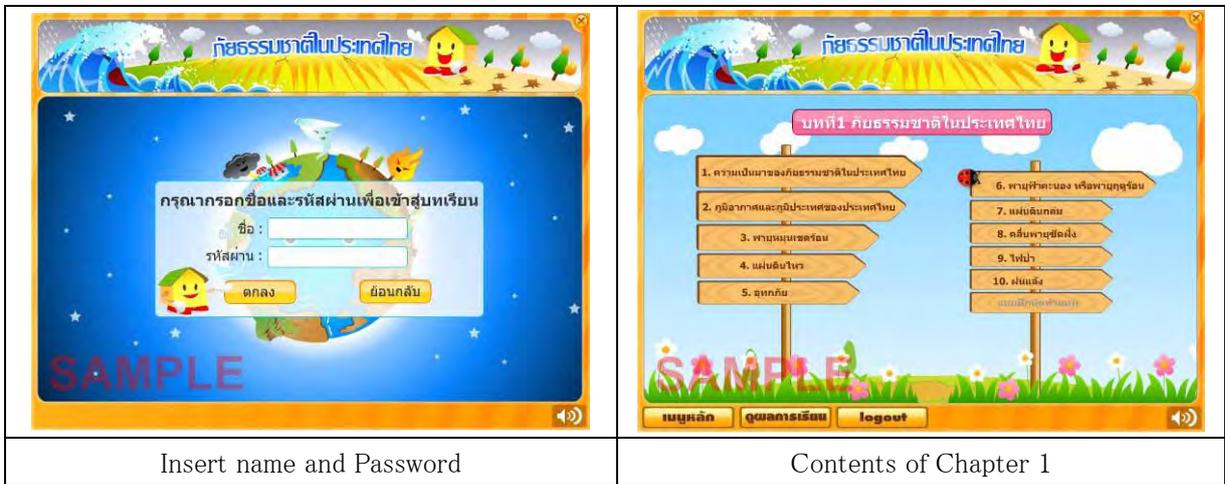


Figure 2-3-1 Example e-learning Material (a)



Screen of Chapter 3



Screen of Chapter 4



Screen of Chapter 5



Screen of Chapter 6



Test for Each Chapter



Result of the Test for Each Chapter

Figure 2-3-1 Example e-learning Material (a)

**Table 2-3-2 Distribution of e-Learning Material**

Destination	Number of CD
1. DDPM Center / IT Center / DDPM Library	120
2. DPMA / 6 campus (Cheinmai, Pranchinburi, Khonkaen, Pitsanuloak, Songkha, Phuket)	300
3. DPM Provincial 75 Provinces	750
4. DPM Regional Center 18 Centers	180
5. 3 Pilot Project Communities / School / Library	100
6. Disaster Prevention Promotion Bureau for Training Course : OTOS, Early Warning, CBDRM, Civil Volunteers, Youth Volunteer etc.	200
7. local Organization in 3 pilot area	60
8. Task Force 1 – 4	40
9. Task Force 5 (Working Group)	50
10. Task Force 6	80
11. Public Relation Division / Press Release	50
12. Activity of Task Force 5 in Phase II	70
Total	2,000

## **2) Assist DPMA to Formulate Master Plan in the Field of Natural Disaster Management**

Under the cooperation of JICA expert ,Mr. Miyashiro, and the JICA expert team, the draft of a DPMA master plan was formulated by the DPMA working group.

A series of meetings with the working group for the DPMA master plan was held. Based on the meetings, it was concluded that JICA expert team assistance is limited to the natural disaster training field. Based on this agreement, the following information was provided from the JICA expert Team.

- Example of Japanese training establishment for natural disasters
- Example of the training program for natural disaster management in Japan
- Suggestion for the DPMA natural disaster management training course

Such information is being examined by the working group of the DPMA master plan and the DPMA master plan was completed in May 2008. The contents of the DPMA master plan are shown in Table 2-3-3.

**Table 2-3-3 Contents of DPMA Master Plan**

<p><b>1. Background</b></p>	<p><b>2. Overall Operation</b>                  2- 1. DDPM Staff                  2- 2. Department of Local Administration Staff                  2- 3. Government organizations' staff                  2- 4. Private organizations' staff                  2- 5. Volunteer Networks                  2- 6. People</p>
<p><b>3: Curriculum Production</b>                  3-1. Fire                  3- 2. Collapsed Building Rescue                  3- 3. Chemical Substance Rescue                  3- 4. Civil Defense                  3- 5. Disaster Management</p>	<p><b>4. Trainer</b>                  4-1. Trainer of DDPM 930 persons                  4- 2. Trainer of other organizations 90 persons</p>
<p><b>5. Training</b>                  5-1. People Preparedness Training Course                  5-2. Capacity Development Training Course for Civil Defense Volunteers                  5-3. Capacity Development Training Course for Local Administration Officers                  5-4. Other government organization officers training                  5-5. DDPM Officer Training</p>	<p><b>6. Branch Expansion</b>                  6-1. Pracheenburi Campus                  6- 2. Song Kla Campus                  6- 3. Chiang Mai Campus                  6- 4. Khon Kean Campus                  6- 5. Phuket Campus                  6- 6. Pissanulok Campus</p>
<p><b>7. International Cooperation</b></p>	<p><b>8. Development direction in the future</b>                  8-1Weakness / limited                  8-2Place / Building Development                  8-3Training Material Development                  8-4Officers Development                  8-5Curriculum Development</p>
<p><b>9. Strength / Opportunity</b>                  9.1 Fire and Rescue Training Center Establishment                  9.2 Disaster Management System Development</p>	<p><b>10. Development Direction</b>                  10.1 Target Group Developments                  10.3 Curriculum Development                  10.4 Training Material Developments                  10.5 Training Development</p>
<p>Table: Operation Plan and Budget in 2008</p>	

### **2-3-3 Evaluation of the Achievement**

#### **1) Natural Disaster Management Training material**

The e-learning material for natural disaster management was completed through cooperation between the JICA expert team and DDPM working group. Through the preparation of material, technical transfer for natural disaster management knowledge and experience has been pursued and completed. The capacity of DDPM staff especially working group staff was fully enhanced through preparation of the e-learning manuscript. The e-learning material has been distributed across Thailand and utilized for the training of natural disaster management. DDPM and the JICA expert team received many positive responses and request for additional distribution from various organizations and persons concerned with disaster management in Thailand. DDPM shall prepare additional CD-ROMs and distribute them.

It can be evaluated that the purpose of the project in this field was successfully completed.

#### **2) DPMA Master Plan**

A DPMA master plan was formulated under the cooperation of JICA expert Mr. Miyashiro and the JICA expert team. The cooperation from the JICA expert team is limited to the natural disaster training field but it can be evaluated that the purpose of the project in this field was successfully completed.

### **2-3-4 Recommendations**

In this project, the target of the completed e-learning material is limited to beginners who do not have enough knowledge and experience in this field and detailed explanations and scientific background are omitted in the material. Therefore, it must be said that a person who has some knowledge and experience in this field will not be entirely satisfied by this material.

It is recommended to develop further e-learning material targeting more experienced people in the natural disaster management field. However it is recommended to describe substantial and practical matters in the material but not for needless scientific description.

Further, it must be recognized that the e-learning material is one of the tools to conduct training. A comprehensive natural disaster management training course including DIG examination, hazard map preparation / utilization and observation of the past disaster areas should be established. It is recommended to establish such a training course in DPMA. The master plan formulated in the project shall be realized through constant effort.

Further, DDPM has to turn out active leader / trainers who can practice, lead and establish plans in the natural disaster management field.

It must be said that the e-learning material formulated in this project is just a first step of the natural disaster management training in Thailand. Further assistance from Japan and further efforts of DDPM is strongly anticipated.