

PROPOSAL PROJECT TO WARD EFFECTIVE FLOOD HAZARD MAPPING IN CAMBODIA

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1- Introduction

The Regional training Program on Flood Hazard Mapping was conducted on 28 October until 01 December, 2007 by Public Works Research Institute (PWRI) by International Center for Water Hazard and Risk Management (ICHARM) together with the Japan International Cooperation Agency (JICA) and JICE. The total of 30 participants which include 10 participants master course students from 13 countries (Bangladesh, Cambodia, China, India, Indonesia, Japan, Lao PDR, Nepal, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam) attended the course. This course also provided participants with a better understanding not only of general knowledge on flood hazard mapping in Japan and the world, but also professional knowledge and techniques which are indispensable for the development of flood hazard map (FHM). These techniques included flow routing, topographical maps, GIS and Inundation analysis. , 5 days of special field work on 'Town Watching' was conducted in Kurihashi Town for one day and Ise Town , Miyagava River for four days with coordinate various participants from Ise city hall .

A. OBJECTIF OF THE PLANNED PROJECT

1. To reduce the adverse impact of floods and the likelihood of flood in Cambodia
2. Save life and properties, economic losses by flood disaster
3. Reduce poor peoples at the risk area
4. To produce flood hazard map for flood preparedness and emergency response
5. To inform the public and relevant authorities about the flood risk and how to deal it.
6. To propose an integrated flood management (IFM) that can be used for another areas in Cambodia
7. To promote sustainable flood risk management measures.

B. Flood hazard maps will be useful in Cambodia

Flood Hazard Map is very useful to be implemented in Cambodia. With regards of the Flood Hazard Map objectives, to prevent loss of people's lives, properties and helps smooth refugee from home to evacuation shelter as well as to notifying the residents of

potential flood damage and enhancing their awareness of the importance of flood disaster preparedness could be achieved.

C. CAMPARISON OF FLOOD IMPACTS ON POPULATION AND ECONOMIC LOSSES

Year Impacts	Household	Peoples	Death toll	Economic Loses (USD)
1996	386,132	2,029,748	169	
2000	750,618	3,448,629	347	157,000,000
2001	429,689	2,121,952	62	34,000,000
2002	296,234	1,439,936	29	12,000,000
2007		19,000	2	1,000,000

2. TARGET AREA TO IMPLEMENTATION OF FHM

A. Stung Prek Thnot River Basin is the target area for flood hazard maps

The Prek Thnot River flows in the direction of southeast to east from the Elephant mountain region as origin. The highest elevation of the basin is El. 1,543 m above mean sea level. The schematic diagram of the Prek Thnot River system is shown in Figure 1. The Prek Thnot River joins the Bassac River at Kandal. The catchments area of the Prek Thnot River and the length of river course are about 5,740 km² and 232 km at the confluence with the Bassac River. The major tributaries and the catchments area of the tributaries are as shown here.

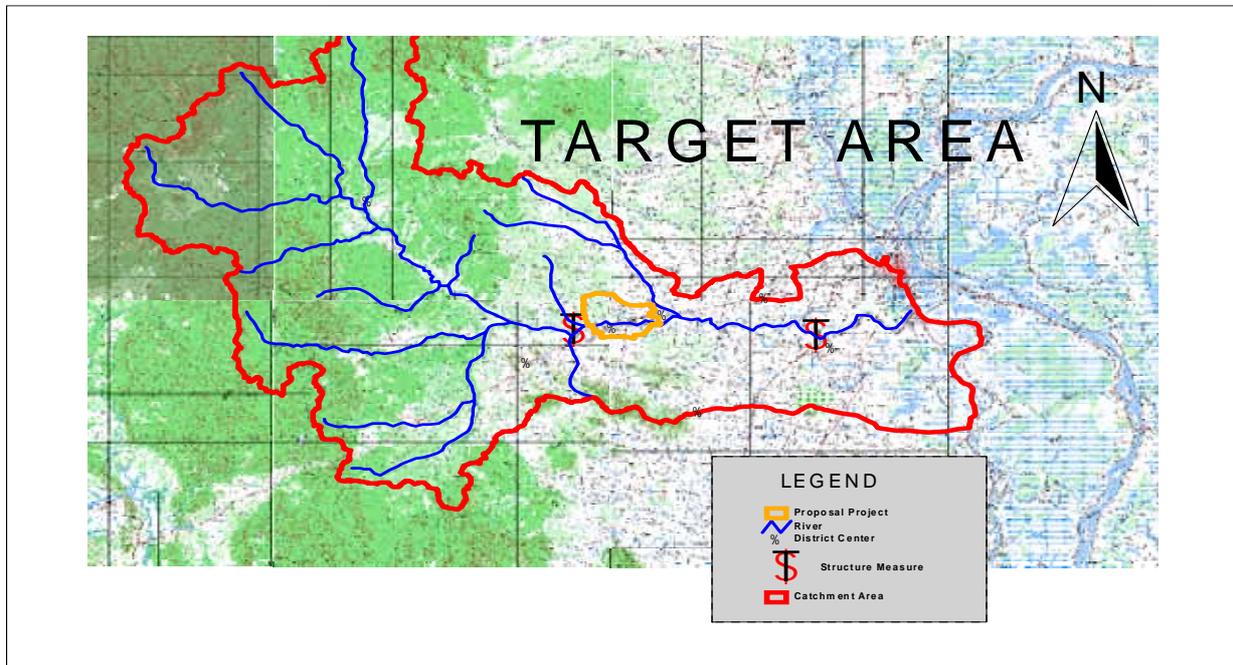
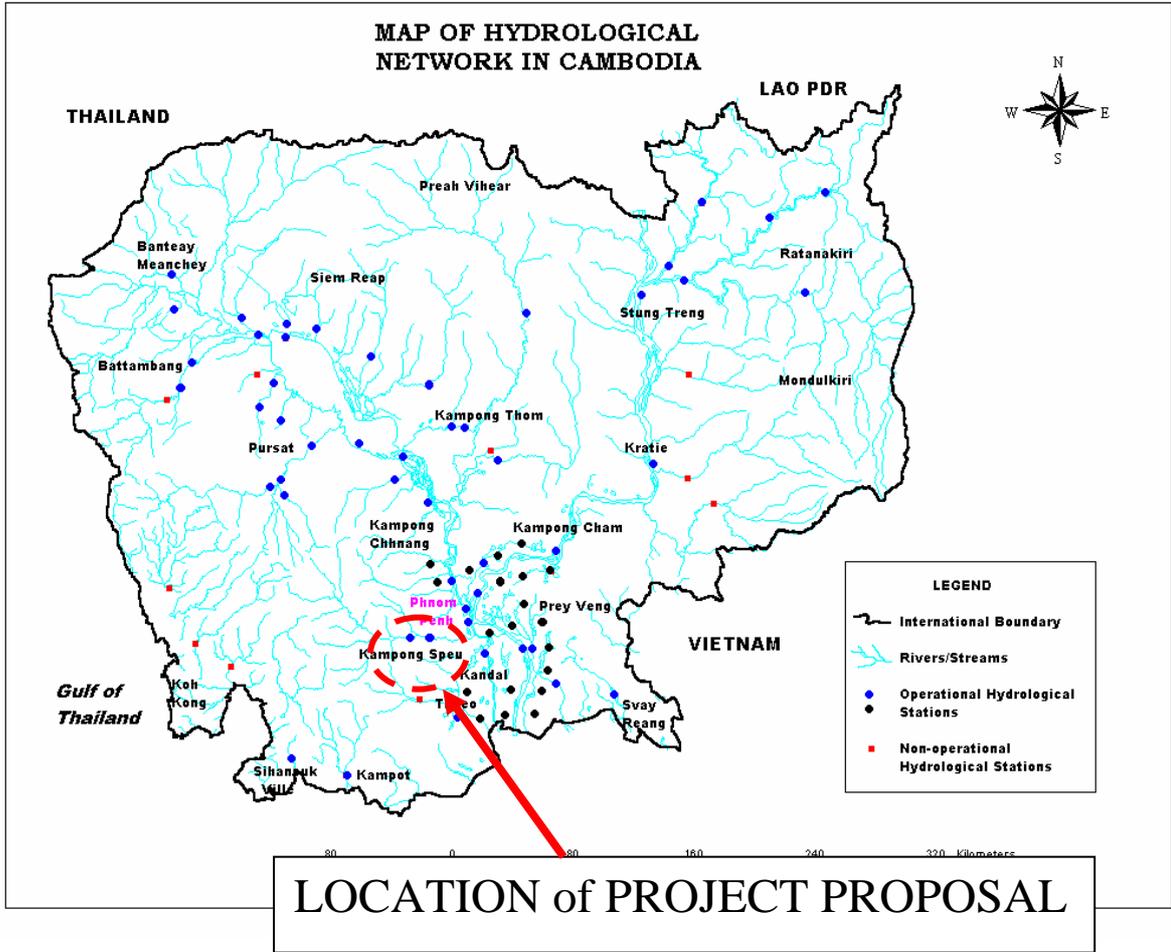
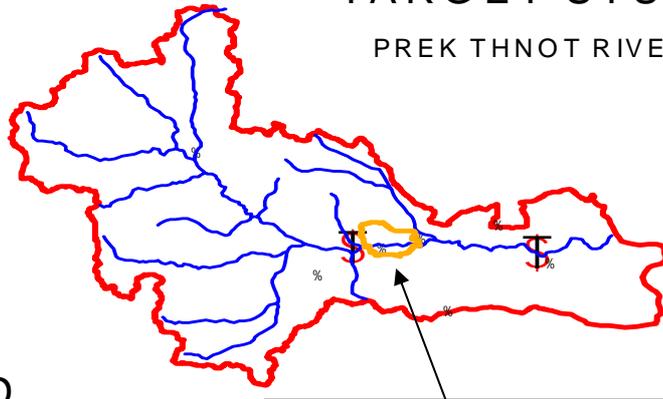


Figure.1

TARGET STUDY AREA

PREK THNOT RIVER BASIN



LEGEND

-  Proposal Project
-  River
-  District Center
-  Structure Measure
-  Catchment Area

Proposal Project to implement
Flood Hazard Map
At Chbar Mon District,
Kampong Speu Province Center

B. Necessary Stung Prek Thnot River Basin are the target area for flood hazard Maps

FHM is necessary to prevent loss of people's lives and helps smooth refugee from home to evacuation shelter as well as to notifying the residents of potential flood damage and enhancing their awareness of the importance of flood disaster preparedness

Statistic table along Stung Prek Thnot River Basin

Province	Kampong Speu	Kandal	Takeo	Total
District	Aoral, Chbar Mon Kong Pesi, Phnom Chrouch Samrong Tong	Kandal Steung Ang Snoul	Bati	8
No of Commune	43	32	4	79
Population	329,309	145,525	30,942	505,776
House hold	63,576	29,419	6,152	99,147
Rice field	55,143	19,048	7,130	81,321

C - Outline of present countermeasures for mitigating flood damages in Cambodia

The MOWRAM has the right to prohibit activities that are likely to flood damage protection works or to obstruct the natural flow of rivers. Structural (curative) as well as non-structural (preventive) measures have been proposed to alleviate the flooding problem.

Structural measures

- **Flood Control Dams**

The Prek Thnot river Levees along river started rehabilitation in 2002 and now some parts levees under reconstruction of maintenance policies and Kampong Toul outlet structure completed by JICA Project, Some more example of dams specially constructed for flood control are Kob Srov Dam and Tamok Dam built by MOWRAM for water supply, Irrigation but also serves as a flood protection dam.

Non-structural Measures

Non-structural measures are employed more for preventing floods from occurring and with the aim of minimizing losses due to flooding. Some of these measures are:

- **Lake, Pond, River Basin Management**

Under the concept of River Basin Management, the whole river basin is planned in an integrated manner and all factors are taken into consideration when a certain development plan is proposed. Factors like zoning for river corridors, riparian areas, natural flood plain, conservation of wetlands, storage lake, ponds etc will be taken into consideration when preparing flood management plans.

- **Flood Forecasting and Warning System**

Telemetric forecasting systems have been installed in the major river basins namely Stung Treng, Kratie, Prek Kdam and Kompong Loung flood forecasting systems and flood marks have been established in smaller basins.

Department Hydrology and River Works also provides a bulletin and web-site information system on flood warning and flood response will be functional after the flood event occurs especially during the monsoon season. It's included with the five main activities as below:

- Pre- flood, During the post flood
- Flood forecasting and warning system
- Flood disaster management, flood fighting, evacuation
- Flood operation and relief centers at District, State and Federal levels
- Flood damage assessment

- First Warning is made to the Public by Minister / Secretary of State (MOWRAM) when both observed and forecasted levels exceed the Warning Levels.

- Second Warning is made to the Public by Minister/Secretary of State (MOWRAM) when both observed and forecasted levels rise closely to the Flooding Levels.

- Flood Alarming is made to the Public by Minister/Secretary of State (MOWRAM) when both observed and forecasted levels exceed the Flooding Levels.

D. The Allocation of Role in Making Flood Hazard Maps in Cambodia

C1-Organization should hold the main responsibility for making a fundamental map such as anticipate inundation area map.

No	Organizations	Roles
1	Ministry of Water Resources and Meteorology	<ul style="list-style-type: none">-Planning, coordinating and supervising relief-Operations during flood. Support the flood disaster preparedness activities among the committee members.- Providing flood forecasting and warning service to the public.- Main organizations for planning,prepare and disseminate Flood Hazard Map.-Providing weather forecast information due to flood forecasting and warning activities
2	Ministry of Finance	<ul style="list-style-type: none">-Prepare budgets for yearly project developments.
3	Ministry of Environment	<ul style="list-style-type: none">-Support and provide development allocation for flood mitigation projects at the federal level.
4	Ministry of Land Resources Management	<ul style="list-style-type: none">-Providing the digital topographic map, DEM of the drainage basin
5	Provincial Government	<ul style="list-style-type: none">-Support and provide development allocation for flood mitigation projects at the state level.- Dissemination of Flood Hazard Map- Provide information on evacuation routes in their region.

E. Organization should hold the main responsibility for making and disseminating flood hazard maps.

No	Organizations	Roles
1	Ministry of Water Resources and Meteorology	-Making Flood Hazard Map. -Dissemination of Flood Hazard Map
2	Ministry of Finance	-Prepare budgets
3	Ministry of Environment	-Support
4	Ministry of Land	-Providing the digital topographic map, DEM of the drainage basin
5	Provincial Government	- Dissemination of Flood Hazard Map
6	National Committee for Disaster Management.	- Dissemination of Flood Hazard Map
7	Cambodia Red Cross	- Dissemination of Flood Hazard Map

4- PROJECT SCHEDULE AND IT'S ITEMS

Action plan for implementation flood hazard map in Stung prek thnot river basin
At Chbar Mon District, Kampong Speu Province.

No	Activities	2008									
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	Data collection and processing										
	- Provided and acquisition Data	—————									
	-Varify data		—————								
	- Pre-analysis Data			—————							
2	Analysis Inundations depth										
	- Simulation and Extrac of Innundation depth					—————					
	- Verify and Integrated Innundation depth						—————				
3	Flood Hazard Map production										
	- Design and Integrated information						—————				
	- Evaluation of map									—	
	- Print									—	
4	Dissemination of FHM										
	- Distribution varies organizations										—
	-Site Pratices										—
	-Site Evaluation										—

5. EXPECTED BENEFITS OF FHM

- 7 Alarm and early warning information due to flood to local resident and their inundation area .
- 7 To reduce loses of peoples (incremental of death peoples) and properties, infrastructure damage due to flood occurrence.
- 7 Enhancing awareness to resident to evacuation shelter before flood come .
- 7 Helps smooth refugee from home to evacuation shelter before flood come
- 7 Integration of flood modeling, topographical modeling and flood stimulation of Prek Thnot Catchments will helped DHRW, MOWRAM, to enhance the exist of flood forecasting and flood warning system.

7 Strengthening technical support to the DHRW, MOWRAM to ward implementation other rivers.

7 People awareness about evacuation route if the exist road inundated.

5.1. PROBLEM IMPLEMENTAION OF FHM

Problems that might be faced in the process of developing Flood Hazard Map in Stung Prek Thnot River can be divided into aspects as follow:

i. hydrological and topographic

- Data availability – rainfall, water level and discharge
- Installation of gauge stations along river
- Insufficient data, updated topographical map
- No have DEM in past big flood area
- Lack of awareness of hydraulic modeling and GIS analysis
- Resettlement of construction

ii. Community awareness level

In view of the impact of introducing flood hazard map as non-structural measure in reducing and preventing lost of human life, it is expected that certain level of community will have different perception of the map. There might be group of community looking it as threat rather than information for preparedness and any other perception related to properties value or so. Effective awareness rising and community consultation in the initial stage of the map development will be helpful to overcome this problem. Working with community based non-government organization to carry out this is also a possibility.

6. Approximate and Cost Estimate

Project estimate Cost		
No.	Activities	Budget (USD)
1	Data collection and crossing	4900.00
	- Provided and acquisition Data	
	-Verify data	
	- Pre-analysis Data	
2	Analysis Inundations depth	2200.00
	- Simulation and Extrac of Innundation depth	
3	Flood Hazard Map production	3300.00
	- Design and Integrated information	
	- Evaluation of map	
	- Print	
4	Dissemination of FHM	10,900.00
	- Distribution varies organizations	
	-Site Prattice	
	-Site Evaluation	
Grand Total		21,300.00

7. Suggestions and opinion for FHM training course

- It should be longer is also important to do more exercises and practice on field survey, because we can see everything at site relationship on flood hazard map.
- should be extended software longer more time let all participants go back countries implementation their own data,
- All parameter input for only situation in Japan, should be input parameter in situation each countries for soft ware run.

Concluding

The training course on flood hazard map is very important because let we know how to product flood hazard map, other way let we many informations of natural disaster in region and world countries related the flood and climate change. The one more is the tool on activities as software for hydro-meteorological data analysis, hydrology, hydraulic model, flood hazards mapping developing by using ArcGIS and HEC-RAS to apply their countries, especially in Cambodia....

Consideration, support and willingness of Japanese Government Agencies especially Japan International Cooperation Agency (JICA), Public Works Research Institute (PWRI) and all the participating country in relation to the training course are highly appreciated.