



**INTERNATIONAL CONFERENCE  
“TRANSBOUNDARY WATER RESOURCES  
AND RELATED RESOURCES COOPERATION”  
AND EXCURSION**

ทิวชมบริเวณแม่น้ำปากอิงไหล บ้านปากอิง

19.12.59



**Dusit Island Resort  
2 March 2018  
Chiang Rai, Thailand**

# Agenda





**International Conference  
“Transboundary Water Resources and  
Related Resources Cooperation” and excursion**















**2 March 2018**

<b>Time</b>	<b>Topics</b>	<b>Presenters/Facilitator</b>
08.00 – 08.30	Register and welcome	DWR staffs
08.30 – 08.45	Opening Ceremony : Welcome address	CEI Governor
	<b>Presentation Session</b>	<b>Dr. Pongsak Suttinon,</b> Thailand.
08.45 – 09.15	01.The study on impacts and monitoring of transboundary environment from hydropower development along the Mekong mainstream (TNMC Study)	<b>Dr. Panut</b> Manoonvoravong, Thailand.
09.15 – 09.45	02. The Role of Cascade Reservoirs on the Lancang River for Flood Control and Drought Relief of the Mekong River	<b>Mr. Li Zhongping,</b> China
09.45 – 10.15	03.Waterborne Connectivity in Mekong-Lancang River.	<b>Mr. Thanathip</b> Marine Department, Thailand
10.15 – 10.30	Coffee break	
10.30 – 10.50	04. Current situation and investment/development challenge regarding the Mekong River Basin Development in Cambodia	<b>Mr. Khlok Sam Ang,</b> Cambodia
10.50 – 11.20	05. Nam Xe Bang hieng Lao PDR–Nam Kam Thailand M-IWRM Transboundary Projects	<b>Mr.Thongthip</b> Chandalasane, Lao PDR.
11.20 – 11.40	06. TransboundaryWater Resources Cooperation of Myanmar.	<b>Mr. Sein Lwin,</b> Myanmar.
11.40 – 12.00	07. TransboundaryWater Resources Cooperation of Viet Nam.	<b>Ms.Nguyen Thi Thu Linh,</b> Viet Nam
12.00 – 12.15	Summary: Key Message of International Conference	<b>Dr.Pongsak Suttinon,</b> Thailand
12.15 – 13.00	Luncheon	
13.15 – 18.00	Excursion : Visit Doi Tung	
18.30 – 20.30	Dinner (hosted by DWR)	

**International Conference " Transboundary Water Resources and Related Resources Cooperation  
on 2 March 2018  
At Dusit Island Resort Chiang Rai, Thailand**

Agenda :		Summary: Key Message of International Conference	
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**Presentations and Abstracts**

Country	Topic	Abstract	Presentation
<b>Thailand</b>	The study on impacts and monitoring of transboundary environment from hydropower development along the Mekong mainstream (TNMC Study)		
<b>China</b>	The Role of Cascade Reservoirs on the Lancang River for Flood Control and Drought Relief of the Mekong River		
<b>Thailand</b>	Waterborne Connectivity in Mekong-Lancang River		
<b>Cambodia</b>	Current situation and investment/development challenge regarding the Mekong River Basin Development in Cambodia		
<b>LaoPDR</b>	Nam Xe Bang hieng Lao PDR–Nam Kam Thailand M-IWRM Transboundary Projects		
<b>Myanma</b>	Transboundary Water Resources Cooperation of Myanmar.		
<b>Viet Nam</b>	Transboundary Water Resources Cooperation of Viet Nam.		

**More Information**

**Source:** [www.tnmc-is.org](http://www.tnmc-is.org)



# Presentations



# Thailand

## **The study on impacts and monitoring of transboundary environment from hydropower development along the Mekong mainstream (TNMC Study)**

**Dr Panut Manoonvoravong**

*Department of Water Resources, Ministry of Natural Resources and Environment, Thailand*

*mpanut@gmail.com*

### **Abstract**

This joint study between Department of Water Resources, and Office of National Resources and Environmental Policy and Planning has been commenced since 2014 in 8 provinces along the Mekong corridor (15 km landwards from the bank) i.e. Chiang Rai, Loi, Nong Khai, Bueng Kan, Nakorn Panom, Mukdahan, Amnart Charoen, and Ubon Ratchatani. Local institutional consults were hired to study on multi-disciplinary tasks. Three phases of study (pre-during–post dam construction) have been planned for 15 years. The main objectives are 1) to study and monitoring transboundary (Tb) environmental and social impacts from hydropower development along the Mekong mainstream during pre-present-post construction 2) to create Geo-Informatics database of transboundary environmental and social impact induced by hydropower development 3) to grant awareness to the riparian stakeholders for good preparation on mitigation, adaptation due to hydropower development 4) to build up the cooperation between civil society and government on monitoring transboundary environmental and social impacts from hydropower development along the Mekong mainstream.

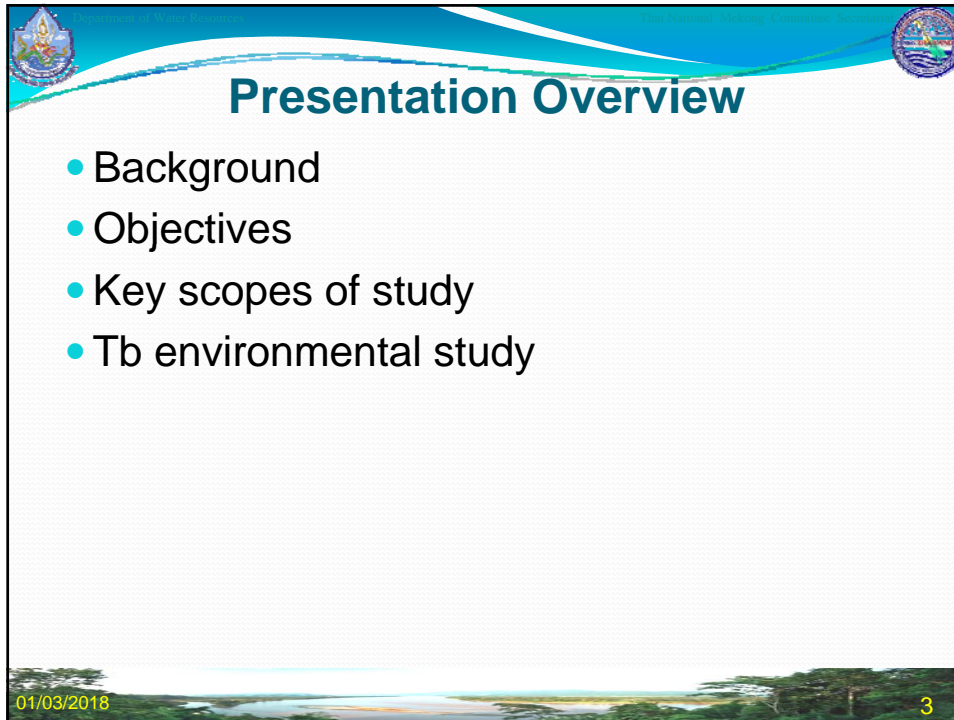
**Keywords:** transboundary, environment, impact, mainstream, hydropower

The study on impacts and monitoring of transboundary environment from hydropower development along the Mekong mainstream (TNMC Study)

The 2<sup>nd</sup> Meeting of Joint Working Group on Water Resources of Mekong-Lancang Cooperation, Chiang Rai, Thailand  
1-2 March 2018

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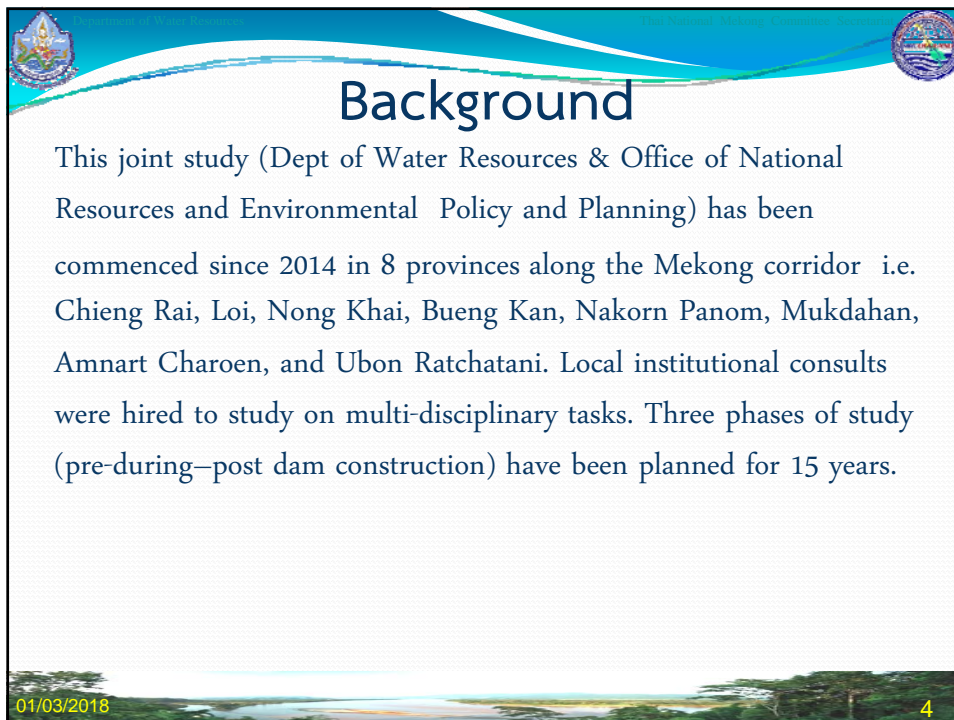


**Presentation Overview**

- Background
- Objectives
- Key scopes of study
- Tb environmental study

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This slide features a blue header with a white wavy line. On the left and right sides of the header are circular logos. The main content is a bulleted list. At the bottom, there is a landscape image of a river and trees, with the date '01/03/2018' on the left and the number '3' on the right.





**Background**

This joint study (Dept of Water Resources & Office of National Resources and Environmental Policy and Planning) has been commenced since 2014 in 8 provinces along the Mekong corridor i.e. Chiang Rai, Loi, Nong Khai, Bueng Kan, Nakorn Panom, Mukdahan, Amnart Charoen, and Ubon Ratchatani. Local institutional consults were hired to study on multi-disciplinary tasks. Three phases of study (pre-during-post dam construction) have been planned for 15 years.

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This slide features a blue header with a white wavy line. On the left and right sides of the header are circular logos. The main content is a paragraph of text. At the bottom, there is a landscape image of a river and trees, with the date '01/03/2018' on the left and the number '4' on the right.

## Objectives

- To study and monitoring transboundary (Tb) environmental and social impacts from hydropower development along the Mekong mainstream on pre-during-post construction
- To create Geo-Informatics database of transboundary environmental and social impact induced by hydropower development
- To grant awareness to the riparian stakeholders for good preparation on mitigation, adaptation due to hydropower development
- To build up the cooperation between civil society and government on monitoring transboundary environmental and social impacts from hydropower development along the Mekong mainstream

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## Key scopes of the study



- Literature review of secondary environmental impact data
- Primary data collections of the Tb environmental & socio-economic impacts by conducting field survey along the Mekong corridor
- Evaluate data & find out the potential Tb risk areas.
- Scenarios & mathematical models advance HP development
- Stakeholder information sharing forums
- Annual reports



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## Tb environmental study

1. Water level & Flow rate
2. Sedimentation
3. Bank erosion
4. Water quality
5. Fishery
6. Ecosystem services
7. Scenarios & Models
8. Stakeholder information sharing forums

For the fact finding of the potential risk areas affected by adverse impacts of these issues.

01/03/20187

**Crucial TbEI on the potential risk areas**

Impact area degree		Bank erosion	Sedimentation	Water level change	Flow rate	Fishery & riparian ecology	Ecosystem services	Water quality, etc.	Total
Chiang Rai	Chiang Khong	3	3	4	4	4	3	1	22

<table style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: lightblue; width: 20px; text-align: center;">1</td><td>Lowest risk</td></tr> <tr><td style="background-color: lightgreen; width: 20px; text-align: center;">2</td><td>Low risk</td></tr> <tr><td style="background-color: yellow; width: 20px; text-align: center;">3</td><td>Moderate risk</td></tr> <tr><td style="background-color: orange; width: 20px; text-align: center;">4</td><td>High risk</td></tr> <tr><td style="background-color: red; width: 20px; text-align: center;">5</td><td>Highest risk</td></tr> </table>	1	Lowest risk	2	Low risk	3	Moderate risk	4	High risk	5	Highest risk	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: lightblue; width: 20px; text-align: center;">1-7</td><td>Lowest risk area</td></tr> <tr><td style="background-color: lightgreen; width: 20px; text-align: center;">8-14</td><td>Low risk area</td></tr> <tr><td style="background-color: yellow; width: 20px; text-align: center;">15-21</td><td>Moderate risk area</td></tr> <tr><td style="background-color: orange; width: 20px; text-align: center;">22-28</td><td>High risk area</td></tr> <tr><td style="background-color: red; width: 20px; text-align: center;">29-35</td><td>Highest risk area</td></tr> </table>	1-7	Lowest risk area	8-14	Low risk area	15-21	Moderate risk area	22-28	High risk area	29-35	Highest risk area
1	Lowest risk																				
2	Low risk																				
3	Moderate risk																				
4	High risk																				
5	Highest risk																				
1-7	Lowest risk area																				
8-14	Low risk area																				
15-21	Moderate risk area																				
22-28	High risk area																				
29-35	Highest risk area																				

6 considerate factors for the potential risk area selection

**Physical**

1. Water level & Flow rate
2. Bank erosion
3. Sedimentation
4. Water quality

**Biological**


5. Fishery

**Socio-economic**

6. Ecosystem services

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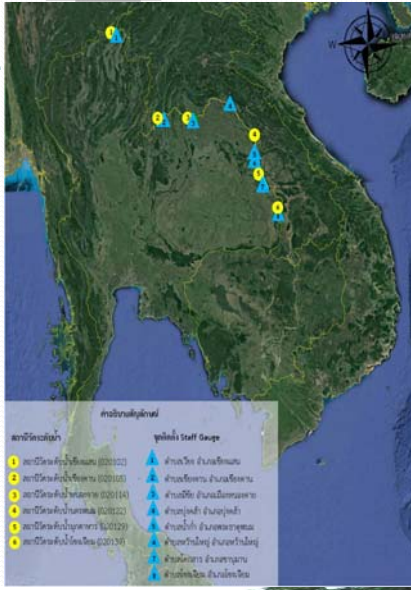
## Water level & Flow rate



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## Water level & Flow rate


- During the year 1985 – 2014 water level & flow rate data were contributed from 6 DWR Hydrological Cycling Observation System (HYCOS) stations
  - 1985 – 1991 No HP in mainstream
  - 1992 – 2014 HP development




สถานีตรวจวัดน้ำ	พื้นที่ใน ๖๐๕๕ กม.๒
1 สถานีตรวจวัดน้ำที่เมือง (020101)	อำเภอเมือง จังหวัดสุพรรณบุรี
2 สถานีตรวจวัดน้ำที่เมือง (020102)	อำเภอเมือง จังหวัดสุพรรณบุรี
3 สถานีตรวจวัดน้ำที่เมือง (020103)	อำเภอเมือง จังหวัดสุพรรณบุรี
4 สถานีตรวจวัดน้ำที่เมือง (020104)	อำเภอเมือง จังหวัดสุพรรณบุรี
5 สถานีตรวจวัดน้ำที่เมือง (020105)	อำเภอเมือง จังหวัดสุพรรณบุรี
6 สถานีตรวจวัดน้ำที่เมือง (020106)	อำเภอเมือง จังหวัดสุพรรณบุรี

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## Study periods




1. Before HPD  
1985-1991




4. Jinghong HP  
2009-2010




2. Manwan HP  
1992-2002




5. Xiaowan HP  
2010-2011



3. Dachaoshan HP  
2003-2008



6. Gongguoqiao HP  
2012-2013



7. Nuozadu HP  
2013-2015

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## Flow rate comparison at Chiang Sean station

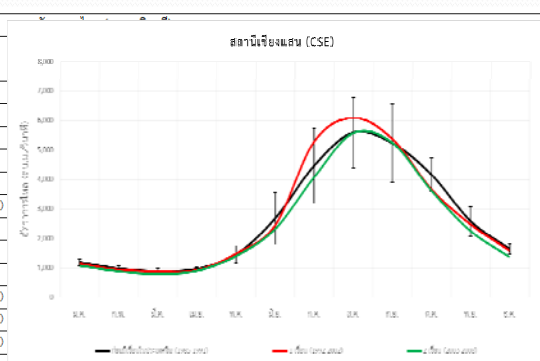
เดือน	ก่อนมี			มี 1			มี 2		
	เดือน	%	SD	เดือน	%	SD	เดือน	%	SD
ม.ค.	1,185	10	1,136	16	(4.2)	1,079	20	(9.0)	
ก.พ.	977	10	934	17	(4.4)	882	13	(9.7)	
มี.ค.	882	11	982	18	(0.05)	796	21	(9.8)	
เม.ย.	966	8	920	23	(4.8)	900	18	(6.8)	
พ.ค.	1,450	20	1,481	26	2.2	1,404	19	(3.2)	
มี.ย.	2,675	33	2,438	37	(8.9)	2,320	15	(13.3)	
ก.ค.	4,462	29	5,280	25	18.3	4,080	14	(8.6)	
ส.ค.	5,587	21	6,086	26	8.9	5,580	22	(0.1)	
ก.ย.	5,222	25	5,369	27	2.8	5,248	19	0.5	
ค.ค.	4,158	13	3,660	16	(12.0)	3,625	20	(12.8)	
พ.ย.	2,586	19	2,473	28	(4.4)	2,253	31	(12.9)	
ธ.ค.	1,637	10	1,578	17	(3.6)	1,373	22	(16.1)	
เฉลี่ย	2,649	18	2,686	23	(1)	2,462	20	(8)	

หมายเหตุ

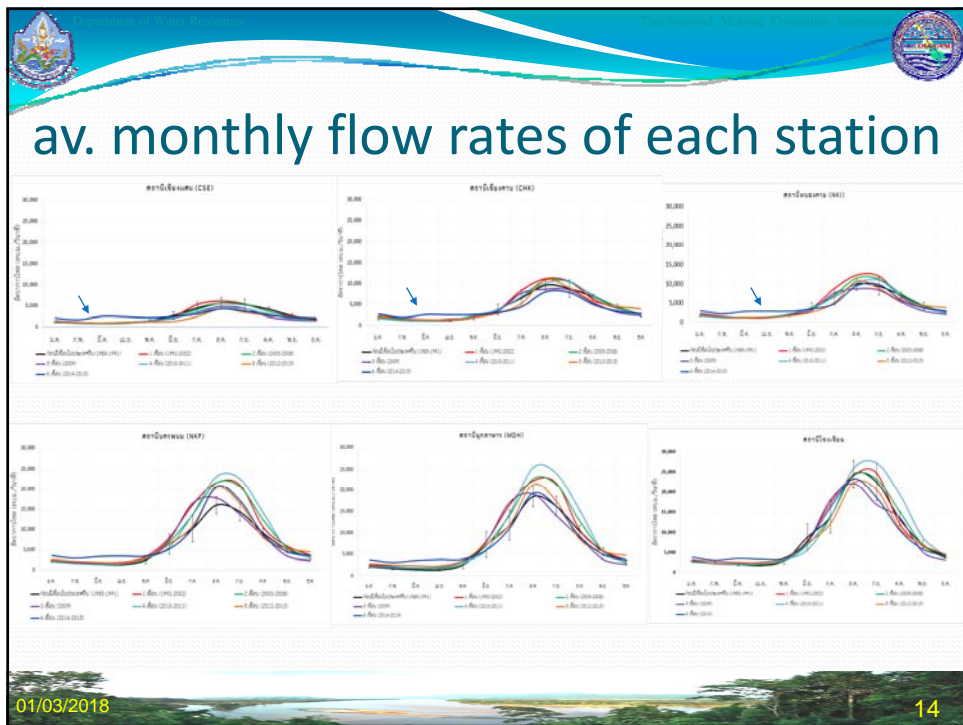
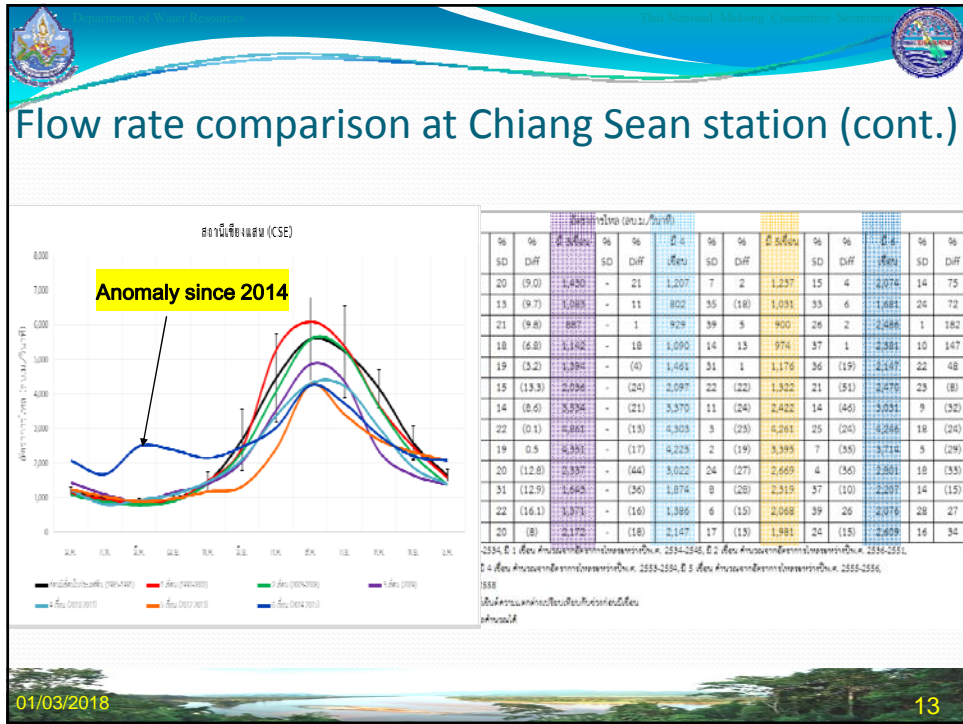
ก่อนมีเดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2528-2534, มี 1 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2534-2545, มี 2 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2536-2551, มี 3 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2552, มี 4 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2553-2554, มี 5 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2555-2556, มี 6 เดือน จำนวนจากสถิติการไหลระหว่างปี.ศ. 2557-2558

% SD = เปอร์เซ็นต์ค่าเบี่ยงเบนมาตรฐาน , % Diff = เปอร์เซ็นต์ความแตกต่างเปรียบเทียบกับช่วงก่อนมีเดือน

(๐) หมายถึง มีค่าสอง x เปอร์เซ็นต์ , - หมายถึง ไม่สามารถคำนวณได้



01/03/201812





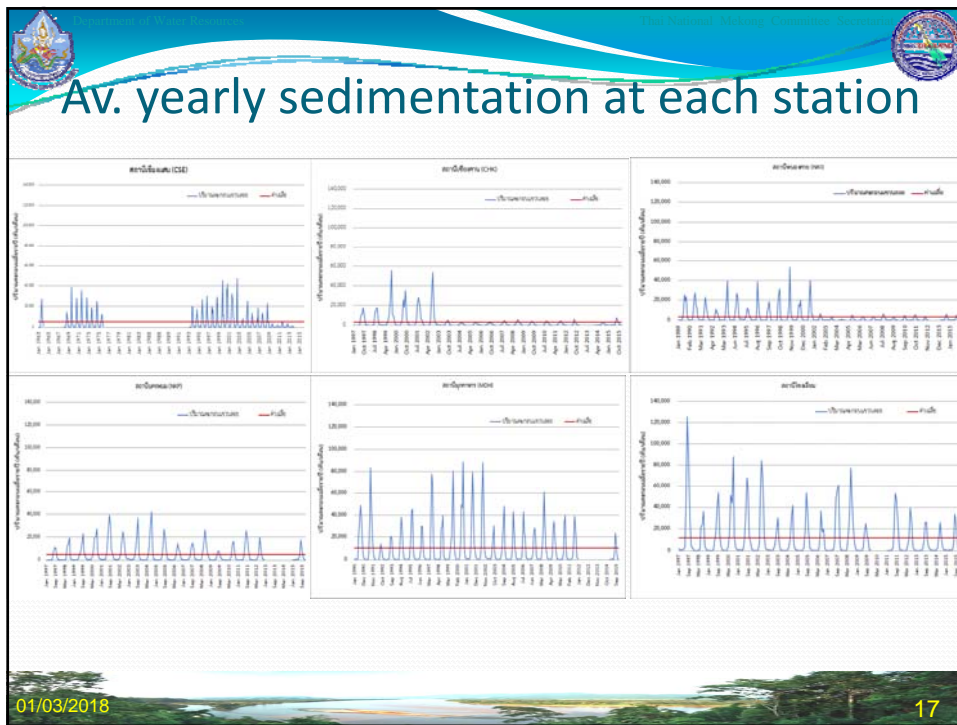
# Sedimentation

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# Sedimentation at CSE station

Comparison with base line						
No dam (1963-1991)	1 dams (Manwan) (1992-2002)	2 dams (Dachashan) (2003-2008)	3 dams (Jinghong) (2009-2010)	4 dams (Xiaowan) (2010-2011)	5 dams (Gongguoqiao) (2012-2013)	6 dams (Nuozadu) (2013-2015)
Base-line	↑	↓	↓	↓	↓	↓

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## Bank protection

- Rock fill bank protection mostly used

Type of Bank protection

ลักษณะของเขื่อน					
<input type="checkbox"/> เขื่อนป้องกันตลิ่งชนิดลาดเอียง	<input type="checkbox"/> เขื่อนป้องกันตลิ่งชนิดแนวตั้ง	<input type="checkbox"/> เขื่อนป้องกันตลิ่งชนิดอาศัยธรรมชาติ			
วัสดุที่ใช้ทำเขื่อน					
<input checked="" type="checkbox"/> เรืองหินใหญ่ .....เมตร	<input type="checkbox"/> เรืองหินขนาดเล็ก .....เมตร	<input type="checkbox"/> ก่อลงลวดตาข่าย .....เมตร	<input type="checkbox"/> แผ่นคอนกรีตสำเร็จรูป .....เมตร	<input type="checkbox"/> กระสอบทราย .....เมตร	<input type="checkbox"/> หญ้า .....เมตร

01/03/201821

Wieng Kaen district, Chiang Rai




Khong Chiem district, Ubon





01/03/201822

# Khong Chiem district, Ubon



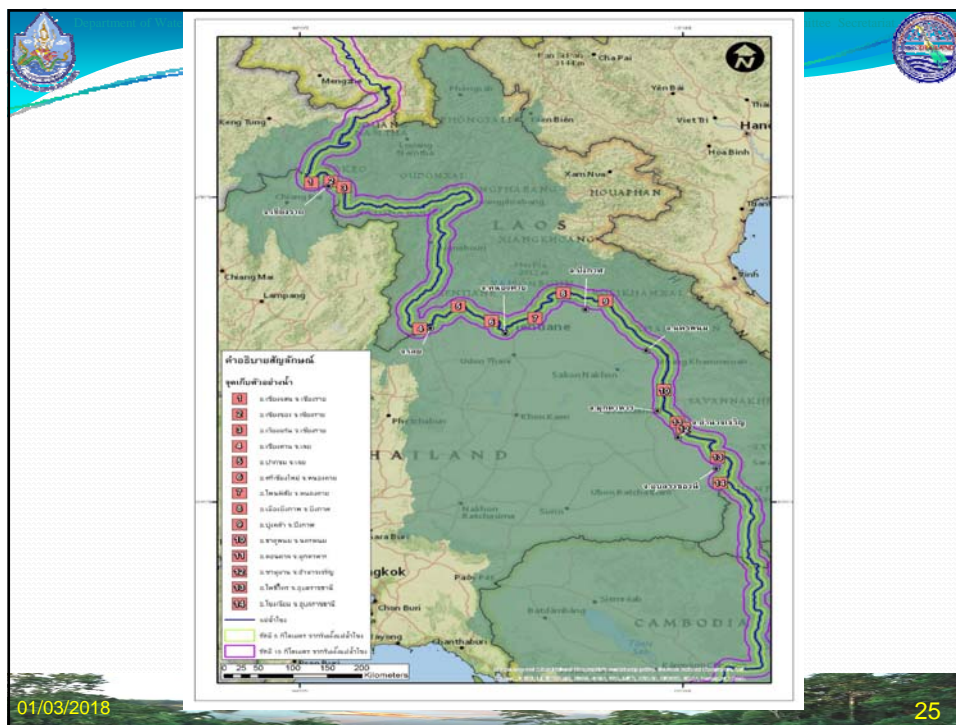
The slide features a main title "Khong Chiem district, Ubon" at the top. Below the title, there are two photographs on the left showing a riverbank collapse. The top photo shows a person in a red shirt standing near a tripod-mounted surveying instrument on a bank. The bottom photo shows a cross-section of a collapsed earthen bank. To the right of the photos is a technical diagram of a bank protection structure. The diagram shows a cross-section of a riverbank with a structure labeled 'X' and 'Y'. It includes various labels such as 'ระดับน้ำ' (water level), 'ระดับตลิ่ง' (bank level), 'ระดับพื้นดิน' (ground level), and 'ระดับน้ำใต้ดิน' (groundwater level). The diagram also shows a north arrow 'N' and points 'a', 'b', 'c', and 'd'. Below the diagram, there are two labels in Thai: 'จุดเริ่มต้นของภาพที่วัดด้วย GPS' and 'จุดสิ้นสุดของภาพที่วัดด้วย GPS'. The text "Bank protection collapse" is written below the diagram. At the bottom left, the date "01/03/2018" is displayed, and at the bottom right, the number "23" is shown.

# Water quality



The slide features a main title "Water quality" at the top. Below the title, there is a collage of five images. From left to right: a dam with water flowing over it; a person in a blue cap and jacket sampling water from a green bucket in a boat; a boat on a river; a field of green crops; and a temple with a golden stupa. At the bottom left, the date "01/03/2018" is displayed, and at the bottom right, the number "24" is shown.

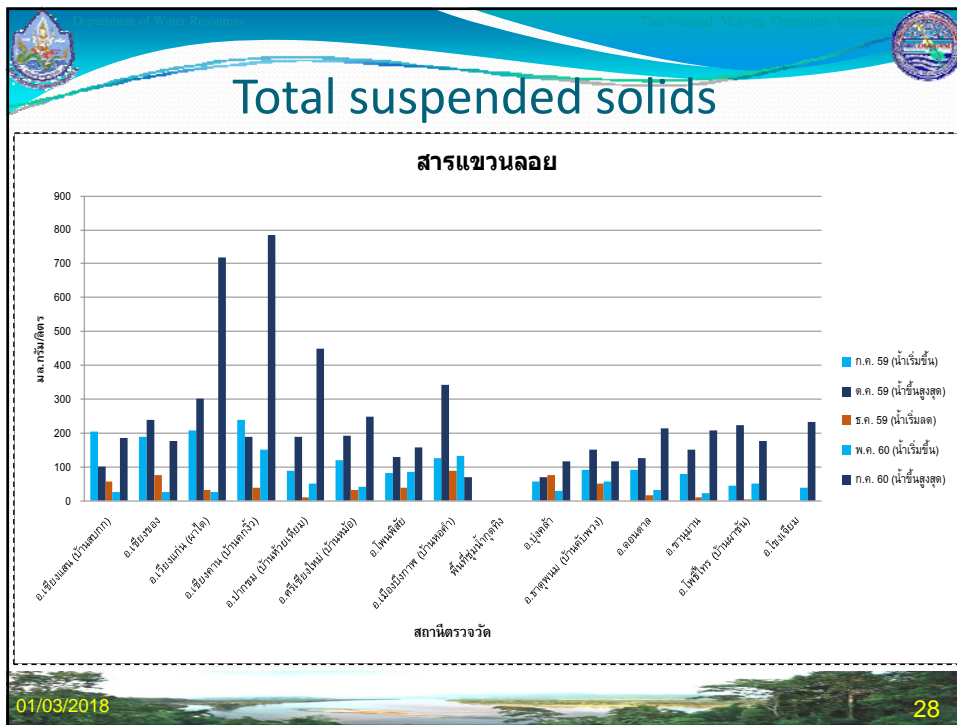
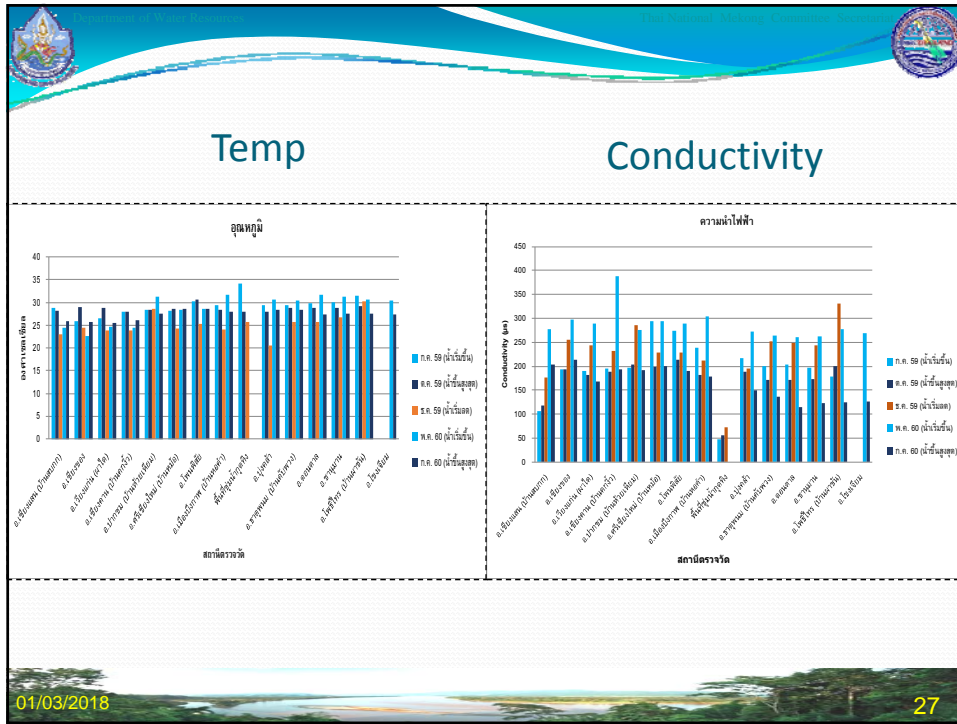


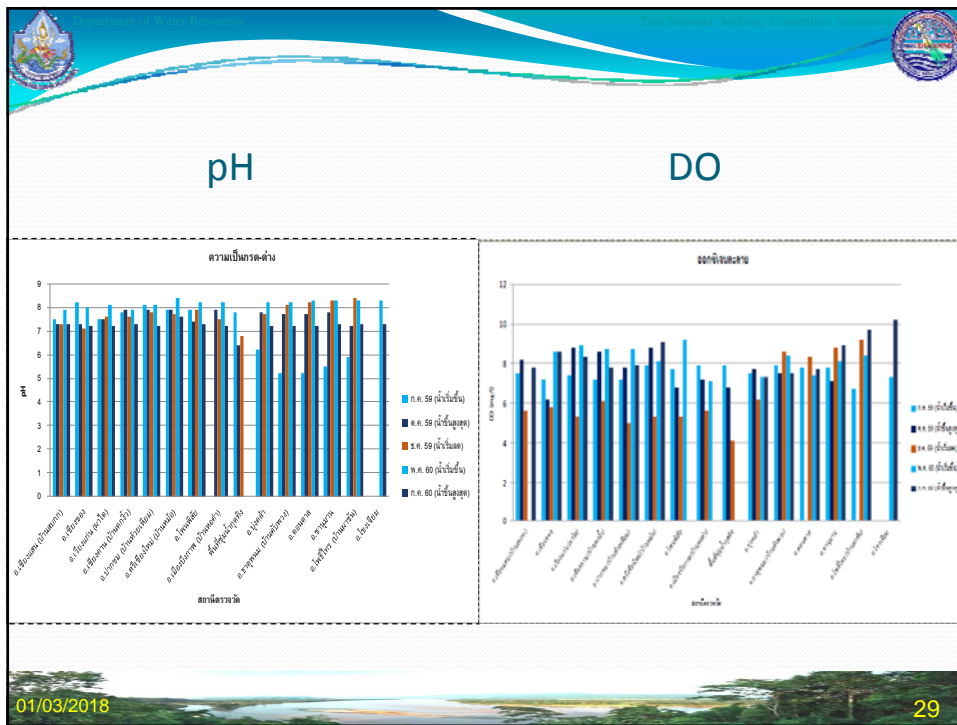


## Water analysis

Indices	Methodology
1. Temperature	Thermometer
2. pH	Electrometric Method
3. Conductivity	Electrometrical Conductivity Method
3. Dissolved Oxygen	Membrane Electrode Method
4. Total suspended solids	Gravimetric Method; Dried at 103-105 °C
5. Total NO <sub>3</sub> -N	Cadmium Reduction Method
6. Total PO <sub>4</sub> -P	Ascorbic Acid Method
7. Colour / transparency	Visual comparison method, Nephelometric


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## Fishery study



Beach Seine



Dipnet




Market approach

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## Periods of sampling

3 times a year

1. Water rising (April-May)
2. Max. water level (July-August)
3. Water declining (December-January)



01/03/2018

### Fishes

ปลาไนล (Oreochromis niloticus)

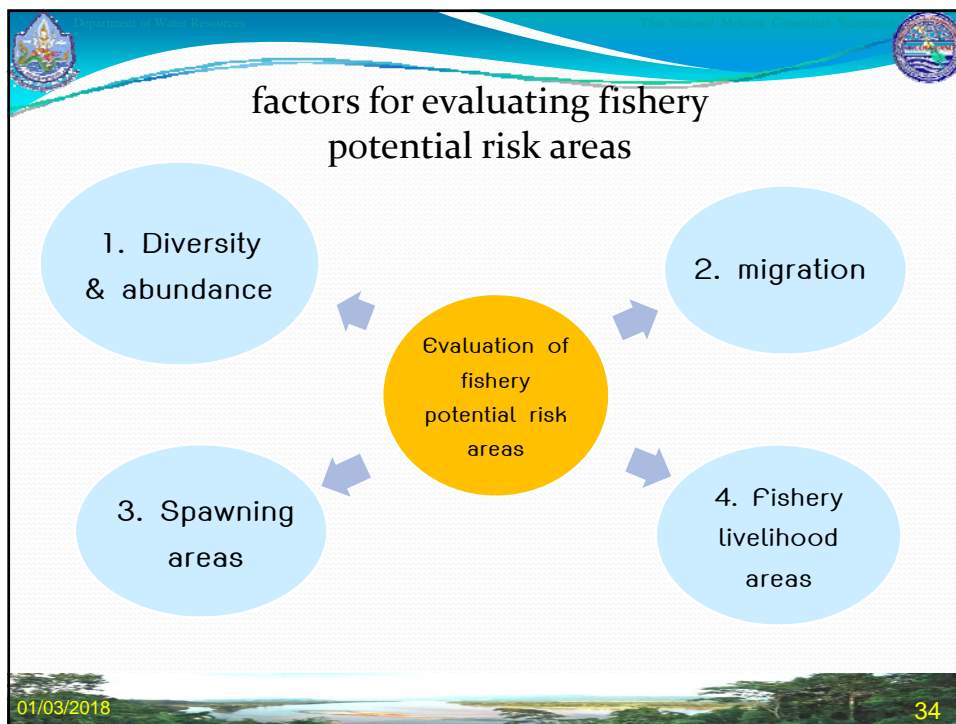
ปลาเกราะ (Pterygoplichthys disjunctivus)

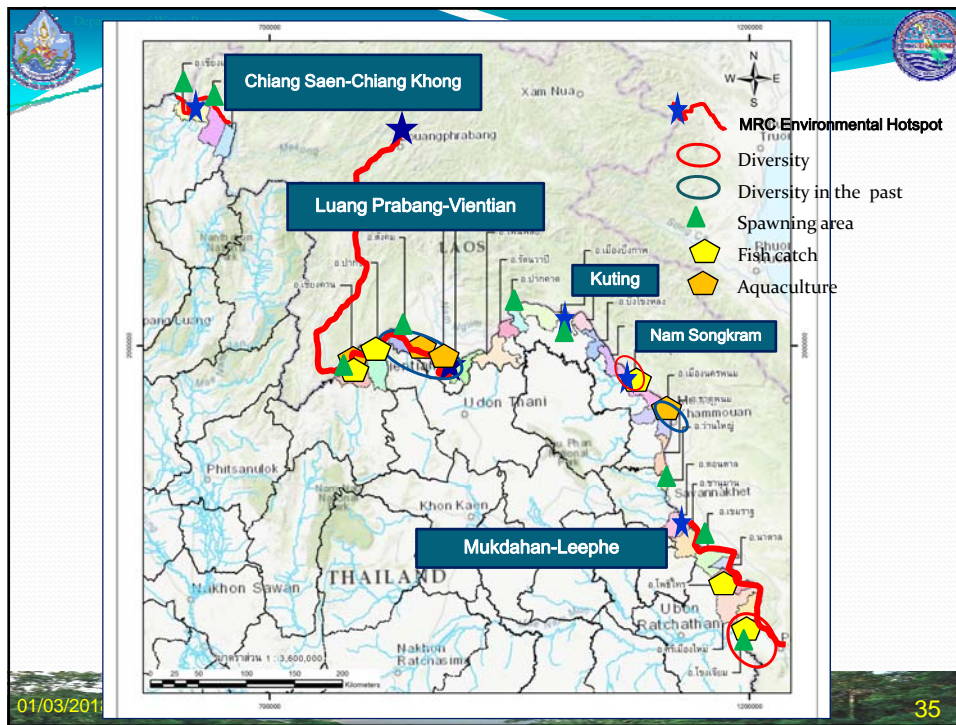
ปลากระเบนลาว (Hemitrygon laosensis)

ปลาขี้สกไทย (Probarbus jullieni)

- 156 species found, 152 native species and 4 alien species namely: *Oreochromis niloticus*, *Pterygoplichthys disjunctivus*, *Clarias* spp., and *Ictalurus punctatus*
- 130 economic species
- 10 threatened species, e.g., *Probarbus jullieni*, *Tenualosa thibeaudai*, *Hemitrygon laosensis*

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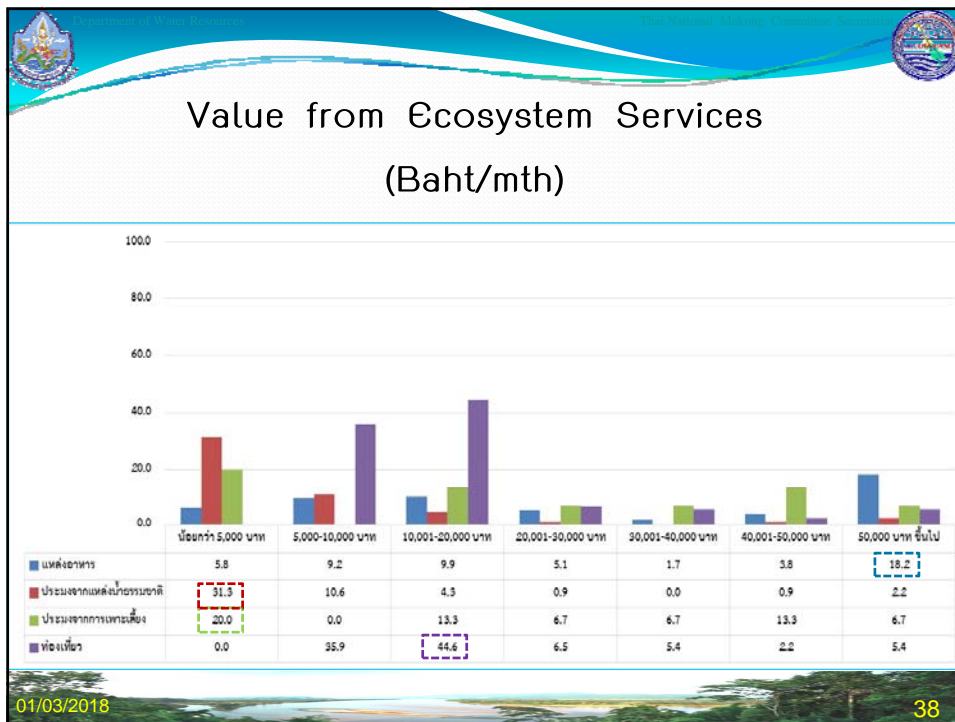
# Ecosystem service

A collage of five images illustrating different ecosystem services. From left to right: a dam with water flowing through its spillways; a person in a boat using a net to catch fish; a large fish being processed in a market; a person standing in a rice paddy field; and a traditional wooden stupa or pagoda situated on a riverbank. The collage is set against a background of a river and a landscape. The text 'Ecosystem service' is centered above the collage.

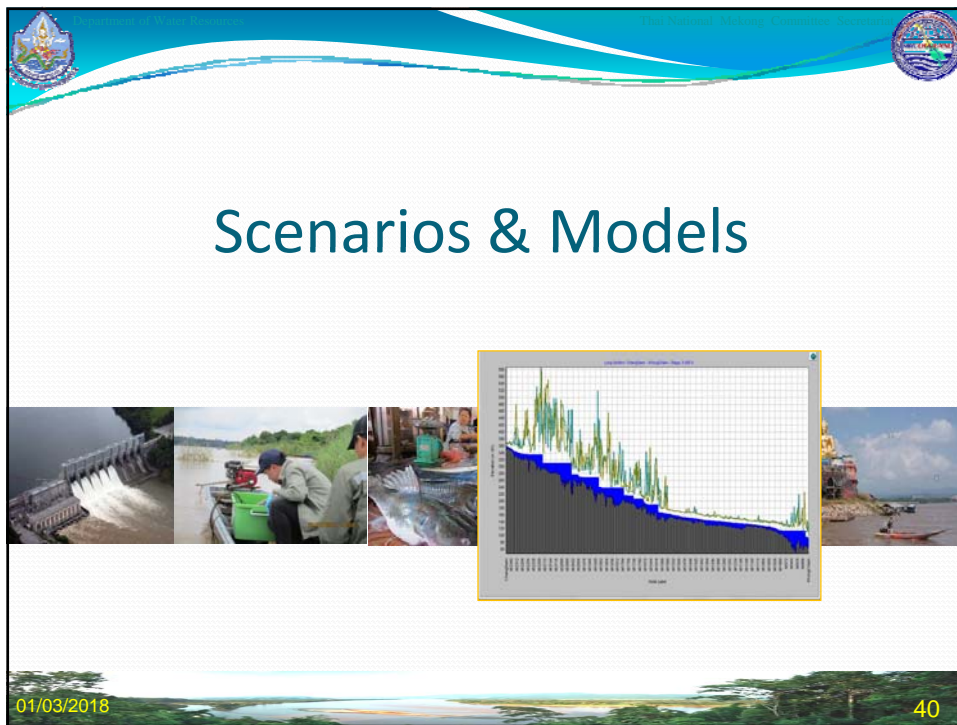
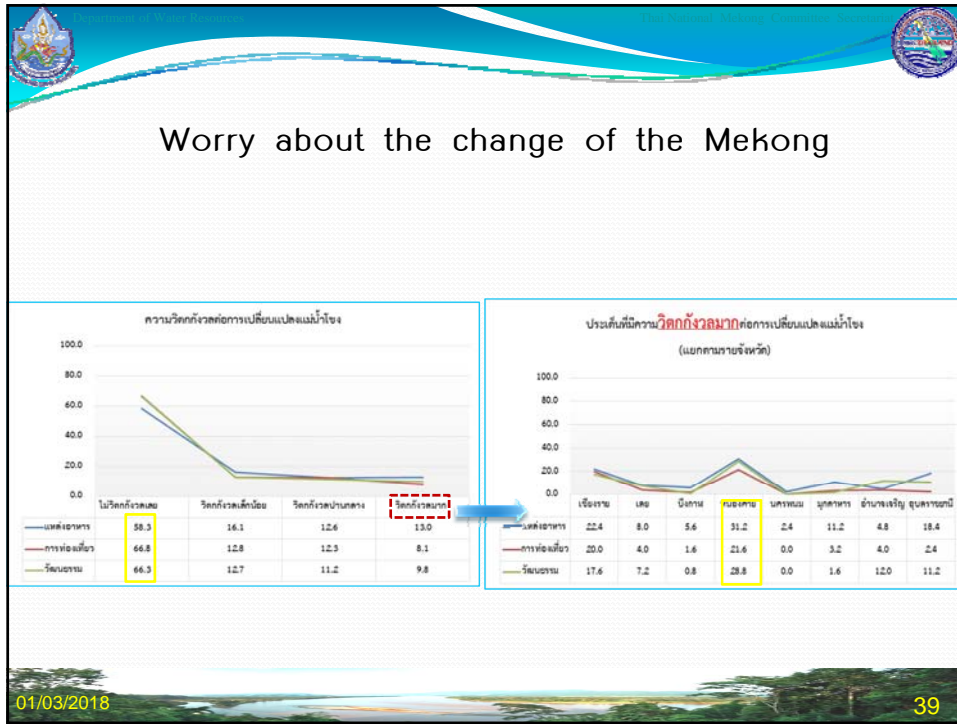
01/03/2018 36

### Ecosystem service surveys

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## Mathematical Model

- Hydrological model–Soil and Water Assessment Tools: SWAT
- Basin simulation model- Integrated Quantity and Quality Model: IQQM
- Hydrodynamic model -ISIS

## Scenarios

- Reference scenario: Baseline condition in the past no longer dam at all in the Lancang -Mekong
- If there are 6 dams in the Lancang and 2 dams in the Mekong
- If there are 6 dams in the Lancang and 6 dams in the Mekong

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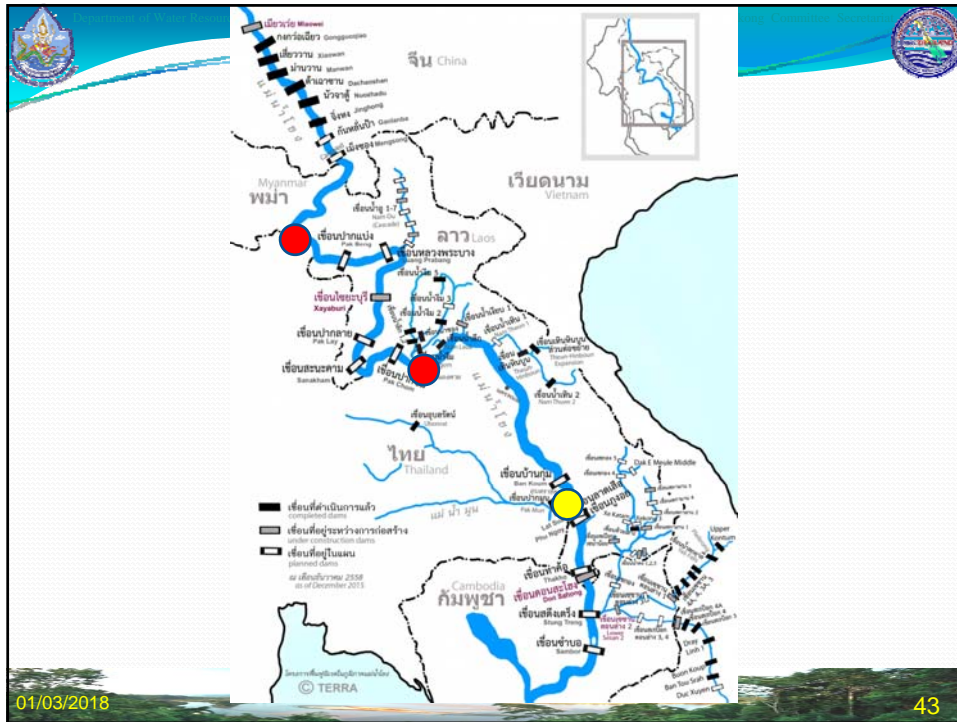
### SWAT MODEL

### IQQM MODEL

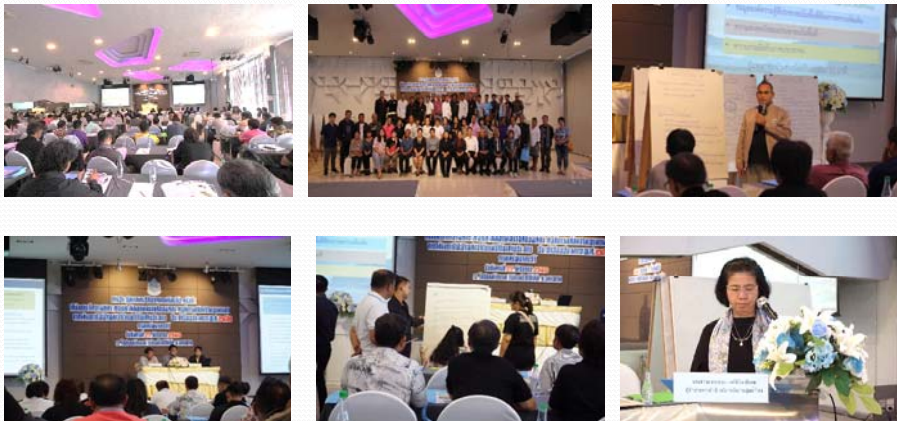
### ISIS MODEL

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## Stakeholder information sharing forums



[www.tnmcstudy.org](http://www.tnmcstudy.org)

โครงการศึกษาผลกระทบ  
และติดตามตรวจสอบผลกระทบสิ่งแวดล้อม  
จากโครงการผลิตไฟฟ้าพลังน้ำในเขตน้ำใจสวยประจวบ

โครงการศึกษาผลกระทบและติดตามตรวจสอบ  
ผลกระทบสิ่งแวดล้อมจากโครงการผลิต  
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ฉบับสมบูรณ์ พ.ศ. 2559

01/03/2018 45

Thank you for your  
attention

01/03/2018 46


**China**

# The Role of Cascade Reservoirs on the Lancang River for Flood Control and Drought Relief of the Mekong River

**Li Zhongping, Deputy Director General**

Changjiang Water Resources Commission  
Ministry of Water Resources

## Outlines

-  1. Introduction on Development of the Lancang River
2. Impacts of Climate Change on Lancang-Mekong River Basin
3. Preliminary Analysis on Performance of Cascade Reservoirs on Flood Control and Drought Relief

## Characteristics of Lancang-Mekong River

😊 The Lancang-Mekong river originates in the Qinghai-Tibetan Plateau of **China**, and flows **southeastward** through **Myanmar, Laos, Thailand, Cambodia, and Vietnam**.

	Basin	China	% of China
<b>Drainage Area</b> (10 <sup>4</sup> km <sup>2</sup> )	<b>81.24</b>	<b>16.44</b>	<b>20.2</b>
<b>Length of Mainstream</b> (km)	<b>4880</b>	<b>2161</b>	<b>44.3</b>
<b>Average Annual Runoff</b> (billion m <sup>3</sup> )	<b>475</b>	<b>64</b>	<b>13.5</b>



## Development of Lancang River

- 😊 The main missions of development of the Lancang River are:
- (1) rationally exploiting hydropower resources,
  - (2) securing water supply for drinking, agriculture, and industry,
  - (3) preventing again flood ,
  - (4) effectively protecting aquatic ecosystem and environment.

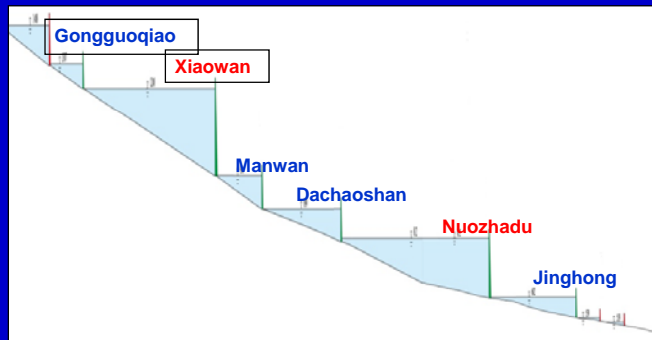
😊 Up to now, **6 hydropower stations** has been built on the middle and lower reaches along Lancang River named **Gongguoqiao, Xiaowan, Manwan, Dachaoshan, Nuozhadu, Jinghong**



## Development of Lancang River

References of cascade hydropower stations built on middle and lower reaches along Lancang River

Name of Station	Gongguoqiao	Xiaowan	Manwan	Dachaoshan	Nuozhadu	Jinghong	Total
Normal Water Level (m)	1307	1240	994	899	812	602	
Regulating Storage Capacity (10 <sup>8</sup> m <sup>3</sup> )	0.49	98.95	1.23	2.75	113.35	3.09	219.86



## Development of Lancang River



**Xiaowan hydropower Station**

## Development of Lancang River



Nuozhadu hydropower Station

## Outlines

1. Introduction on Development of the Lancang River
- ★ 2. Impacts of Climate Change on Lancang-Mekong River Basin
3. Preliminary Analysis on Performance of Cascade Reservoirs on Flood Control and Drought Relief

## Impacts of Climate Change on Lancang-Mekong

😊 Tsinghua University in China has carried out the studies of the impacts of future climate change on the hydrological regime of Lancang-Mekong River Basin, the main conclusions and comments are cited as following:

(1) In 2100, the average temperature will **increase** while precipitation **decrease**. According to the 3 scenarios for Carbon Dioxide emissions in the future given by IPCC, the climate change is listed as following:

**Climate Change in 2100**

Scenarios	rcp4.5	rcp6	rcp8.5
Changes in T	<b>+0.01</b>	<b>+0.08</b>	<b>+2.2</b>
Changes in P	<b>-155</b>	<b>-213</b>	<b>-196</b>

Note: Source from the research results of Tsinghua University in Beijing

## Impacts of Climate Change on Lancang-Mekong

(2) The annual runoff will **decrease** due to precipitation **decreasing**;

(3) Climate change will **increase** inter-annual difference in runoff which means extreme hydrological event will become more frequent;


(4) The intra-annual variation of runoff in the upper and middle reaches of the Lancang-Mekong River will be more significant.

The simulation calculatoin of Chiang Saen hydrological station shows that: the runoff in flood season and in dry season will respectively **increase** and **decrease**. The distribution of water resources during the year is even more uneven.


## Outlines

1. Introduction on Development of the Lancang River

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## Preliminary Analysis on Performance

 The cascade reservoirs built on the middle and lower reaches of the Lancang River have a large regulating capacity, especially Xiaowan and Nuozhadu with a total regulating capacity of about 22 billion m<sup>3</sup>. The cascade reservoirs play a positive role on flood control and drought relief, power generation and navigation for the Mekong River, by scientific regulation of retaining and storing floodwater in flood season and increasing discharges in dry season.

## Preliminary Analysis on Performance





### Analysis Methodology:

> **Long-term average:** Selecting long series of hydrological data(1967-2013) measured on the mainstream of the Lancang River, calculating the discharges from Jinghong Reservoir ,comparing with the discharges under natural condition(no dam conditions), analyzing the effect of cascade reservoirs on flood control and drought relief .

> **Case study:** Flood in 1966  
Drought in 2010  
Emergency water supplement in 2016

## Performance on Flood Control

### **Long-term average:**

-  In wet season, scientific operation on cascade reservoirs could retain and store flood, and decrease the water level in the downstream, which can effectively relieve the flood control pressure of the mainstream in the upper and Middle reach of the Mekong River.
-  The long-term average flow of the Lancang River out of China could be reduced by **30 %** during the wet season compared with that under the natural conditions.
-  The long-term average discharge of the Lancang River out of China could be reduced by **1300m<sup>3</sup>/s** during July to August.
-  The water level at Chiang Saen and Vientiane could be reduced respectively about **1 m and 0.8m** on average during wet season.



## Performance on Flood Control

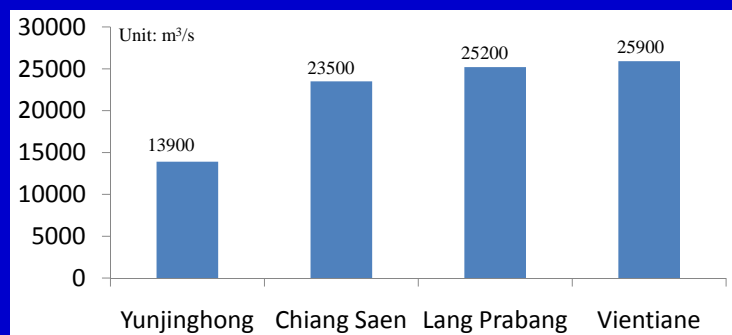
### Case Study : Flood in 1966

- ☺ The flood during Aug. to Sep. in 1966 was **the most serious basin-wide flood** since observation data has been recorded, with recurrence interval of **50 years**, causing serious damage to the riparian countries.
- ☺ During 30 days of the flood process , the total volume of discharge at Yunjinghong station was **22 billion m<sup>3</sup>**, the discharge concluded from observation data was **13900m<sup>3</sup>/s**, ranking **the first place** since 1953.

## Performance on Flood Control

### Case Study : Flood in 1966

- ☺ During the flood process, the maximum water level observed at Chiang Saen station was 13.80m, ranking the first place since 1961.



Peak flow observed

## Performance on Flood Control

### Case Study : Flood in 1966

- 😊 Under the current condition, through scientific operation and regulation the cascade reservoirs on Lancang River can play a significant role on flood in Mekong River.
- 😊 Simulation results showed: in case of extraordinary flood with recurrence interval of 50 years, with the type of 1966, the peak flow and water level at Chiang Saen station could be decreased by **3300 m<sup>3</sup>/s** and **1.2 m** respectively through scientific operation on cascade reservoirs on Lancang River.

## Performance on Drought Relief

The Mekong River Basin is prone to drought because of its uneven temporal and spatial distribution of precipitation. Influenced by global climate change, the drought will be much more frequent.

In dry season, scientific operation cascade reservoirs on Lancang River could raise water level through increasing discharge, which will benefit water supply, irrigation and navigation to Mekong River.

### Long-term average:

- 😊 The long-term average flow of the Lancang River out of China could be increased by **70 %** during the dry season compared with that under the natural conditions(no dam conditions).
- 😊 The water level from Chiang Saen to Vientiane could be raised about **1 m** on average during January to April.

## Case Study 1: Drought in 2010

😊 The Lancang-Mekong River basin suffered a severe drought during the spring season in 2010, affecting seriously the irrigation, fishery, navigation and livelihood of riparian residents, which is still impressive for all the participants.

**How about the drought situation in 2013 ?**

## Case Study 1: Drought in 2010

Runoff and Discharges at Jinghong Hydrological Station

Period	Volume of runoff ( $10^8\text{m}^3$ )	Average flow ( $\text{m}^3/\text{s}$ )
2012.11~2013.4	74.2	474
2009.11~2010.4	92.9	594
Long term average during the same period	129.5	827

**This table show that there was an even more severe drought in the Lancang-Mekong River in 2013**

## Case Study 1: Drought in 2010

Minimum Water Level Comparison

Year Station	2010 (m)	2013 (m)	Difference in water level (m)
Chiang Saen	0.96	1.39	0.43
Lang Prabang	2.47	3.01	0.54
Vientiane	-0.18	0.19	0.37

This table showed in 2013 the minimum water level in Chiang Saen, Lang Prabang, and Vientiane were higher than 2010.

## Case Study 1: Drought in 2010

In 2013, the Mekong riparian countries had not suffered the same drought like 2010.

**Why?**

## Case Study 1: Drought in 2010

During the dry season in 2013, the cascade reservoirs on Lancang River increased discharge volume about **7 billion m<sup>3</sup>**, adding **65%** of the natural runoff (While in 2010, the upstream cascade reservoirs have not been constructed yet) . That's why the riparian residents felt **less obvious** of the severer drought in 2013 compared with the situation in 2010.

## Case Study 2: Emergency Water Supplement in 2016

### Emergency Water Supplement

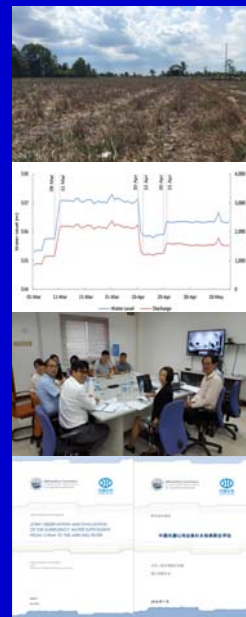
Affected by super El Niño, Lancang-Mekong River Basin has suffered drought disaster since the end of 2015. The drought condition over Mekong Basin have worsened and triggered China to implement its emergency water supplement by increasing water discharge from Yunnan's Jinghong Reservoir on the request of downstream countries.

### 'Three-Phase plan'

- 2016.3.15~4.10: no less than 2000m<sup>3</sup>/s;
- 2016.4.11~4.20: no less than 1200m<sup>3</sup>/s;
- 2016.4.21~5.31: no less than 1500m<sup>3</sup>/s.

### Joint Observation and Evaluation

MWR of China and MRC Secretariat co-organised experts from both sides to conduct a Joint Observation and Evaluation of the Emergency Water Supplement from China and its effect of easing the drought situation in the Mekong Basin.





## Case Study 2: Emergency Water Supplement in 2016

😊 Positive Effect: the emergency water supplement from cascade reservoirs **increased water level and discharge** along the Mekong mainstream and **decreased salinity intrusion** in the Mekong delta.

- 🏠 Total volume released from cascade reservoirs: **12.65 billion m<sup>3</sup>**
- 🏠 Discharge released at Jinghong: **2-3.5 times** than natural conditions
- 🏠 Increased water level along the Mekong mainstream: **0.18-1.53m**
- 🏠 Increased discharge along the Mekong mainstream: **602-1010m<sup>3</sup>/s**
- 🏠 Maximum salinity in Mekong Delta decreased by: **15%-74%**
- 🏠 Minimum salinity in Mekong Delta decreased by: **9%-78%**

## Case Study 2: Emergency Water Supplement in 2016

The news on MRC's official site point out that:

- ◆ the release of water emergency water supplement from the Lancang dams eased the regional drought in 2016
- ◆ because of the emergency water releases from the Chinese dams upstream, the increased dry season flows that ultimately helped to mitigate potential impacts of the drought

The screenshot shows the MRC website with the following content:

**Mekong River Commission**  
For Sustainable Development

Home | About MRC | Mekong Basin | Topics | Publications | News & Events | Working with MRC

Home » News & Events » News » The effects of Chinese dams on water flows in the Lower Mekong Basin

### The effects of Chinese dams on water flows in the Lower Mekong Basin

Vientiane Capital, Lao PDR, 6th Jun 2017

Since 1993, China has built six dams in the mainstream on the Upper Mekong Basin, known as the Lancang in China. Operations of these dams have stirred many concerns from the Lower Mekong Basin communities on how these dams will impact their river and livelihoods. With the two biggest storage dams of the cascade, Xiaowan and Nuoshadu, their impacts have often been in the news. The concerns include how changes in water flow (discharge) impact on fisheries, sediments, and downstream community livelihoods.

While the picture of the impacts is incomplete, the Mekong River Commission's (MRC) river monitoring arm points out that these Chinese dams do affect water flows in the Lower Mekong Basin, generally reducing the flow during the wet season and increasing it during the dry season.

**Downstream water flow in the dry season increased, easing effects of droughts. Storage dams can contribute to increased flow during the dry season as they discharge water for energy production. For example, the release of water supplement from the Lancang dams eased the regional drought of 2016. The drought resulted in 16% less flows compared to the long term average. However, because of the emergency water releases from the Chinese dams upstream, that increased dry season flows that ultimately helped to mitigate potential impacts of the drought.**

A total of 12.65 billion cubic meters of water was discharged from the Jinghong hydropower reservoir during the period of March to May 2016. These releases amounted to between 40 - 89% of flows along various sections of the Mekong River. The emergency water supplement increased water level or discharge along the Mekong mainstream to an overall extent of 0.18-1.53m or 602-1010m<sup>3</sup>/s.

If these emergency releases did not occur, flows would have been 47% lower at Jinghong, 44% lower at Chiang Saen, 38% lower at Nong Khai and 22% lower at Stung Treng. This additional flow has also alleviated salinity intrusion in the Mekong Delta.



# Thailand

# **WATERBORNE CONNECTIVITY IN MEKONG-LANCANG RIVER**

**International Conference  
Transboundary Water Resources and Related Resources  
on 2 March 2018**

by  
Mr. Thanatip Jantarapakde  
Marine Department of Thailand

## **OUTLINE**

- **MEKONG RIVER BACKGROUND**
- DEVELOPMENT PLAN OF JCCCN
- SAFE NAVIGATION PROJECT
- WATERWAY TRANSPORTATION
- CONCLUSION
- Q&A

## CONNECTIVITY

- **TRADE**
- **TOURISM**
- **LOGISTIC**
- **CULTURE**

### Lancang-Mekong River Basin



The map illustrates the Lancang-Mekong River Basin, showing the river's path from its source in China (Yunnan and Guangxi provinces) through Myanmar, Laos, Thailand, Cambodia, and Vietnam. Key cities and regional flags are indicated, including Kunming, Baoshan, Jiangong, Luang Prabang, Vientiane, Nong Khai, Udon Thani, Savannakhet, Da Nang, Bangkok, Siem Reap, Phnom Penh, Ho Chi Minh City, and Hanoi. The basin flows into the Gulf of Thailand and the Andaman Sea.

**Length**

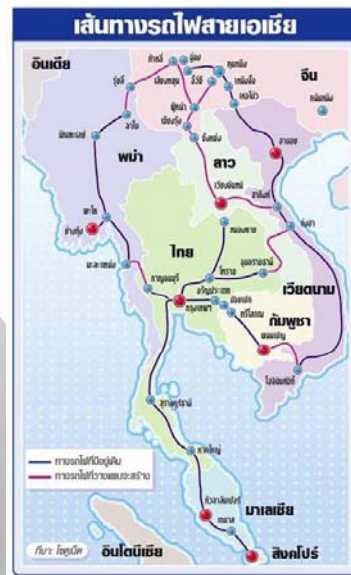
- 4,880 kms in total
- 2,130 kms in China

**Populations**

- China : 1.3 bil (60 mil)
- Myanmar : 52 mil
- Laos : 6.8 mil
- Thailand : 65 mil
- Cambodia : 16 mil
- Vietnam : 94 mil



## Railways connectivity



## BASIC FIGURES ABOUT THE RIVER

- 4880 KM IN LENGTH CONNECTING 6 COUNTRIES IN ASIA
- 2130 KM INLAND RIVER IN CHINA
- 31 KM BOUNDARY RIVER BETWEEN CHINA AND MYANMAR
- 234 KM BOUNDARY RIVER BETWEEN LAOS AND MYANMAR
- 976 KM BOUNDARY RIVER BETWEEN LAOS AND THAILAND
- 777 KM INLAND RIVER IN LAOS
- 502 KM INLAND RIVER IN CAMBODIA
- 230 KM INLAND RIVER IN VIETNAM
- THE RIVER BASIN COVERS 810,000 Km<sup>2</sup>

## TRADE VOLUME : 2016

**Export :15,229 mil Baht from Thailand**

- To China : 2,836 mil Baht
- To Myanmar : 2,810 mil Baht
- To Laos : 9,583 mil Baht

**Export Cargo : frozen chicken (40,000 tons) ,  
white sugar, car**

**Import cargo : fresh garlic, sun peanut**

## ข้อมูลการนำเข้า - ส่งออกสินค้า

สถิติมูลค่าการค้าชายแดน ณ ค่ายศุลกากรเชียงแสน

( หน่วย : ล้านบาท )

ปีงบประมาณ	นำเข้า	ส่งออก	ดุลการค้า
2552	1,230.37	5,082.05	3,851.68
2553	1,057.39	5,630.20	4,572.81
2554	1099.98	8,991.17	7,891.19
2555	512.22	11,337.50	10,825.28
2556	654.733	12,325.521	11,670.788
2557	702.21	13,532.75	12,830.54
2558	669.71	15,814.42	15,144.71
2559	710.95	15,229.51	14,518.56
2560	899.90	14,431.26	13,521.36

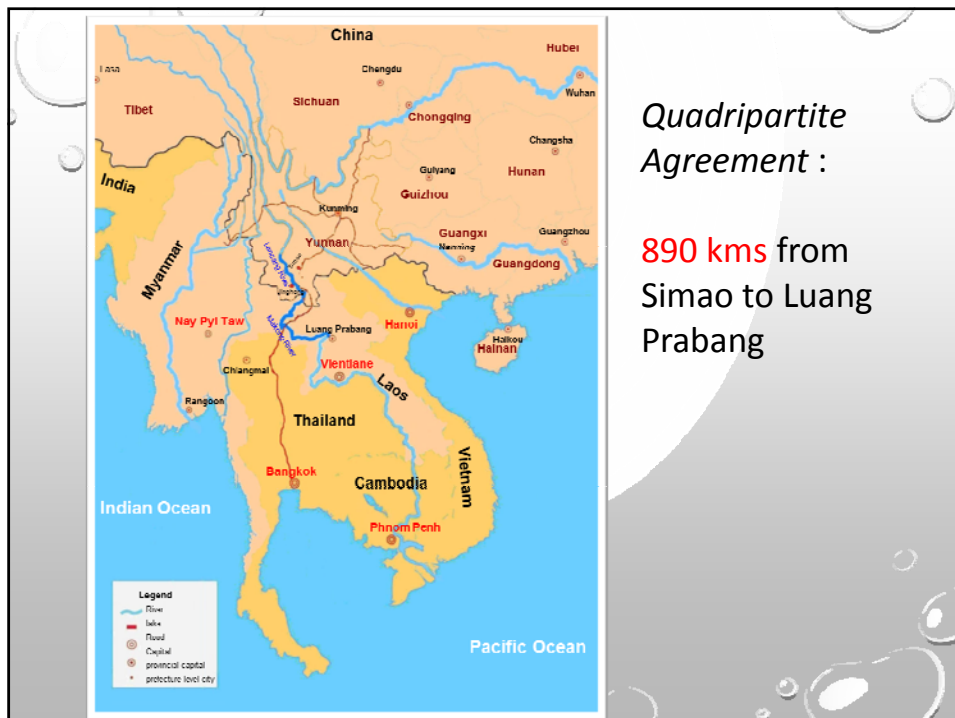
Numbers of ships in Chiangsean Port								
YEAR MONTH	2011	2012	2013	2014	2015	2016	2017	2018
January	332	554	1,358	1,005	1,517	372	432	635
February	305	767	939	835	1,567	901	507	
March	426	612	935	1,045	1,594	1,097	585	
April	417	217	983	955	988	1,000	393	
May	376	330	1,059	1,036	991	703	413	
June	416	581	944	812	1,052	447	384	
July	344	369	1,062	999	1,531	386	512	
August	353	427	1,073	960	1,589	355	425	
September	259	709	964	1,063	702	298	428	
October	474	842	1,187	1,251	376	358	384	
November	686	1,043	1,158	937	558	400	631	
December	592	1,205	1,069	1,393	1,017	528	729	
	4,980	7,656	12,731	12,291	13,482	6,087	5,823	635

## OUTLINE

- MEKONG RIVER BACKGROUND
- **DEVELOPMENT PLAN OF JCCCN**
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- WATERWAY TRANSPORTATION
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## DEVELOPMENT PLAN OF INTERNATIONAL NAVIGATION ON THE LANCANG-MEKONG RIVER (2015-2025)

- AGREEMENT ON COMMERCIAL NAVIGATION ON THE LANCANG-MEKONG RIVER AMONG THE GOVERNMENTS OF THE PEOPLE'S REPUBLIC OF CHINA, THE LAO PEOPLE'S DEMOCRATIC REPUBLIC, THE UNION OF MYANMAR AND THE KINGDOM OF THAILAND IN APRIL 2000 (**THE QUADRIPARTITE AGREEMENT**)
- GMS ECONOMIC COOPERATION AND ACCELERATE THE OVERALL CONSTRUCTION OF **CHINA-ASEAN FREE TRADE AREA** HAS POSED INCREASING DEMAND FOR THE CONNECTIVITY OF TRANSPORT INFRASTRUCTURE IN THE REGION.
- **THE LANCANG-MEKONG RIVER**, AS A VITAL TRANSPORT CORRIDOR, AND FROM THE PERSPECTIVE OF INTERNATIONAL NAVIGATION, WILL SERVE FOR PASSENGERS AND GOODS TRANSPORT, AND THE SUSTAINABLE SOCIO-ECONOMIC PROSPERITY OF THE REGION
- JOINT COMMITTEE ON COORDINATION OF COMMERCIAL NAVIGATION ON THE LANCANG-MEKONG RIVER (**JCCCN**)





**Cargo Volume Prediction (Unit: Ton)  
between China, Laos, Myanmar, Thailand**

Prediction method	By 2025
multiple regression models	6,300,000
Analysis based on investigations	6,000,000~7,200,000
Final recommended value	6,450,000

Source : Development Plan of JCCCN, 2015

**Passenger Prediction Volume  
Unit: Person-Time**

Predicting method	By 2025
polynomial regression model	3,600,000
Analysis based on investigations	2,200,000~3,000,000
Final recommended value	3,300,000

Source : Development Plan of JCCCN, 2015



## Channel Conditions of the Section from Simao to Luang Prabang

Section	Length (km)	Grade	DWT of navigating vessels	Channel dimensions(m)
Nandeba area of Simao Port to Nuozhadu Hub	74	IV	500 DWT throughout the year	1.2×30×180
Nuozhadu Hub to China-Myanmar Boundary Marker 243	185	V	300 DWT	2.0×40×300
China-Myanmar Boundary Marker 243 to China-Laos-Myanmar Boundary Marker 244	31	VI	150 DWT throughout the year and 200-300 DWT seasonally	1.2×30×180
China-Laos-Myanmar Boundary Marker 244 to Houaysai, Laos	300	VI	150 DWT throughout the year and 200-300 DWT seasonally	1.2×30×180
Houaysai to Luang Prabang	300	Never improved and maintained, some simple aids to navigation, wide and shallow section navigable for vessels of 60 DWT in dry season		
Total	890			

Source : Development Plan of JCCCN, 2015

## Planning of the International Navigation Channel from Nandeba Port Area of Simao Port of China to Luang Prabang of Laos

Name and Type of Project			Length and Standard of Navigation Channel Planned (2025)	
No.	Scope	Current Grade	Length(km)	Planned Target
1	Nandeba Port Area of Simao Port of China to China-Myanmar Boundary Marker 243	Grade IV and V	259	Navigable for vessels of 500 DWT
2	China-Myanmar Boundary Marker 243 to Luang Prabang of Laos	Grade VI and under	631	Navigable for vessels of 500 DWT
Total			890	

DEVELOPMENT PLAN : PHASE I (2015-2020)

- 1) **Preliminary Work** : Engineering Design , ESIA, Public Participation
- 2) **Improvement of Channel** : The 631 kilometers channel from China-Myanmar Boundary Marker 243 to Luang Prabang will be upgraded for vessels up to 500 DWT.
- 3) **Construction of Port** : 3 berths for cargo vessel will be built respectively at Guanlei, Xiengkok, Wan Pong, Pakbeng and Luang Prabang Ports. Passenger ports: 1 berth will be built respectively at Xiengkok, Pakbeng and Luang Prabang.
- 4) **Establishment of Supporting System** : 3 channel maintenance and emergency response, rescue ships, training of crew and shore personnel.

**Investment Estimation** : 2.3 billion RMB (approximately 377 million USD).

DEVELOPMENT PLAN : PHASE II (2020-2025)

- 1) **Preliminary Work** : Engineering Design , ESIA, PP
- 2) **Improvement of Channel** : 259 kms from Nandeba Area of Simao Port 勐定 China-Myanmar Boundary Marker 243 for vessels up to 500 DWT
- 3) **Construction of Port**
  - Passenger Port:** 1 berth will be respectively built at Simao, Jinghong, Ban Sai, Muongmom, Wan Pong, Ban Khouane, Chiangsaen, Houaysai, Chiangkhong ports.
  - Cargo Port:** 3 berths of 500 DWT will respectively be built at Simao, Menghan, Suploi and Chiangsaen Ports. 1 berth of 300 DWT will be built at Wan Seng Port

**Investment Estimation 1.6957 billion RMB (approximately 278 million USD).**

**ESTIMATED INVESTMENT**  
(UNIT : MILLION RMB)

No.	Item	Phase I		Phase II		Total
		2015-2017	2018-2020	2021-2023	2024-2025	
	<b>Total</b>	1212.3	1087.7	743	952.7	<b>3995.7</b>
1	Preliminary Work	176		43		219
2	Channel Improvement	801.6	837.3		672.7	2311.6
3	Port Construction	227.7	183.4	520	280	1211.1
4	Establishment of Supporting System	7	67			74
5	Bridge Reconstruction			180		180

[WWW.JCCCN.ORG](http://WWW.JCCCN.ORG)



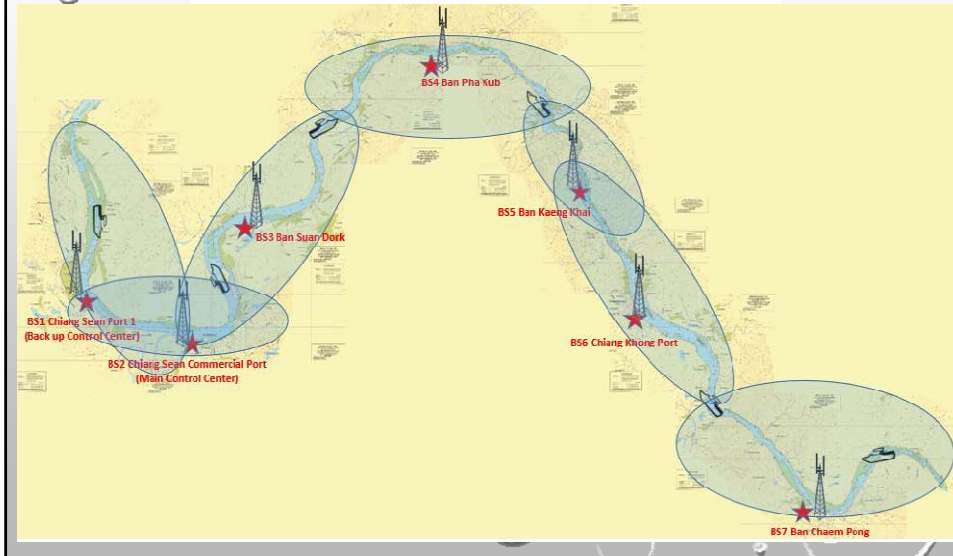
## JCCCN WEBSITE INFORMATION

- RULE AND REGULATIONS (MOU, AGREEMENT, ANNEXES, GUIDELINES)
- PORT INFORMATION
- FLEET INFORMATION / ENTERPRISE (SHIPOWNER)
- NAVIGATIONAL CHANNEL INFORMATION
- WATER INFORMATION (WATER DISCHARGE / LEVEL)
- PROJECT : DP, PW, ESIA, FS-AIS+VHF
- JCCCN MEETING INFORMATION (SUMMARY RECORD)
- PUBLIC RELATION
- CONTACT POINT INFORMATION

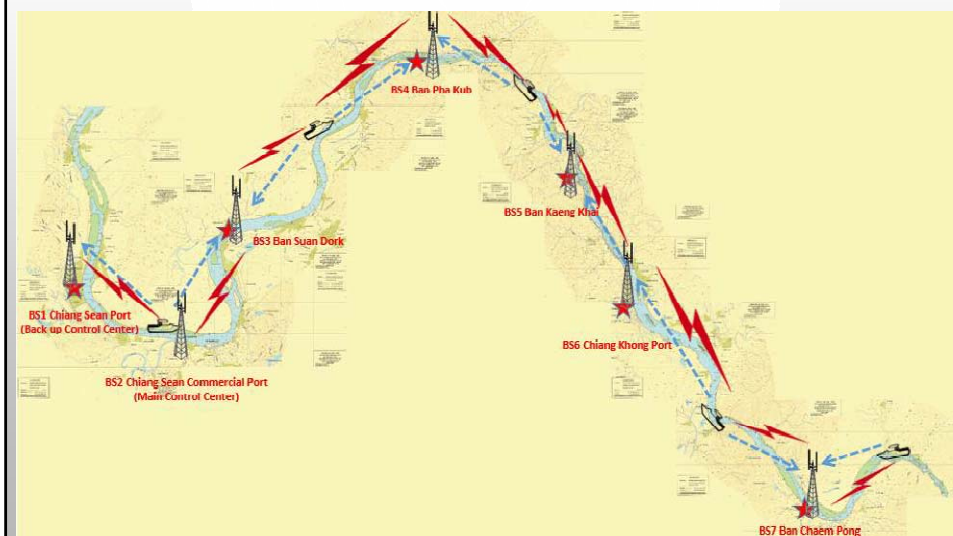
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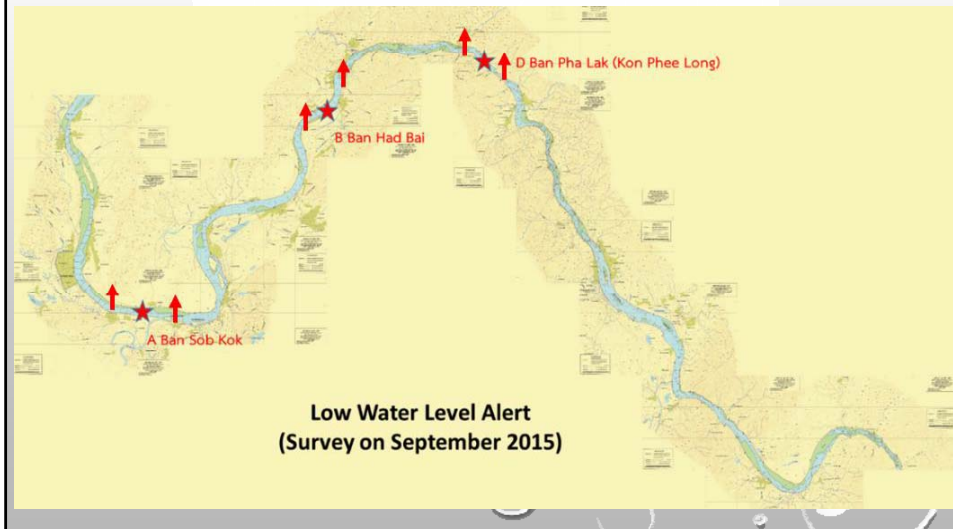
### MRC FEASIBILITY STUDY FOR VHF AND AIS INSTALLATION IN THAILAND AND LAOS



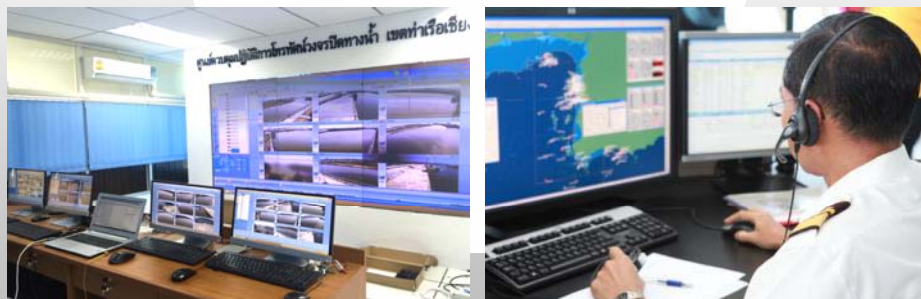
### Radio Communication Systems: VHF base station and communication coverage



### Critical Low Water Level Alerts: Map of Locations to install the Low Water Level Gauges

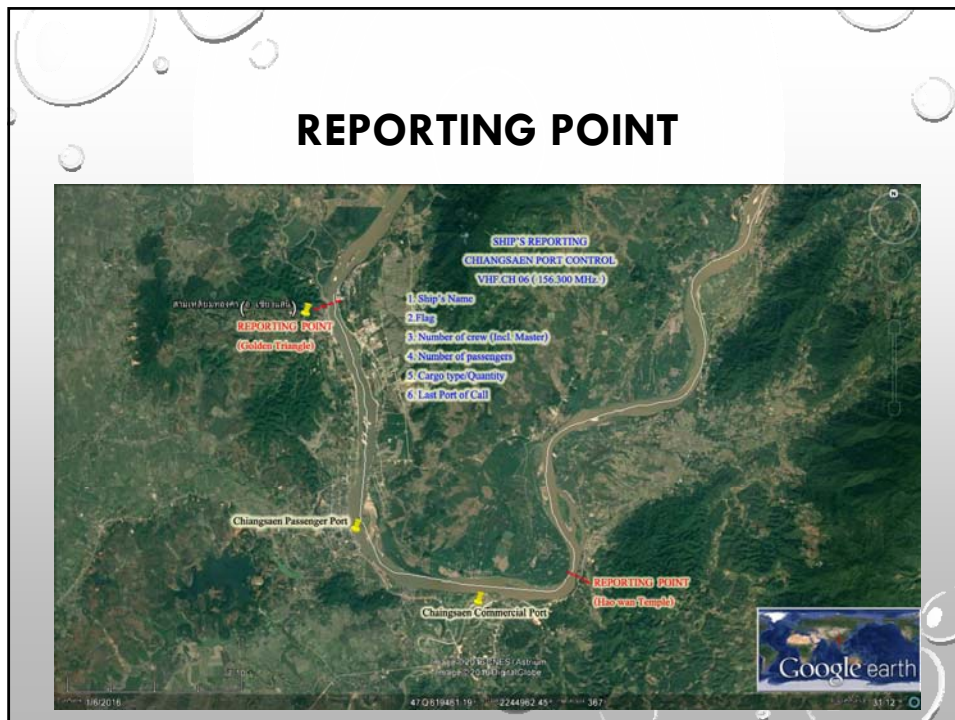


## CHIANG SAEN SHIP REPORTING SYSTEM





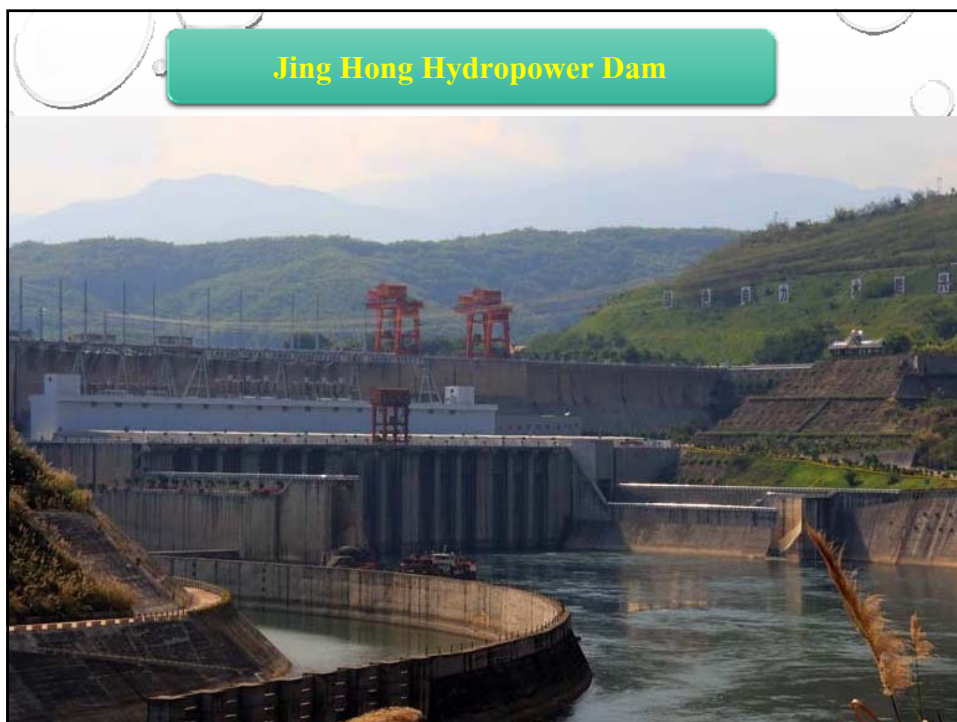
## REPORTING POINT



## OUTLINE

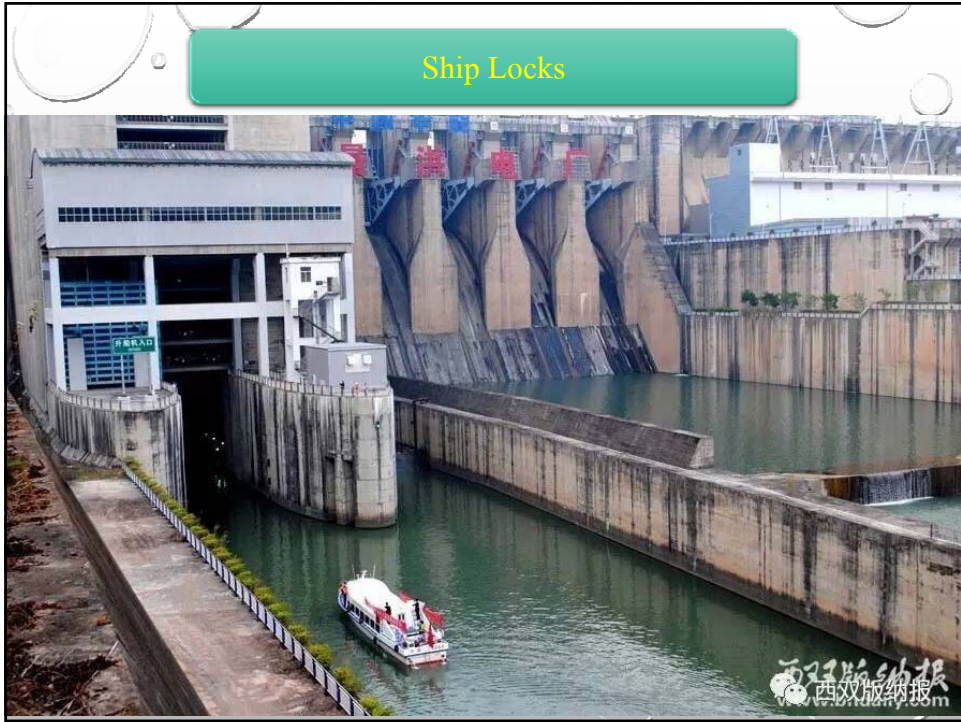
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- CONCLUSION
- Q&A



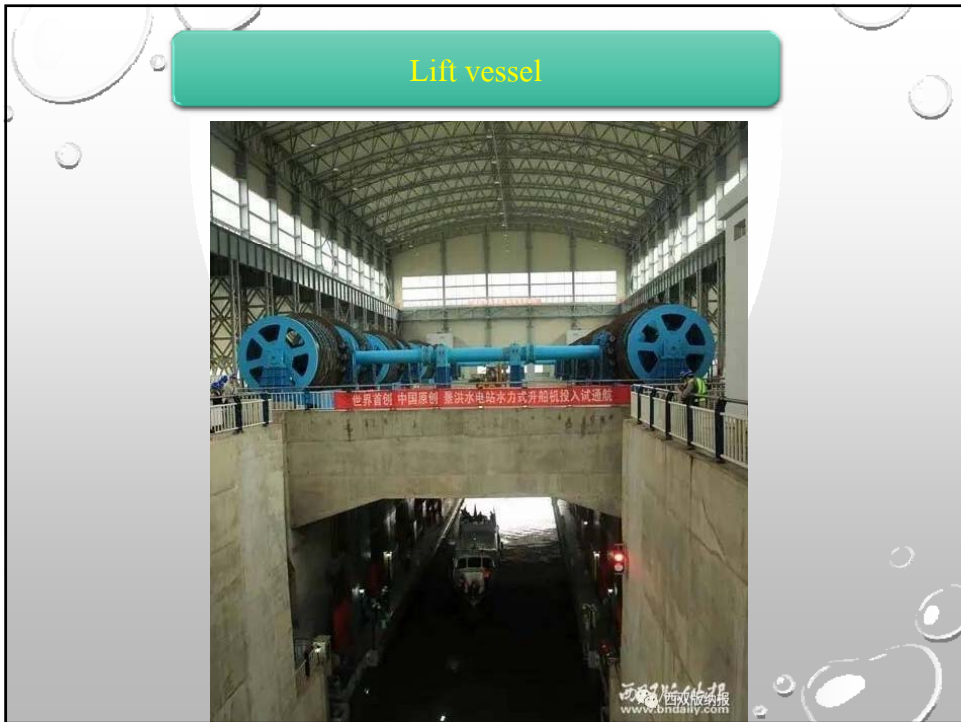




### Ship Locks



### Lift vessel





Tourism Cooperation : Thai-China

西双版纳海外国际旅行社  
Xishuangbanna Overseas International Travel Agency

西双版纳傣族国际旅行社  
Xishuangbanna Dai Nationality International Travel Agency

西双版纳纳姆国际旅行社  
Xishuangbanna Nam International Travel Agency

云南同饮一江水国际  
NOURISHED BY THE SAME RIVER

### Passenger Vessel



### Tourism Cooperation Project : Thai-China





Tourism Cooperation : Thai-China

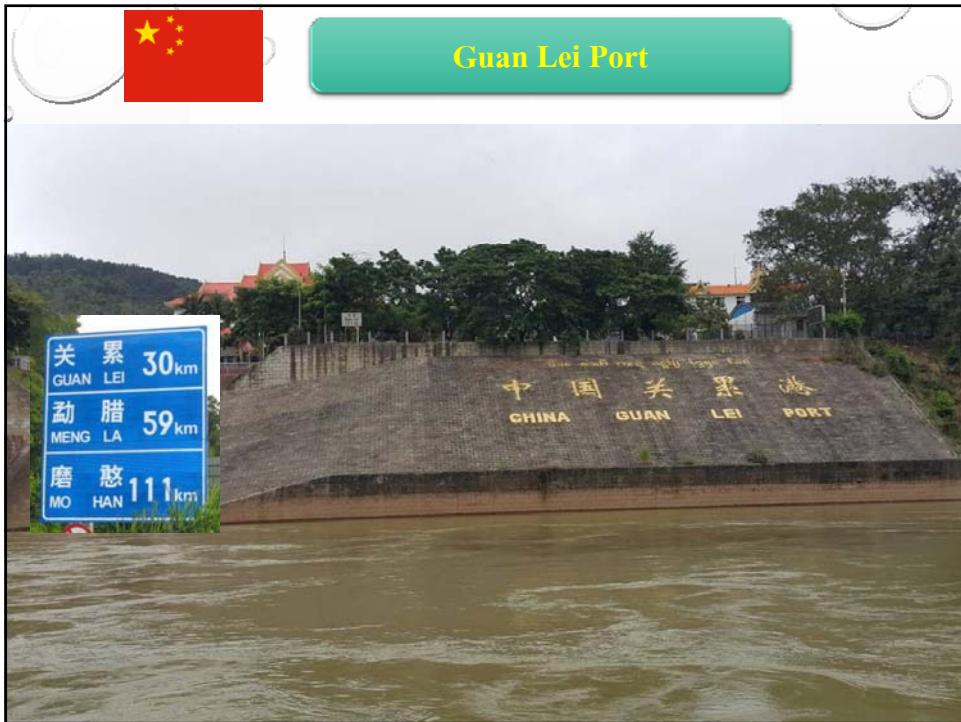


## Jing Hong Gate

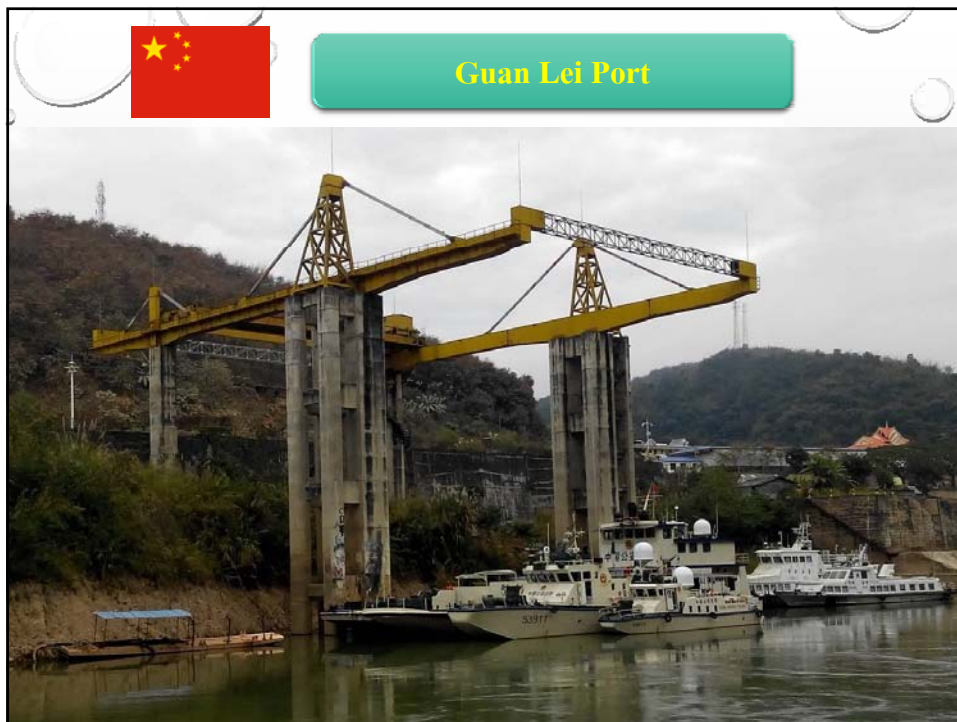
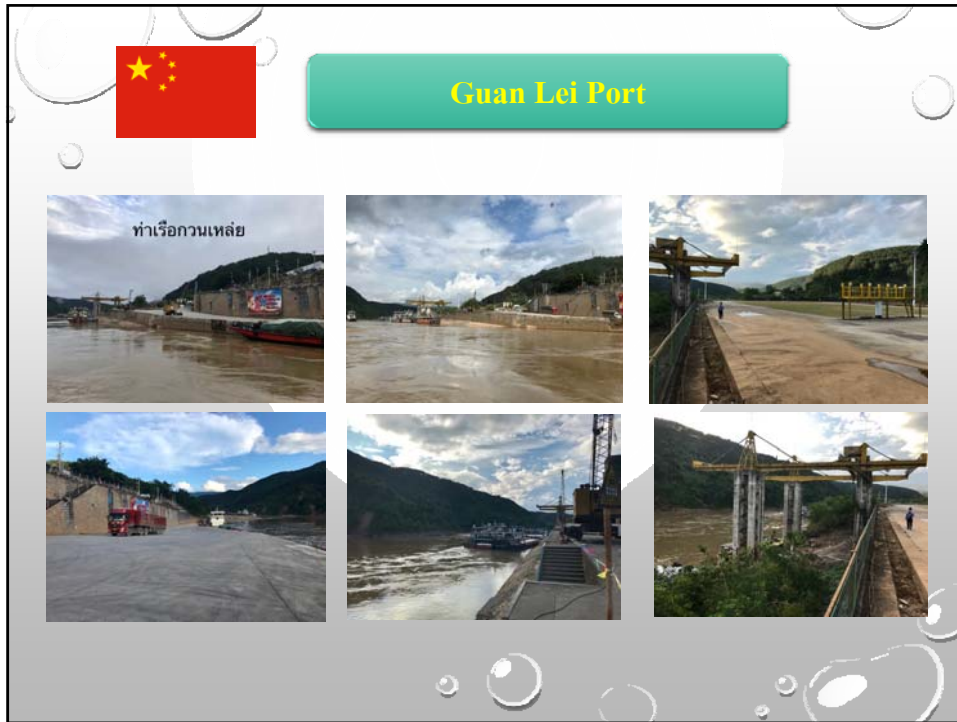


## Kao Jom (เมืองจำลองเชียงใหม่)









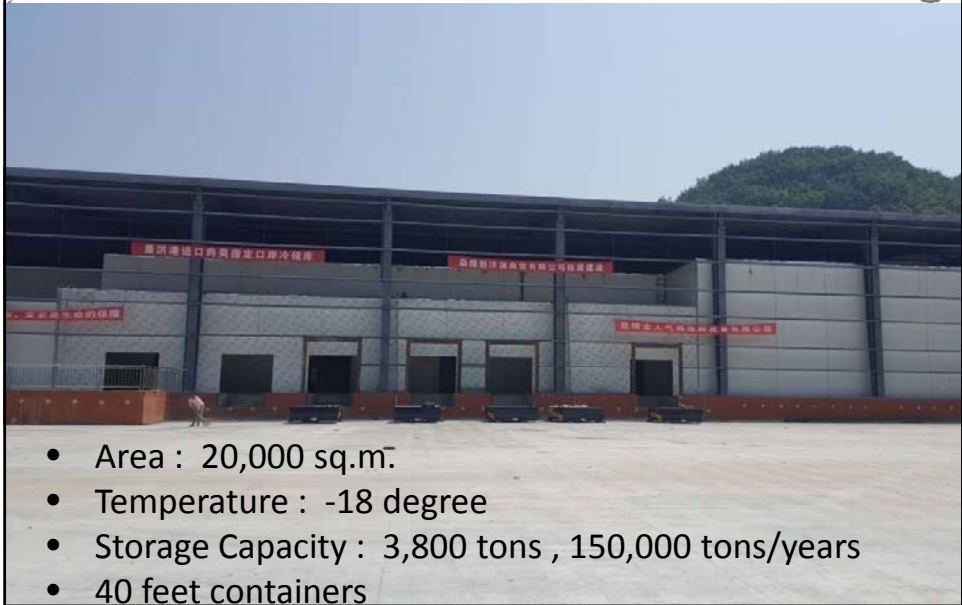








Cold Storage, Guan lei Port



- Area : 20,000 sq.m.
- Temperature : -18 degree
- Storage Capacity : 3,800 tons , 150,000 tons/years
- 40 feet containers



Soaploi Port / Myanmar









Soaploi Port / Myanmar



Navigational Channel



### Navigational Channel



### Chinese Cargo Vessel





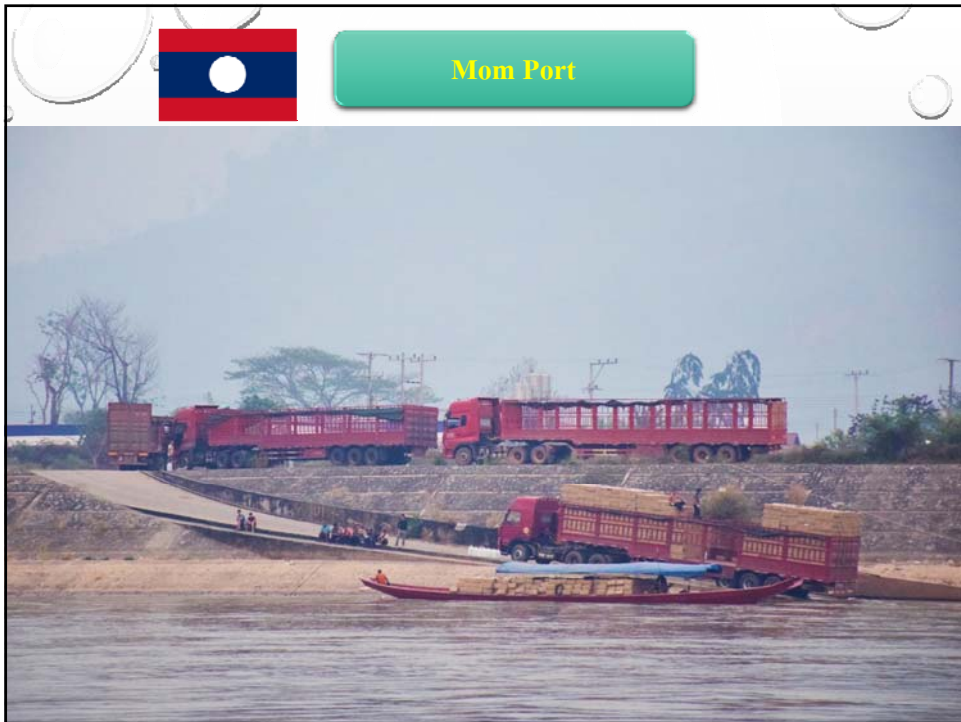
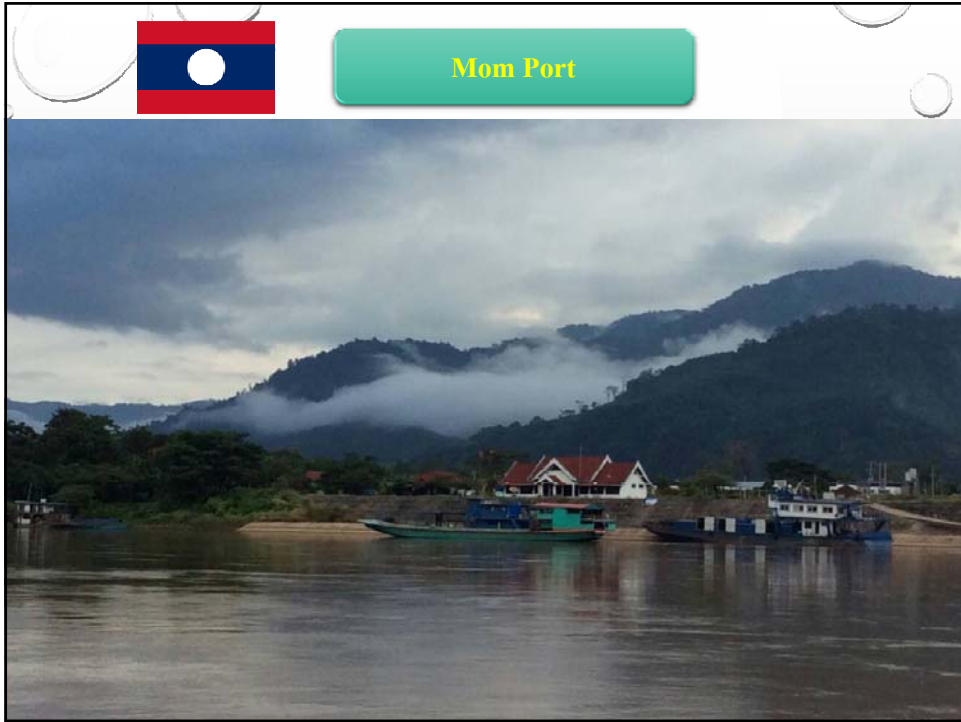


Oil Tanker Pump in Chiangkok port



Oil Tanker Pump in Mom Port





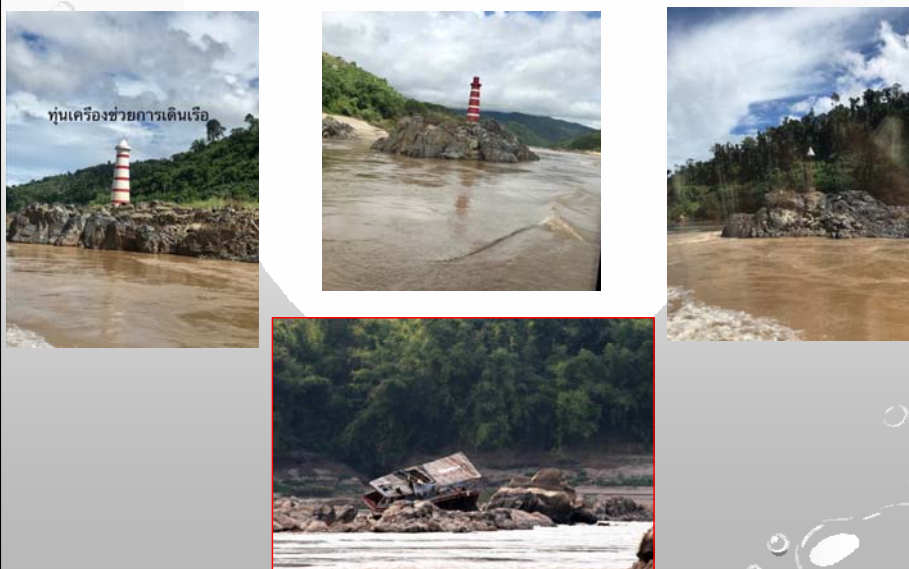




### Navigation Obstruction



### Aids to Navigation







Widest Channel at Mong Pa Lei



Closest Channel at Pasang





Patrol Vessel of Lao People's Army



China Border Police





Myanmar Police



Mekong River Unit, RTN









### Golden Triangle Terminal



### Chiang Saen Port (Passenger Terminal)











Houysai Port, Laos



Houysai Port, Laos





Houysai Port, Laos



Houysai City, Laos











Pakbeng city



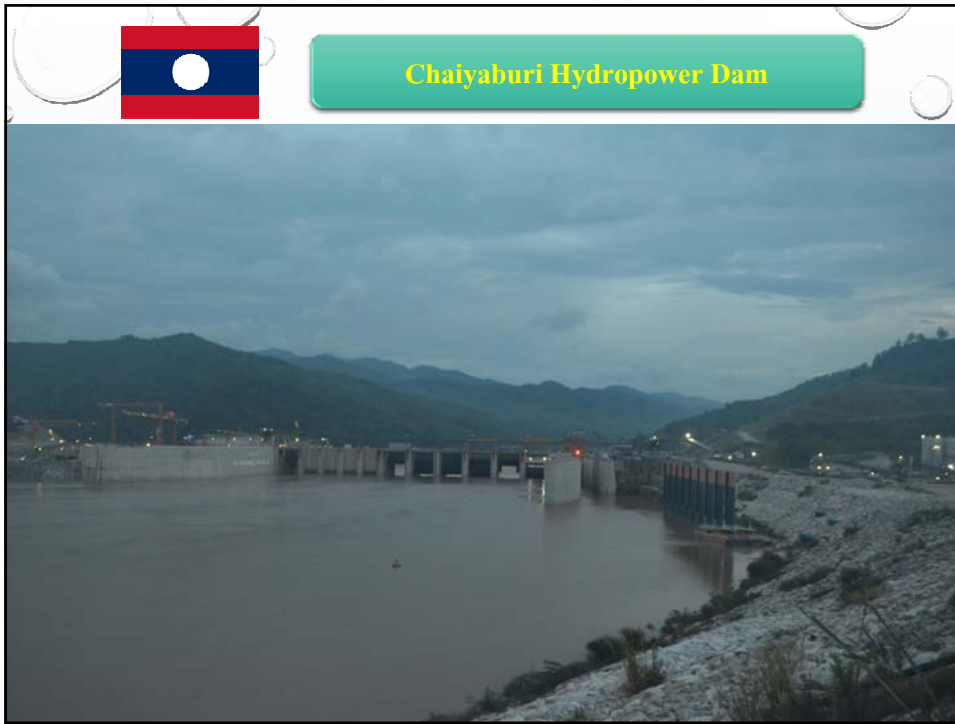
Loung prabang passenger jetty













## CONCLUSION

- SAFE AND SECURE FOR WATERWAY TRANSPORT
- NEED IN TIME INFORMATION SHARING FOR SAFE NAVIGATION

Thank You for your attention !

Mekong Delta, Kasalongkum passenger vessel

# Cambodia

## **Current situation and investment/development challenge regarding the Mekong River Basin Development in Cambodia**

**Mr. Khlok Sam Ang**

*Director of Department of Planning and International Cooperation of Ministry of Water Resources and Meteorology*

### **Abstract**

After many years of isolation, Cambodia is pursuing opportunities to engage with the international community in a number of areas. The kingdom has become a member of the Association of Southeast Asian nations (ASEAN), and is working towards accession to the World Trade Organization (WTO). These and other moves contribute to one of the three elements of the government's “Triangle Strategy” for national reconstruction.

Water resources management is an area in which Cambodia has no choice over international linkages. The kingdom shares the Mekong river basin with five other countries Viet Nam, Lao PDR, Thailand, Myanmar and China and 86 percent of its own land area lies within the Mekong basin. In 1995, it became a signatory to the Agreement on the cooperation for the sustainable development of the Mekong river basin, which established the **Mekong-Lancang Cooperation** (MLC), and it participates in the work following the Sanya Declaration (1<sup>st</sup> LMC Leader's Meeting in Sanya, Hainan, China: 22-23 March 2016 “**Shared River - Share Future**”) and Phnom Penh Declaration (2<sup>nd</sup> MLC Leader's Meeting in Phnom Penh, Cambodia: 10 January 2018 “**Our River of Peace and Sustainable Development**”).

It is in this spirit that Cambodia approaches the World Water Vision process. The nation must adopt a strategic approach to managing water, because water is one of its most important resources. Since 1998 in particular, it has taken a number of important steps to do this. An element of one of these steps preparation of a national water resources policy has been to enunciate a national vision for water. Cambodia is pleased to be working with the wider international community in this activity.

**Keywords:** Shares River - Share Future, Peace and Sustainable Development



**2<sup>nd</sup> Meeting of JWG on Water Resources  
of Mekong-Lancang Cooperation  
1<sup>st</sup> – 2<sup>nd</sup> March, 2018 in Chiang Rai,  
Thailand.**



**Current situation and investment/development  
challenge regarding the Mekong River Basin  
Development**

## **In Cambodia**

Prepared by Khlok Sam Ang, Director of Department of Planning and  
International Cooperation of Ministry of Water Resources and  
Meteorology ,

1. Current situation
2. Challenge
3. Investment
4. On Going Water Project



## I- Current situation

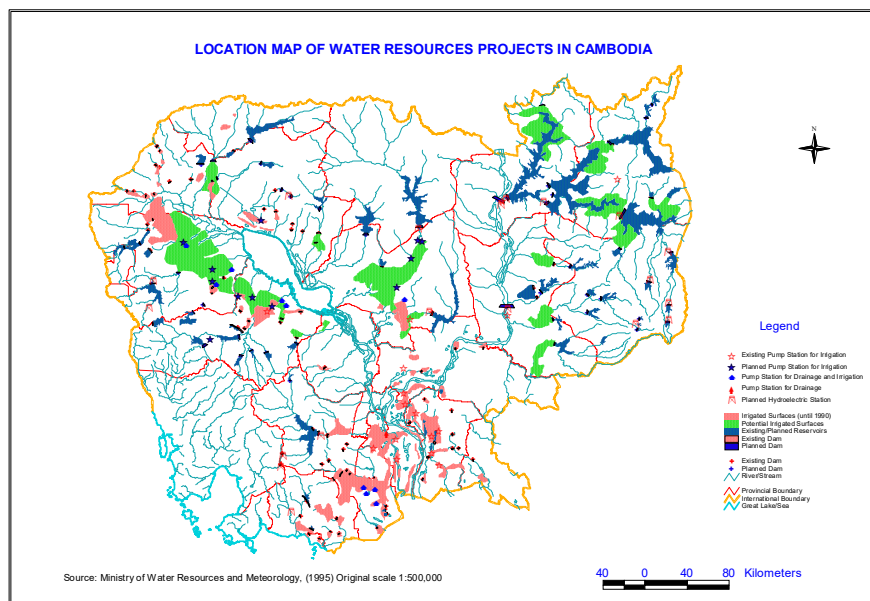
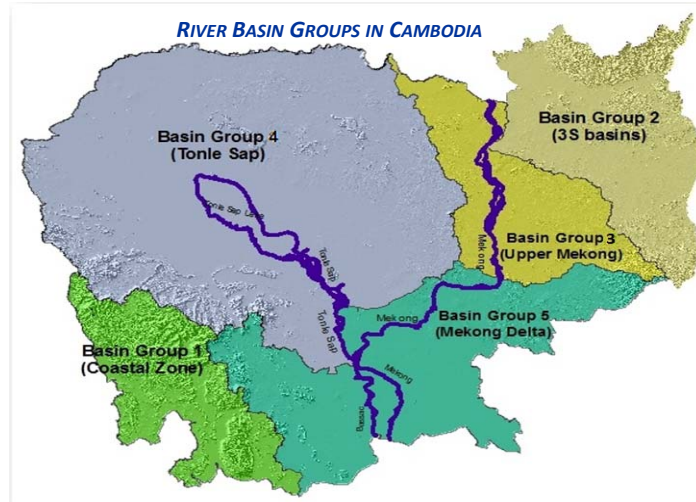
### INTRODUCTION

- Cambodia is a country that is considered to have abundant water, but in future years we expect that population growth and economic development will place rapidly increasing demands of water resources.
- Cambodia's flat-topography in the centre and south-east of the country creates shallow, wide storages in floodplains and wetlands along the mainstream of the Mekong River and tributaries
- 80% of Cambodia's population live in rural areas and more than 70% depend primarily on agriculture for their livelihoods. agriculture contributes 31% of the total national GDP.
- Continued development in agriculture sector remains an important government's strategy to reduce poverty in rural communities, achieve food security, and foster equitable and sustainable social development.
- Increasing rice exportation is current RGC's strategic plan.
- Expanding irrigated agriculture and ensuring water security for irrigation are top priorities to respond to the government's strategy mentioned above.

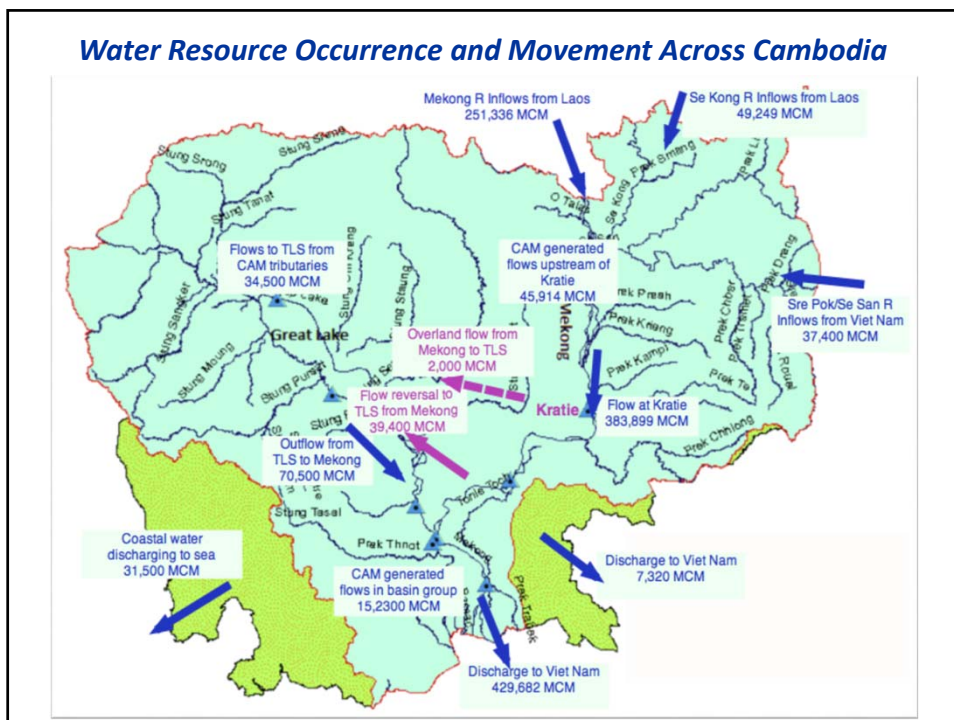
- IWRM is not being applied as required by the Water Law – Cambodia is still very much in a water development phase
- Groundwater is a vital resource in many areas, but is poorly understood and is not being managed.
- Cambodia's water resources assessment and monitoring are totally inadequate for management.
- While river basin management approaches are being piloted in some basins, the model for Cambodia is not being formalized.
- The limited amount of monitoring on water pollution and degradation is increasing as the economic sectors develop.
- Water catchments are not being identified and protected

Water Resources Status In Cambodia

Surface Water Resources

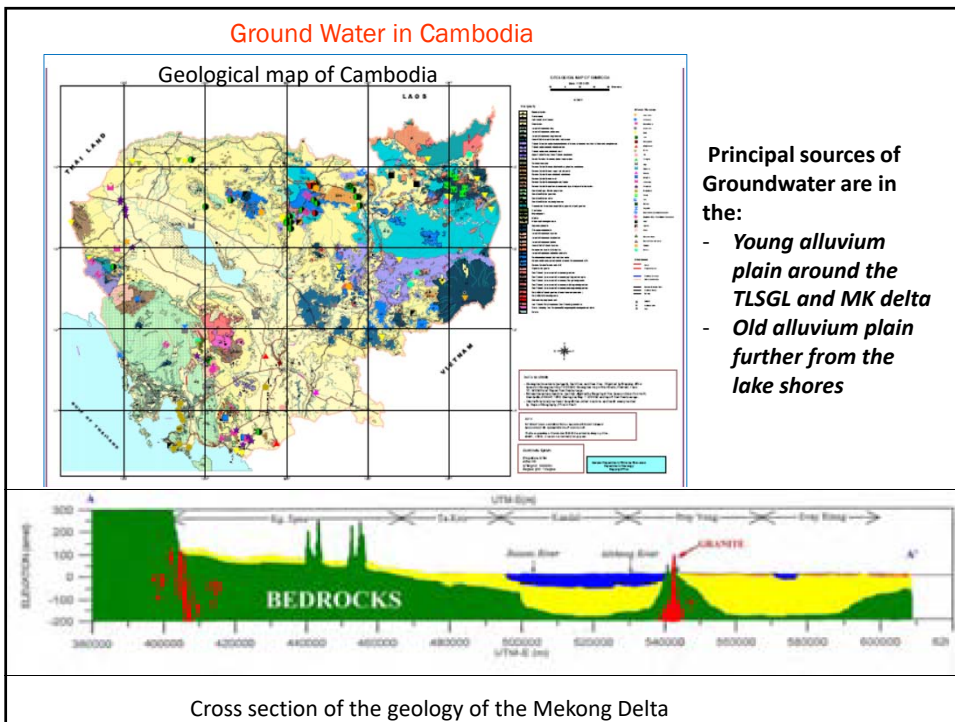
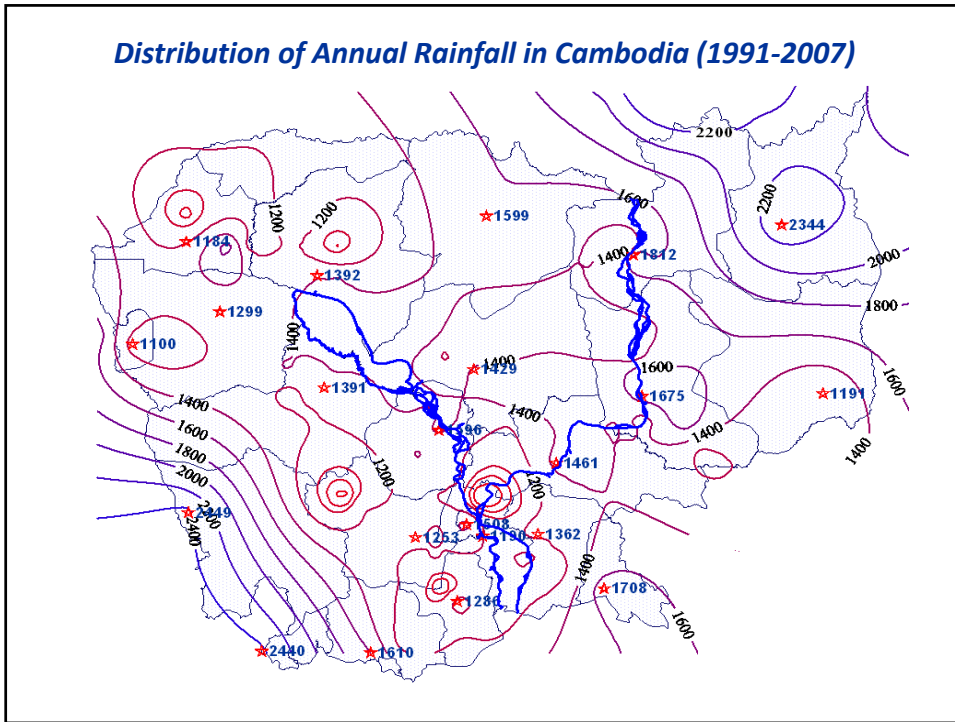






### Cambodia river catchments

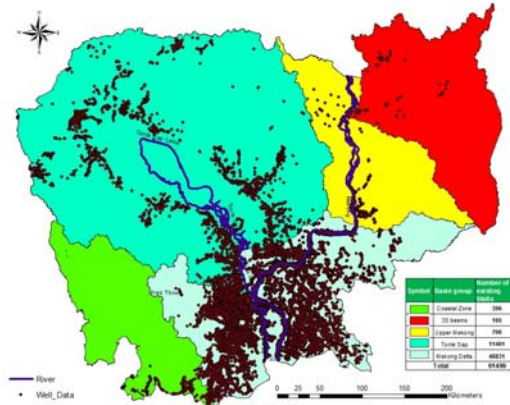
Basin Group	Code	River basin	Area (km <sup>2</sup> )	Basin Group	Code	River basin	Area (km <sup>2</sup> )
I	1	Prek Kampong Bay	3,018	III	30	Prek Preah	2,399
	2	Prek Toek Sap	1,529		31	Prek Krieng	3,331
	3	Prek Sre Ambel	2,653		32	Prek Kampi	1,142
	4	Prek Andong Toek	2,460		33	Prek Te	4,363
	5	Prek Trapang Rung	2,615		35A	Mekong Riverine (Downstream)	8,287
	6	Prek Tatai	1,619	<b>Sub-Total III</b>		<b>19,522</b>	
	7	Prek Koh Pao	3,109	IV	12	Stung Krang Ponley	3,033
	8	Stung Me Toek	1,043		13	Stung Baribour	3,003
<b>Sub-Total I</b>			<b>18,046</b>		14	Stung Bannak	1,116
II	27	Tonle Se Kong	5,564		15	Stung Pursat	5,964
	28	Tonle Se San	8,021		16	Stung Svay Don Keo	2,228
	29	Tonle Srepok	12,380		17	Stung Moug Russei (Dauntry)	1,468
<b>Sub-Total II</b>			<b>25,965</b>		18	Stung Sangker	6,052
V	9	Stung Toan Han	1,765		19	Stung Mongkol Borey	5,264
	10	Stung Slakou	2,485		20	Stung Sisophon	5,593
	11	Stung Prek Thnot	7,055		21	Stung Sreng	9,931
	34	Prek Chhlong	5,599	22	Stung Siem Reap	3,619	
	35B	Mekong Riverine (Upstream)	2,086	23	Stung Chikreng	2,714	
	37	Mekong Delta Cambodia	8,723	24	Stung Staung	4,357	
	38	Mekong TS flood plain (Spean Troas)	1,508	25	Stung Sen	16,342	
36	Tonle Vaico	6,618	26	Stung Chinit	8,236		
<b>Sub-Total V</b>			<b>35,839</b>	39	Boeng Tonle Sap	2,743	
				<b>Sub-Total IV</b>		<b>81,663</b>	
<b>TOTAL = 181,035 km<sup>2</sup></b>							





### GROUNDWATER USE

- Groundwater is widely used throughout the country, particularly in rural areas for domestic and drinking
- 53% of households depends on groundwater (270,000 wells)
- Contents
  - Urban water supplies (Siem Reap, Prey Veng, Svay Rieng)
  - Supplement irrigation (rice farming in Prey Veng and Svay Rieng provinces)



## II-Challenge

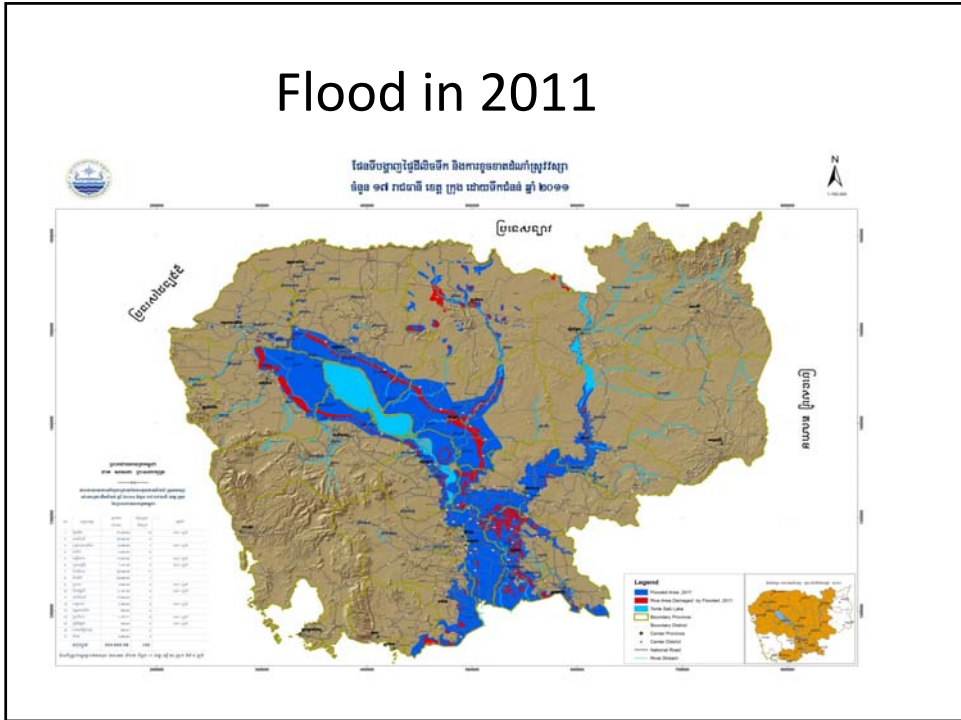
### 1- Too Much Water (Flood)

Extent of flooding in 2000 and 2001

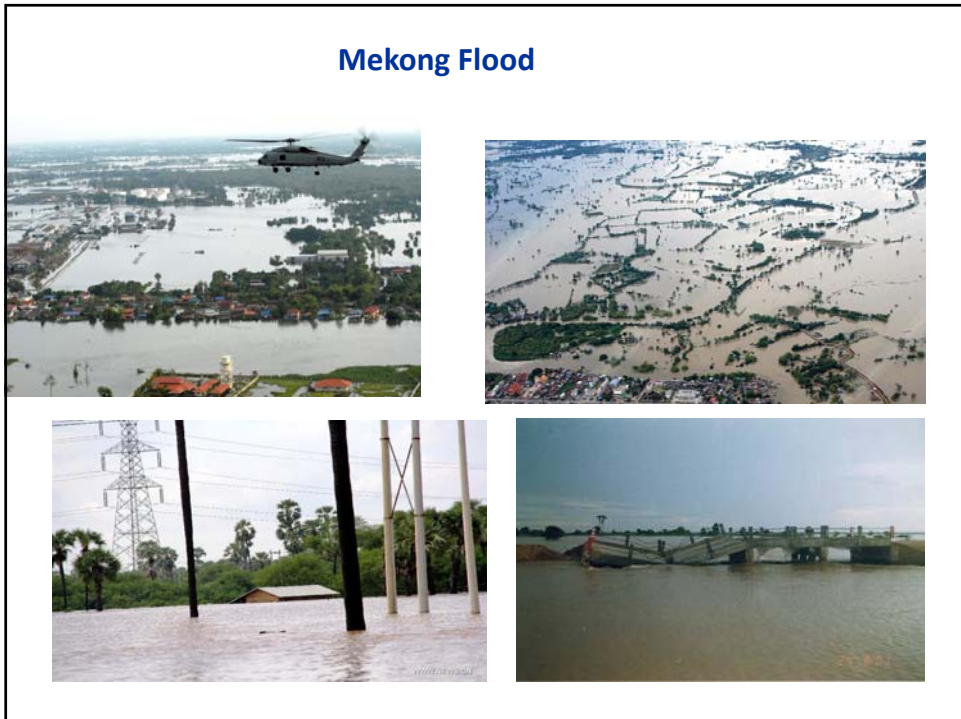
### Major Natural Disasters in Cambodia



# Flood in 2011



## Mekong Flood



### Flash Flood in Rural



### Flash Flood in Urban







## 2- Too little water (Drought)





## Drought





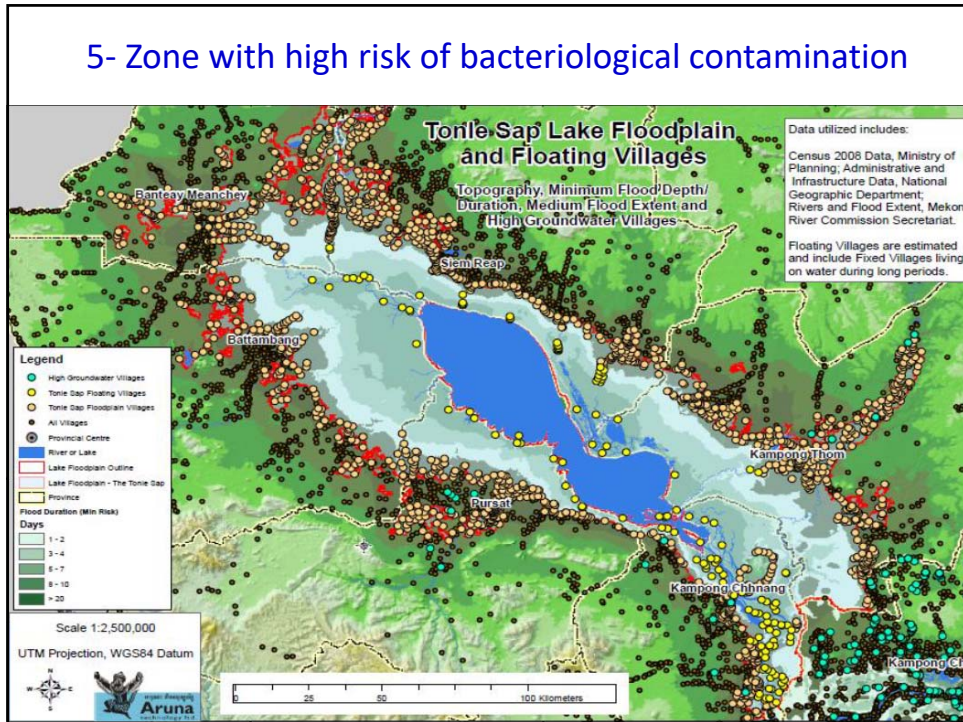
### 3- River bank slide and bank erosion



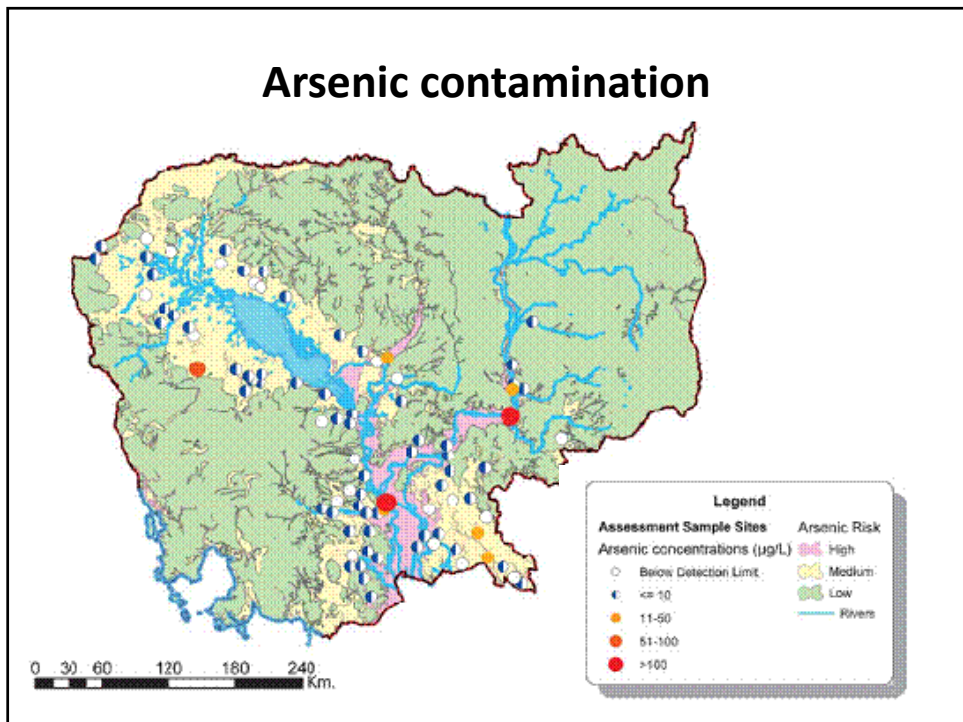
### 4- Increasing competition for water



### 5- Zone with high risk of bacteriological contamination



### Arsenic contamination



## III-Investment

### 1- Legality Frame Works

#### 1.1- Regional

- MRC 1995 Mekong Agreement

#### 1.2 Transboundary

- MOU of Sharing of Water Used at the border (NMCs)
- Water Resources Development Plan (BDP)

#### 1.3 National

- Cambodia Water Resources Management Law
- Sub degree on Famer Water Use Committee
- Sub Degree on River Basin Management
- Drafting Sub Degreeed on Water Quality
- Drafting Bub degree on Water Licensing
- Water Policy
- Master Plan of Water Resources Management
- Strategic Plan of Irrigation Development

### Five Joint Projects

MRC  
basket  
fund

- Lao-Thai safety regulations for navigation

GIZ  
support

- Cross border WR Dev't and mang't, including env'tl **impact monitoring of Don Sahong HPP (Cambodia & Lao PDR)**
- Tb cooperation for **flood & drought mang't in Thai-Cambodian border area** – a part of the 9C-9T Sub-area

MRC  
basket  
fund

- Sustainable WR dev't and mang't in **3S Basin (Cambodia, Lao PDR & Vietnam)**
- Integrated flood mang't in border area of **Cambodia & Viet Nam** in Mekong Delta for water security & sustainable dev't

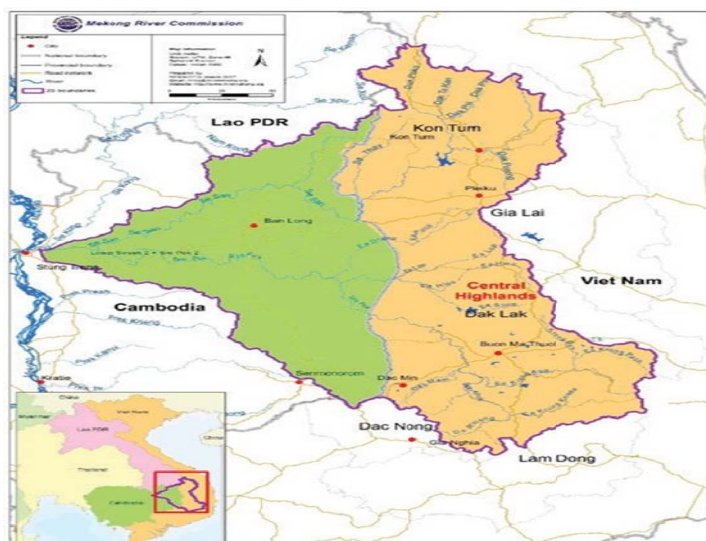




## Sustainable WR dev't and mang't in 3S Basin (Cambodia, Lao PDR & Vietnam)

Attribute	Sesan		Srepok	
	Cambodia	Viet Nam	Cambodia	Viet Nam
Basin Area (km <sup>2</sup> )	7,630	11,260	12,780	18,160
River Length	225	237	265	160
Elevation Range (m)	50-1,434	129-2,390	45-1,081	140-2,409
Population	95,603	896,812	128,074	2,139,470
Annual Precipitation (mm)	1,965	2,115	1,569	1,575
Irrigation (ha)	520	17,591	6,000	40,200
Number of Hydropower Dams	- 1 existing - 1 under construction - 3 planned	- 6 existing - 1 under construction	- 1 under construction - 3 planned	- 7 existing

### Administrative and Hydrological Boundaries of the Sesan and Srepok Project Area



### Water Resources Monitoring Stations in the Sesan and Srepok River Basins

Monitoring Station	Sesan		Srepok	
	Cambodia	Viet Nam	Cambodia	Viet Nam
Hydrological	3	2	1	4
Meteorological	4	3	3	2
Water Quality	1	1	0	1

### What science is needed for -

- Determining how much water is available
- Advising on sharing the water resource
- Advising on how to sustain the riverine environment, avoid mistakes
- Identifying risks to the water resource
- Monitoring availability and ecological impacts
- Assisting with clever, more efficient use of water
- Water policy formation and management
- Water infrastructure investment planning



## **ON-GOING WATER PROJECTS**

### ***Cooperation project and financial sources***

- *Korea (EDCF-K Exim Bank): 3 Projects*
- *Sala Ta Orn Dam Development Project*
- *Dauntry Dam Development*
- *Irrigation Development and Flood Mitigation Project in Bantey Meanchey*

### ***China (China Exim Bank) : 12 Projects***

- *Sek Sork Multi-Purpose Dam Development*
- *Stung Sreng River Basin Development*
- *Irrigation Development of Vaico phase- 2*
- *Master Plan of Water Resources Management*

### ***Japan (JICA): 4 Projects***

- *Rehabilitation Irrigation and Drainage System at West of Tole Sap Lake*
- *South-West Flood Mitigation and Irrigation Development*
- *Technical Service for Irrigation*
- *Flood Protection in Phnom Penh City*

### ***ADB: 4 Projects***

- *Damnak Chhoue Krom Irrigation and Flood Mitigation Project*
- *Water Resources Management and Development*
- *Upper Land Irrigation Development*

### **WB: 2 Projects**

- *Mekong IWRM*
- *Strategic Plan of Irrigation Development*

### **India: 2 Projects**

- *Rehabilitation Tasal Reservoir in Preak Thot River*
- *Study of Master Plan of Siem Reap River Basin Development*

### **France (AFD) : 2 Projects**

- *North-West Irrigation Development*
- *Regulate flow of wet land (Rehabilitation of Colmatage Canal)*



# Lao PDR

## Nam Xe Banghieng Lao PDR–Nam Kam Thailand M-IWRM Transboundary Projects

**Mr. Thongthip Chandalasane**

*Deputy Director of Division, Lao National Mekong Committee Secretariat,  
Ministry of Natural Resources and Environment*

### **Abstract**

The Mekong River flows for almost 4,800 km from its source in Tibet through China, Myanmar, Lao PDR, Thailand, Cambodia and Viet Nam via a Delta into the East Sea. The Mekong River and its tributaries form a dynamic hydro-ecological system supporting unique biodiversity and providing energy security and food security for more than sixty million people in the region.

In 1995, four countries in the Lower Mekong Basin including Lao PDR, Thailand, Cambodia and Viet Nam had signed Agreement for the Cooperation for the Sustainable Development of the Mekong River Basin. This agreement established the Mekong River Commission (MRC), which would serve to coordinate the development of the basin’s resources, in a sustainable manner and ensuring the reasonable and equitable utilization of water between the LMB countries.

Transboundary cooperation and projects in the M-IWRMP framework are designed to link the regional and national levels; showing how the principles of the Mekong Agreement can be applied at sub-basin levels – in recognition of the Dublin Principles.

However, there are few transboundary tributaries between Lao PDR and Thailand as the Mekong River forms the border between the two countries. There are nevertheless significant opportunities for these two countries to cooperate around shared experiences in establishing local water management institutions, planning and managing sub-basins using IWRM principles. Moreover, the two countries can share common interests and problems in sub-basins, which not directly transboundary in nature. The transboundary project aim Lao PDR and Thailand will gain more experiences of water and related resources management and application of IWRM through cooperation and coordination to support sustainable basin development which make a significant contribution to the socio-economic development of both countries and overall benefit to healthy of the Mekong River and its tributaries.

**Keywords:** Nam Xe Banghieng, Nam Kam, M-IWRM project



**The 2nd Meeting of Joint Working Group on Water Resources  
of Mekong-Lancang Cooperation  
1-2 March 2018**

**Nam Xe Banghieng Lao PDR–Nam Kam Thailand M-IWRM  
Transboundary Projects**

**By: Lao National Mekong River Committee Secretariat**

# CONTENTS

- I. Introduction**
- II. Objectives**
- III. Activities**



Figure 1.1: Mekong Basin

## I. Introduction

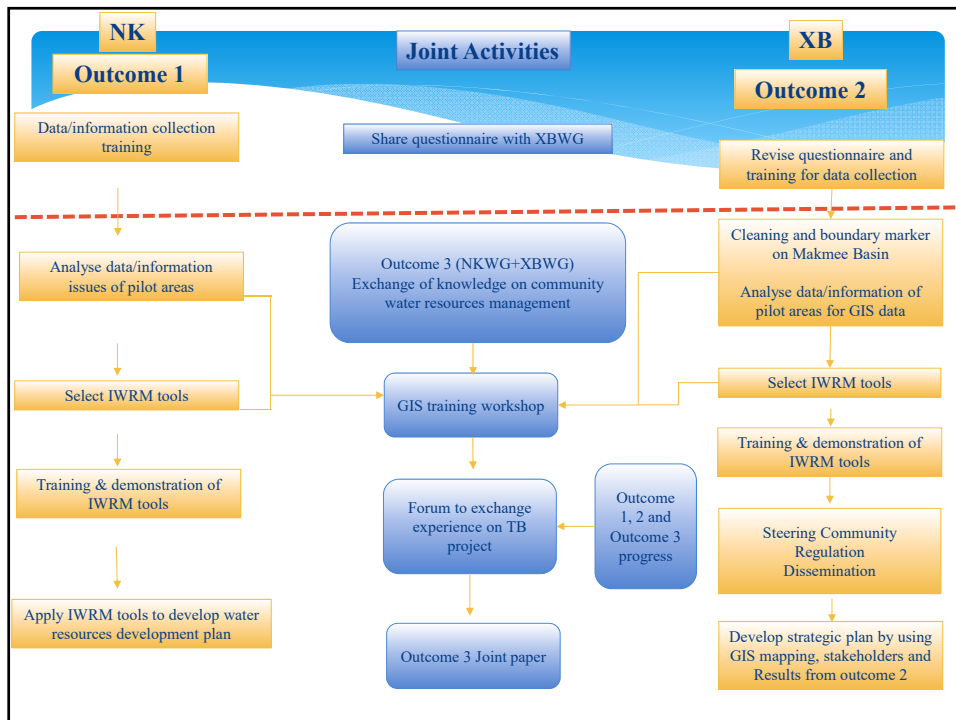
The Mekong River commission (MRC) implemented their Water Utilization Programme (WUP) from 2000-2008. This programme developed basin models, procedures and technical guidelines to implement the 1995 Mekong Agreement. The WUP was considered successful but incomplete, as highlighted in its Evaluation and the Mid-term Review of the MRC Strategic Plan 2006-2010. To ensure follow-up and sustainability - especially regarding the implementation of the Procedures and finalization of the technical guidelines - the Mekong IWRM Project (M-IWRMP) was formulated and has been under implementation since 2010 with support from the Australian Agency for International Development (AusAID) and the World Bank (WB).

## II. Objectives

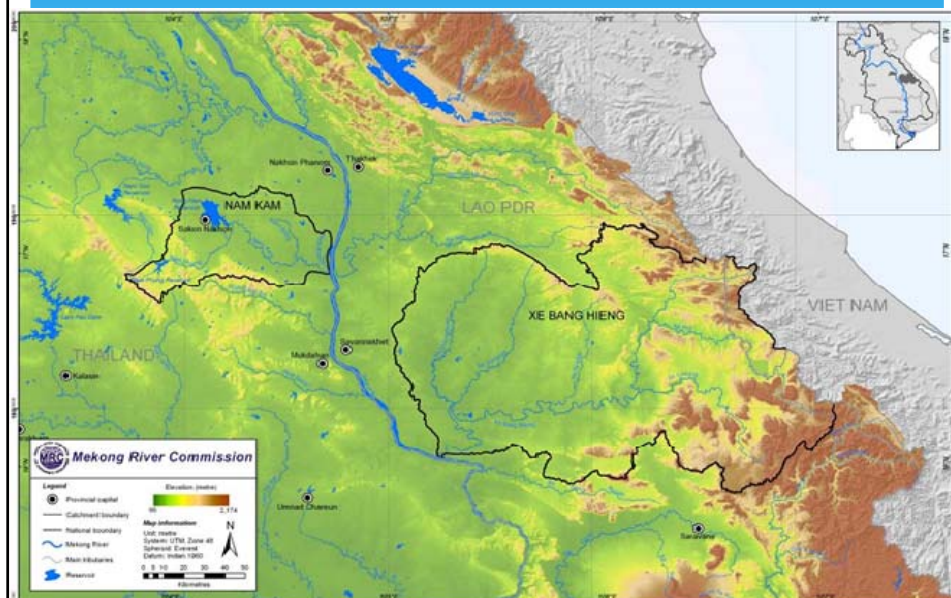
- \* The transboundary cooperation for river basin management between Lao PDR and Thailand. The Nam Xe Bang Hieng Basin in Lao PDR and Nam Kam Basin in Thailand the project has been implemented since January 2014. included three outcomes of the project were set up as follows:
  - \* **Outcome 1:** RBCs/RBPs and working group applying IWRM principles and preparing IWRM-based river basin management plans
  - \* **Outcome 2:** Knowledge and IWRM tools to support river basin planning and management being used effectively, and
  - \* **Outcome 3:** Strengthened transboundary cooperation, and effective transboundary project implementation and management.

## II. Objectives (Cont)

- \* After the WB Implementation Support Mission visited MRCS in March 2015, the WB suggested to focused on specific area of cooperation which possible to implement therefore wetland management was proposed in cooperation issues.
- \* **Outcome 2** was revised to “*Exchange of experience visit to wetland management between Nong Han and Xe Champhone, including preparation of joint paper and reciprocal study visits*”. And **Outcome 3** was revised to “*Exchange of knowledge on community water management in Nam Kam and Xe Bang Hieng, including preparation of a joint paper and reciprocal study visits*”.



## River basin boundaries and topography



## III. Activities

**Outcome 1** :RBCs/RBPs and working groups applying IWRM principles and preparing IWRM-based river basin management plans.

- \* **Establish an initial River Basin Platform (RBP) and working group in the basin.**
- \* River Basin Committees (RBCs) and River Basin Platforms (RBPs) have been drafted simultaneously
- \* Member of Project Advisory Group were selected and presented to LNMC;
- \* But can not approve yet due to the consultation meeting with all key stakeholders from center and local not set up yet.

The outcomes for the project has been re-defined for the new output and the project team was agreed to cut out RBCs from the project activities.



### III. Activities (Cont.)

#### Outcome 2: Exchange of experiences visit in wetland management between Nonghan and Xe Champhone, including preparation of a joint paper and reciprocal study visit.

- \* Consultation Workshop to Select Priorities Areas
- \* Visited the field;
- \* Collected the general information and physical characteristics need;
- \* Prioritized the target area;
- \* Consultation workshop to select project areas
- \* Consultation workshop on questionnaire form revision
- \* Reciprocal Study visit in Xechamphone-Nonghan and Nonghan-Xechamphone and back to back with Meeting on lesson learnt from study visit



### III. Activities (Cont.)

#### Outcome 2: Exchange of experiences visit in wetland management between Nonghan and Xe Champhone, including preparation of a joint paper and reciprocal study visit.

- \* Training workshop on questionnaire form to working group and villagers on data collection
- \* Data collection ----> data entry ----> data analysis
- \* Risk analysis of Wetland Management





### III. Activities (Cont.)

- \* Joint report for outcome 2
- \* leaning up necessary part of the basin
- \* GIS mapping



### III. Activities (Cont.)

Outcome 3 : Demonstration and application of selected IWRM tools to develop community water resources management plan

Set up Wetland Conservation in Markmee reservoir area



✓ Setup boundary marker at MarkMee Basin by using the concrete poles

✓ Setup Steering Community



### III. Activities (Cont.)

Outcome 3 : Demonstration and application of selected IWRM tools to develop community water resources management plan

Set up Rule on Wetland Conservation in Mark Mee Basin

- Consultation workshop among three concerned villages
- Consultation workshop to design a conceptual framework of this rule
- Consultation workshop to finalize the rule on wetland conservation

Thank you very much for your attention

# Myanmar



The 2<sup>nd</sup> Meeting of Joint Working Group on Water  
Resources of Mekong-Lancang Cooperation

## **Transboundary Water Resources Cooperation of Myanmar (JWG & Boundary Rivers)**

**Sein Lwin, Deputy Director  
Directorate of Water Resources and Improvement of River Systems (DWIR),  
Ministry of Transport and Communications (MOTC)**

1-2 March 2018

Chaing Rai, Thailand

# Content

- \* **JWG - WR**
- \* **Myanmar – Thailand Border Rivers Cooperation**
- \* **China – Myanmar Border Rivers Cooperation**



# Five Key Areas

## 1. Connectivity

Focal – **Ministry of Transport and Communications**

## 2. Production Capacity Cooperation

Focal – **Ministry of Industry**

## 3. Cross – Border Economic Cooperation

Focal – **Ministry of Trade, Planning and Finance**

## 4. Water Resources

Focal – **Ministry of Transport and Communications**

## 5. Agriculture and Poverty Reduction

Focal - **Ministry of Agriculture, Livestock and Irrigation**

# JWG on Water Resources

1. Ministry of Transport and Communications
  - (1) Directorate of Water Resources and Improvement of River Systems (DWIR) Focal
  - (2) Department of Meteorology and Hydrology (DMH) Member
2. Ministry of Environmental Conservation and Forestry
  - (3) Environmental Conservation Department (ECD) Member
  - (4) Forest Department (FD) Member
3. Ministry of Border Affairs
  - (6) Department of Progress of Border Areas, National Races and Development Affairs Member
4. Ministry of Agriculture, Livestock and Irrigation Member
  - (7) Irrigation and Water Utilization Management Department (IWUMD) Member
  - (8) Department of Rural Development (DRD) Member
5. Ministry of Electricity and Energy
  - (9) Department of Hydropower Implementation (DHPI) Member
6. Ministry of Industry
  - (10) Department of Industry Collaboration (DIC) Member

# JWG on Water Resources

- **Two meetings (5.9.2017) (19.2.2017)**
- **To prepare project proposals**

# Early Harvest Projects (1 st Batch)

1	MLC Awareness Raising Programme for Diplomats	Completed
2	Feasibility Study to Upgrade the Wan Pong Port, Mekong River	In progress

## Early Harvest Projects (2<sup>nd</sup> Batch)

- 10 projects were proposed



# Lancang – Mekong Cooperation (LMC) Special Fund in 2017

## 1. Ministry of Transport and Communications

(1) Feasibility study on Myanmar Wan Pong Port Improvement Project

## 2. Ministry of Home Affairs

(2) Construction of Conference Room, Administrative Building and Embankment at Wan Pong Port

## 3. Ministry of Religious Affairs and Culture

(3) Lancang – Mekong Culture Exchange Youth Camp

(4) Workshop on Heritage Sites Management in Lancang – Mekong Countries

## 4. Ministry of Education (Yangon University)

(5) Breeding Elite Rice Varieties and Optimizing their cultivation in Myanmar

## 5. Ministry of Agriculture, Livestock and Irrigation

(6) Improvement of Coffee Production and Coffee quality in Lancang – Mekong Region

(7) Rural Development and Vegetable Technology transfer in Lancang – Mekong Region

(8) Processing Technology for Value Added Product Project

(9) Production Technology for Safe and Quality of Fruits and Vegetables Project

(10) Establishment of Home Gardening for Poverty Alleviation

## Lancang – Mekong Cooperation (LMC) Special Fund 2<sup>nd</sup> Batch

- \* Related Ministries were requested to send project proposals urgently
- \* 1<sup>st</sup> projects are to implement start of 2018 – 2019 fiscal year within 2 years.

## Discussions for 5 year plan from Ministries

No.	Project Title	Ministry
1	<ul style="list-style-type: none"> <li>i. Wanpon port wharf project</li> <li>ii. Ayeyarwady waterway improvement (Bamaw – Mandalay)</li> </ul>	DWIR, MOTC
2.	i. Project for water quality assessment at Ayeyarwady river in Kachin state	ECD, MONREC
3.	i. Small-scale water supply project for co-state high school of Wanpon village, Tachilake Tsp	MBA
4.	i. Installation of telemetry water level monitoring and automatic weather observing system for early warning	DMH, MOTC
5.	<ul style="list-style-type: none"> <li>i. Payment for ecosystem service initiatives in watershed management of Myanmar</li> <li>ii. Capacity building for developing ecotourism plan in protected areas of Myanmar</li> </ul>	FD, MONREC

## Discussions for 5 year plan from Ministries

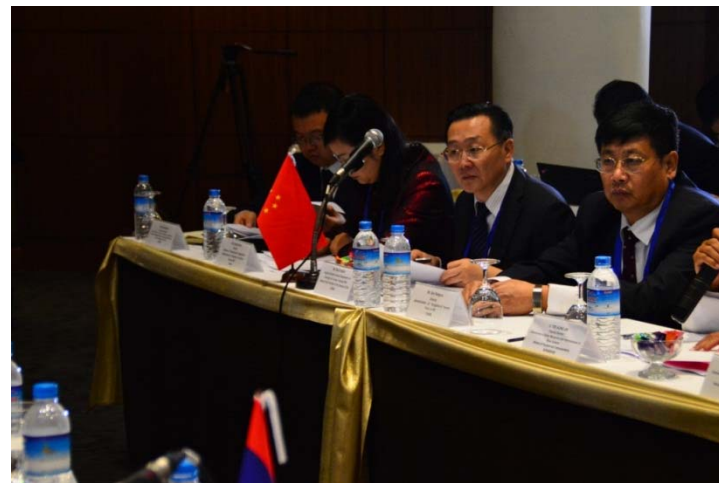
No.	Project Title	Ministry
6	Capacity Building for Planning & Designing the Hydropower Projects for Sustainability & Climate Resilience on Mekong River	MOEE
7	Capacity Building for Hydrological Assessment using Mathematical Models for Hydropower Development in Mekong Basin	MOEE
8	Capacity Building for Seismic Analysis & Dam safety Management of Hydropower Projects	MOEE



# Joint Committee on Coordination of Commercial Navigation on the Lancang Mekong River (JCCCN)

15<sup>th</sup> JCCCN Meeting : 9 – 10 January 2017 in Mandalay, Myanmar

16<sup>th</sup> JCCCN Meeting : 27 – 28 February in Bangkok, Thailand

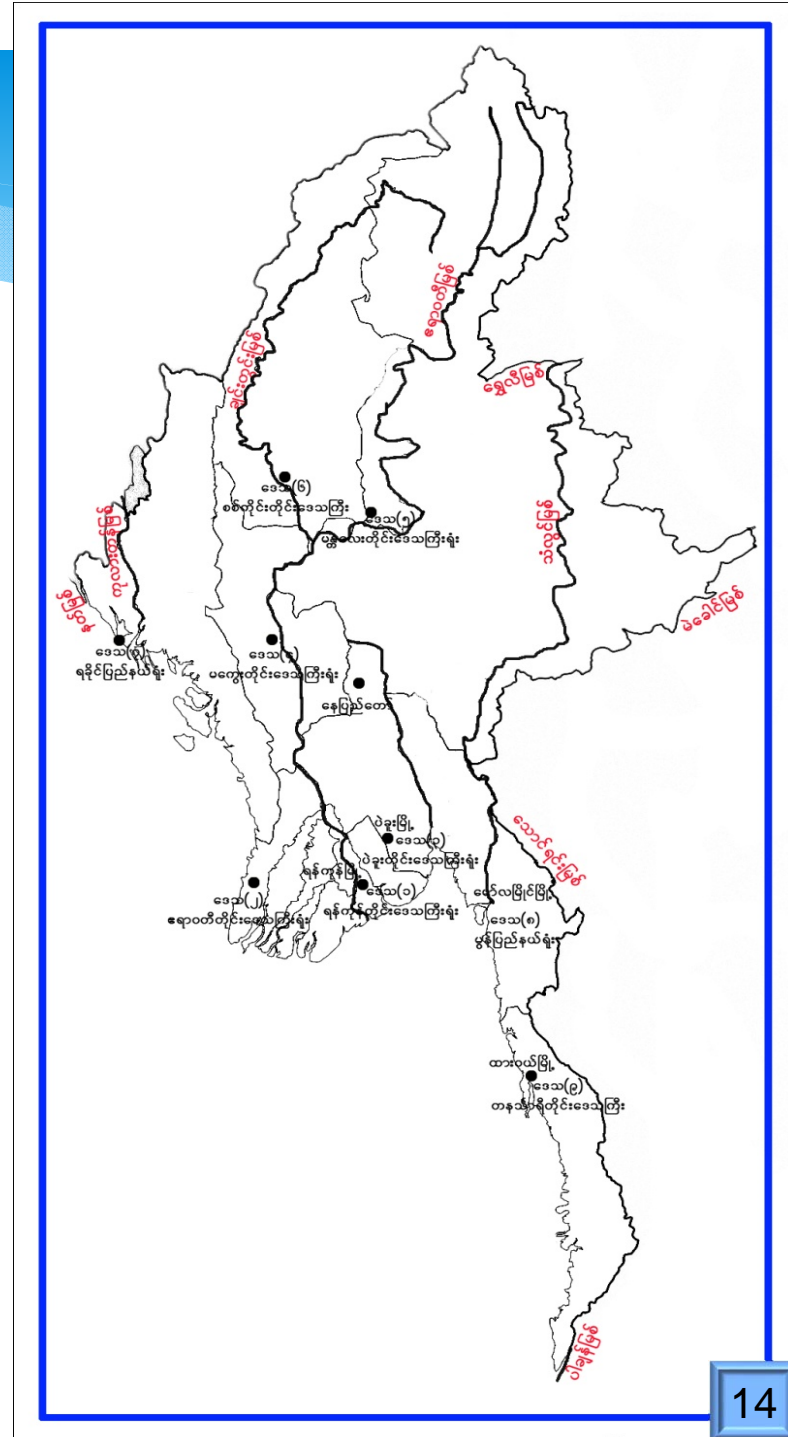




# Myanmar – Thailand

## Border Rivers Cooperation Myanmar-

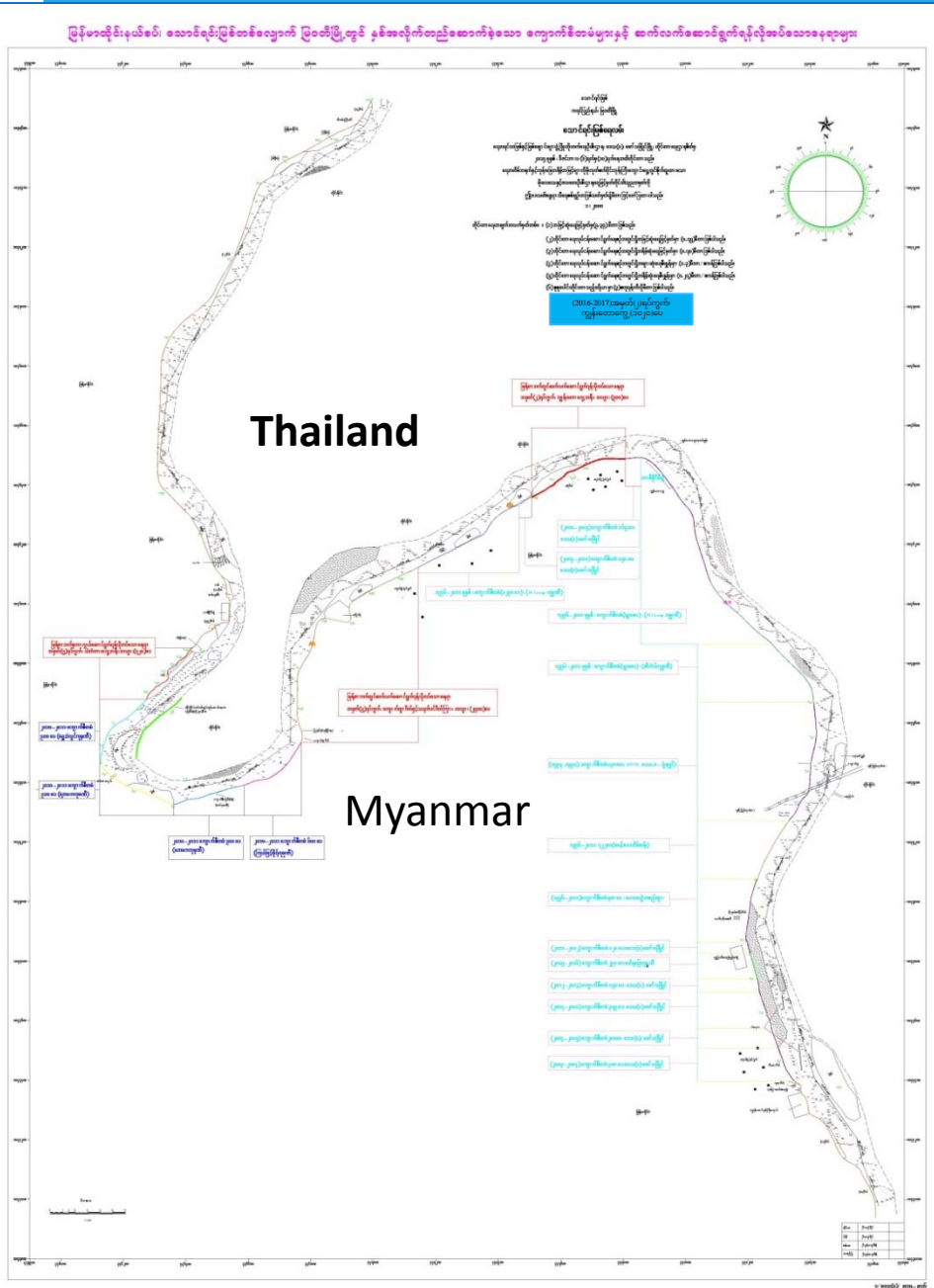
No.	River/ Creek	Border line
1	Thanlwin	126 km
2	Thaung Yin	315 km
3	Parchan	129 km
4	Mae sai – Mae hauk creek	58 km
5	Land	1494 km
	Total	2122 km



## Committees for Border Rivers Cooperation

1. Joint Boundary Committee (JBC)
2. Joint Technical Committee (JTC)
3. Joint Technical Survey Committee (JTSC)
4. Joint Committee Relating to the Fixed Boundary of the Mae Sai – Mae Nam Rauk Rivers Sector (JCR)
5. Sub Committee Relating to Rights of Navigation Equitable Utilization of Water, Maintenance and Preservation of Present Course of Rivers of Mae Sai – Nam Rauk River Sector

# Maintenance of border line in Gawli creek



အမည်	တည်ဆောက် ပြီးပမာဏ (ပေ) (၁၉၉၆-၂၀၁၇)	၂၀၁၇-၂၀၁၈ လျာထား ပမာဏ(ပေ)	ထပ်မံ ကာကွယ် ပေးရမည့် ပမာဏ(ပေ)
သောင်ရင်းမြစ်	၂၃၇၈၇	၂၁၇၅	၆၉၆၀
ဂေါ်လီချောင်း	၂၆၁၀	၂၅၅	၅၁၀
စုစုပေါင်း	၂၆၃၉၇	၂၄၃၀	၇၄၇၀



# Maintenance of Thaung Yin river (border river) in Myawady



Before



After



## Wawlaymyaing (Gaw li creek)



Before



After



**Sub Committee Relating to Rights of Navigation Equitable Utilization  
of Water, Maintenance and Preservation of Present Course of Rivers  
of Mae Sai – Nam Rauk River Sector**



Mae Sai – Nam Rauk , Tachilate (Golden Triangle)





၂။ တာချီလိတ်မြို့၊ မဲခေါင်ရပ်ကွက်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်း မှတ်တိုင် BRP (၄၅၁) အနီး အလျား (၂၀၀) ပေ ခန့် ကမ်းပြုကာကွယ်ထိန်းသိမ်းသင့်နေရာအား မြင်တွေ့ရပုံ

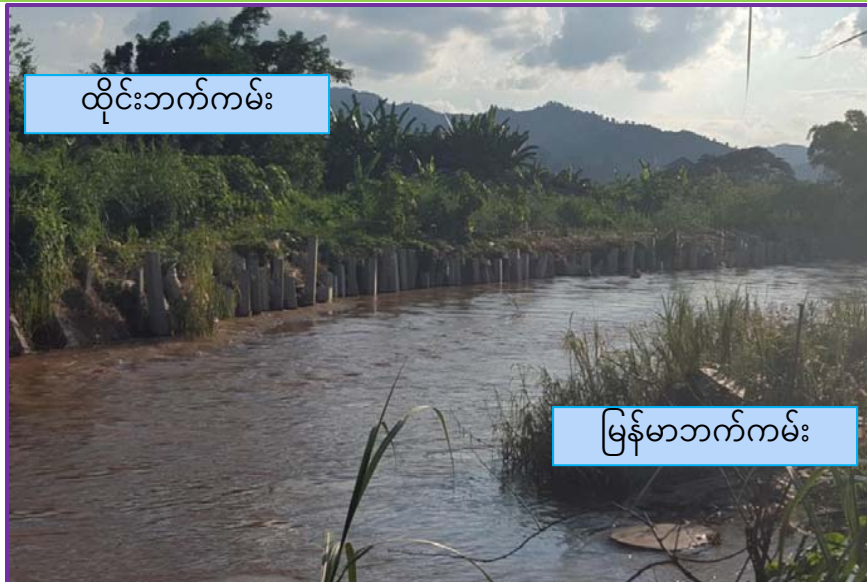


မြန်မာဘက်ကမ်း



မြန်မာဘက်ကမ်း

၂။ တာချီလိတ်မြို့၊ မဲခေါင်ရပ်ကွက်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်း မှတ်တိုင် BRP (၄၅၁) အနီး ထိုင်းဘက်မှ ကမ်းပြု ကာကွယ်ရေးဆောင်ရွက်ထားခြင်းအား မြင်တွေ့ရပုံ



ထိုင်းဘက်ကမ်း

မြန်မာဘက်ကမ်း



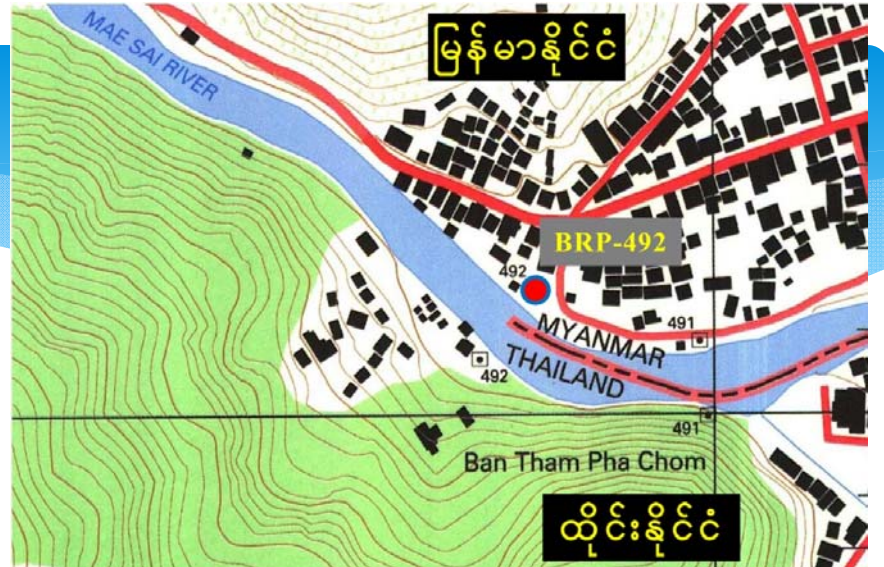
ထိုင်းဘက်ကမ်း

မြန်မာဘက်ကမ်း





ပုန်းထွန်ရပ်ကွက်၊ ဝါးဆိပ်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်းမှတ်တိုင် BRP(၄၉၂) အနီး မယ်ဆိုင်ရေတင် စခန်းနှင့် ရေသွယ်တူးမြောင်း NRC-၁ နေရာ ပြပုံ



ပုန်းထွန်ရပ်ကွက်၊ ဝါးဆိပ်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်းမှတ်တိုင် BRP(၄၉၂) အနီး မယ်ဆိုင်ရေတင် စခန်းနှင့် ရေသွယ်တူးမြောင်း NRC-၁ နေရာ ပြပုံ



ပုန်းထွန်ရပ်ကွက်၊ ဝါးဆိပ်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်းမှတ်တိုင် BRP(၄၉၂) အနီး မယ်ဆိုင်ချောင်း အတွင်း ကျောက်တန်းများချထားပြီး ချောင်းရေကို ဟန့်တား



ပုန်းထွန်ရပ်ကွက်၊ ဝါးဆိပ်၊ မြန်မာ-ထိုင်း နယ်နိမိတ် ရည်ညွှန်းမှတ်တိုင် BRP(၄၉၂) အနီး ရေသွယ်တူးမြောင်း NRC-၁ အားမြင်စေရန်



(၂၉-၁၂-၂၀၁၇) ရက်နေ့ ဆန်ဆိုင်း(က)ရပ်ကွက် BRP-458 အနီး (ဂရင်းဆိပ်) တွင် ထိုင်းနိုင်ငံဘက်မှ အတားအဆီးများအား ဖယ်ရှားရှင်းလင်းနေမှု နှင့် ဆောင်ရွက်ပြီးစီးမှု မှတ်တမ်းဓာတ်ပုံ





Photo record of Intake water canal at Warsate (BRP\_492) in Maesai –Maehauk creek





Photo record of barriers at the Warsate (BRP-492) in Maesai-Maehauk creek



Photo record of water leading canal near (BRP\_367) in Maesai-maehauk creek





Photo record of water leading canal near (BRP-367) in Maesai- Maehauk creek





Photo record of barriers at the Gayinsate (BRP\_458) in Maesai-Maehauk creek



Photo record of barriers at the Gayinsate (BRP\_458) in Maesai-Maehauk creek





Photo record of barriers at the Gayinsate (BRP\_458) in Maesai-Maehauk creek





Photo record of barriers at the Gayinsate (BRP\_458) in Maesai-Maehauk creek





# ပါချန်မြစ်ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း (၂၀၁၃-၂၀၁၄) ကော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ နာလီချန်းကျေးရွာကျေးရွာအနီး

လုပ်ငန်းမဆောင်ရွက်မီတွေ့မြင်ရပုံ



လုပ်ငန်းဆောင်ရွက်ပြီးတွေ့မြင်ရပုံ



ဘဏ္ဍာရေးနှစ်	တည်နေရာ	အမျိုးအစား	ပမာဏ	ရန်ပုံငွေ (ကျပ်သန်း)	မှတ်ချက်
၂၀၁၃-၂၀၁၄	နာလီချန်းကျေးရွာအနီး ခန့်မှန်းမြေပုံညွှန်း MM-801601 မှ MM-801598	ကွန်ကရစ်ပိုင် အခြေပြု ကျောက်ပြားစီတမံ	၆၇၀-ပေ	၂၄၇.၃၁	တိုင်းဒေသကြီးငွေလုံး

လုပ်ငန်းဆောင်ရွက်ပြီးတွေ့မြင်ရပုံ



လုပ်ငန်းဆောင်ရွက်ပြီးတွေ့မြင်ရပုံ



ဘဏ္ဍာရေးနှစ်	တည်နေရာ	အမျိုးအစား	ပမာဏ	ရန်ပုံငွေ (ကျပ်သန်း)	မှတ်ချက်
၂၀၁၃-၂၀၁၄	နန်မနွယ်ချောင်းအထက် ခန့်မှန်းမြေပုံညွှန်း MM-789590	(က) ရေနက်အိုးကျောက်ကြီးဖြည့်ခြင်း	(၂၀၀၀)ပေ	၆၇၂.၃၄	ပြည်ထောင်စုသီးသန့်
		(ခ) (၂၀၁၂-၂၀၁၃) ကျောက်စီတမံ ပြုပြင်ထိန်းသိမ်းခြင်းလုပ်ငန်း	(၁၂၀) ပေ		
		(ဂ) Culvert ပြုလုပ်ခြင်း	(၄)ခု		



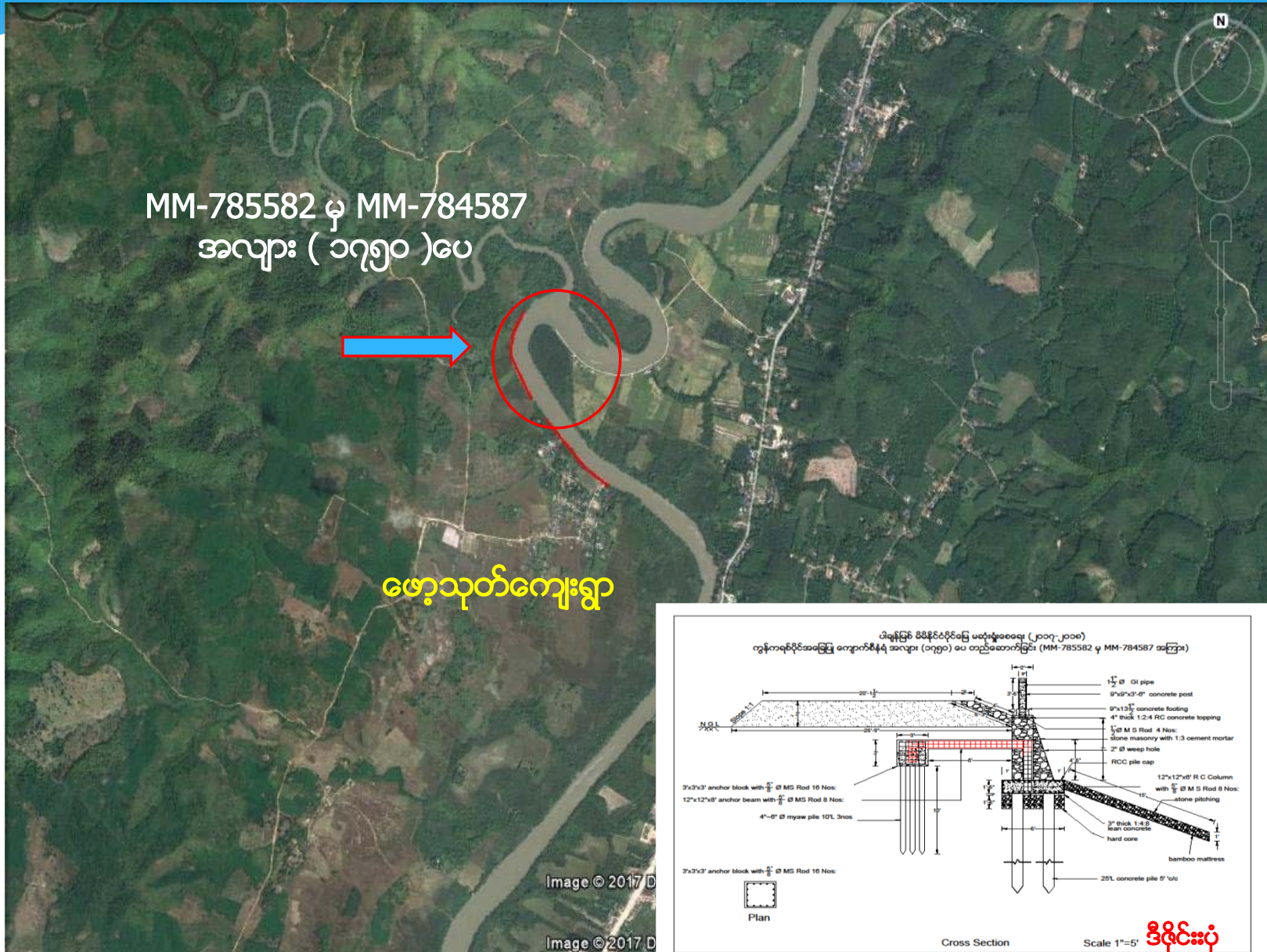
ပါချန်မြစ်ကမ်းပြုကာကွယ်ရေးလုပ်ငန်း (၂၀၁၆-၂၀၁၇)  
 ကော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ ဆိပ်ဖူးကျေးရွာအနီး



ဘဏ္ဍာရေးနှစ်	တည်နေရာ	အမျိုးအစား	ပမာဏ	ရန်ပုံငွေ (ကျပ်သန်း)	မှတ်ချက်
၂၀၁၆-၂၀၁၇	ဆိပ်ဖူးကျေးရွာအနီး ခန့်မှန်းမြေပုံညွှန်း MM-751512 မှ MM-750505	ကွန်ကရစ်ပိုင် အခြေပြု ကျောက်စီမြေထိန်းနံရံ တည်ဆောက်ခြင်း	(၂၃၀၀)ပေ	၇၄၅	တိုင်းဒေသကြီးငွေလုံး

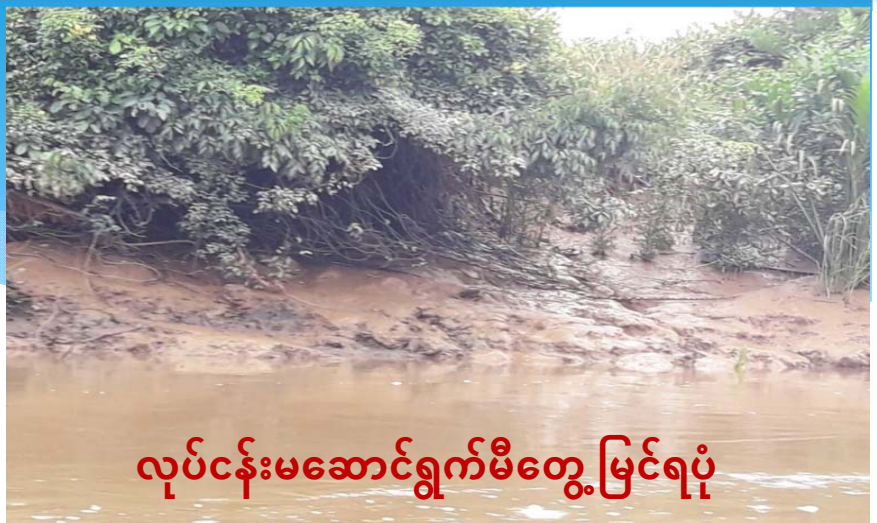
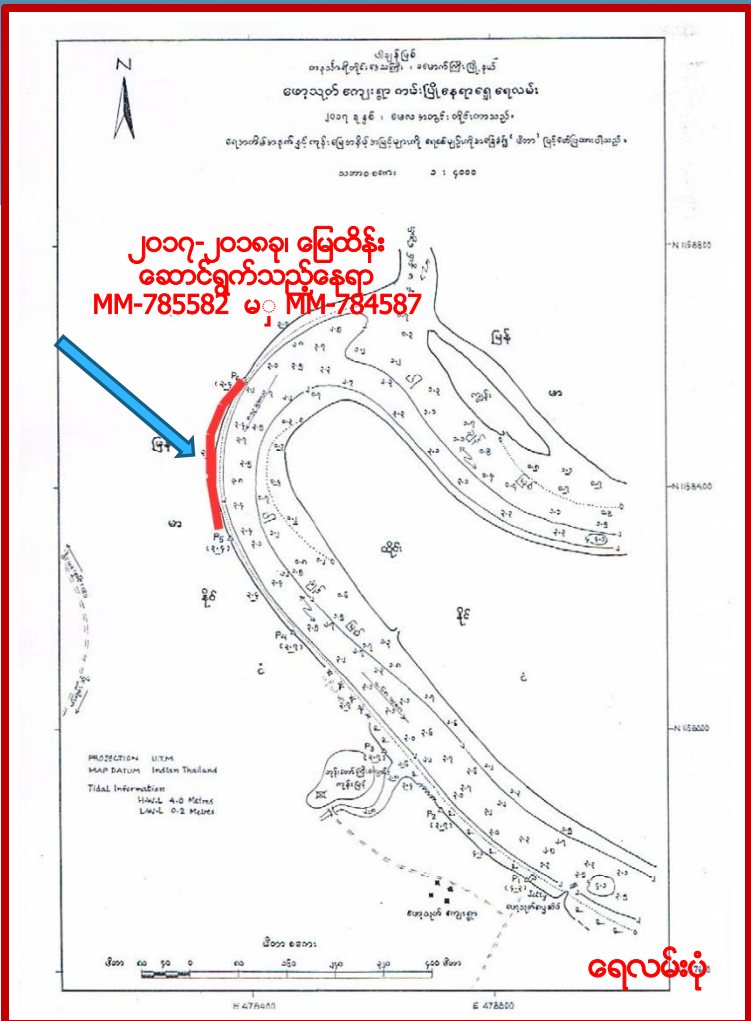


ကျေးရွာများကို ကာကွယ်ရန်အတွက် မြေအောက်ရေစီးကြောင်းကို ထိန်းချုပ်ပေးရန် (၂၀၁၇-၂၀၁၈) ကော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ ဖော့သုတ်ကျေးရွာအနီး





# ပါချန်မြစ်ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း (၂၀၁၇-၂၀၁၈) ကျော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ ဖော့သုတ်ကျေးရွာ



လုပ်ငန်းမဆောင်ရွက်မီတွေ့မြင်ရပုံ



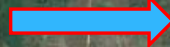
လုပ်ငန်းဆောင်ရွက်ဆဲပုံ

ဘဏ္ဍာရေးနှစ်	တည်နေရာ	အမျိုးအစား	ပမာဏ	ရန်ပုံငွေ (ကျပ်သန်း)	ပြီးစီးမှု ရာခိုင်နှုန်း	မှတ်ချက်
၂၀၁၇- ၂၀၁၈	ဆိပ်ဖူးကျေးရွာအနီး ခန့်မှန်းမြေပုံညွှန်း MM-785582 မှ MM- 784587	ကွန်ကရစ်ပိုင်အခြေပြု ကျောက်စီ မြေထိန်းတံဆောက်ခြင်း	(၁၇၅၀)ပေ	၇၅၄.၈၇	၄%	တိုင်းဒေသကြီးငွေလုံး

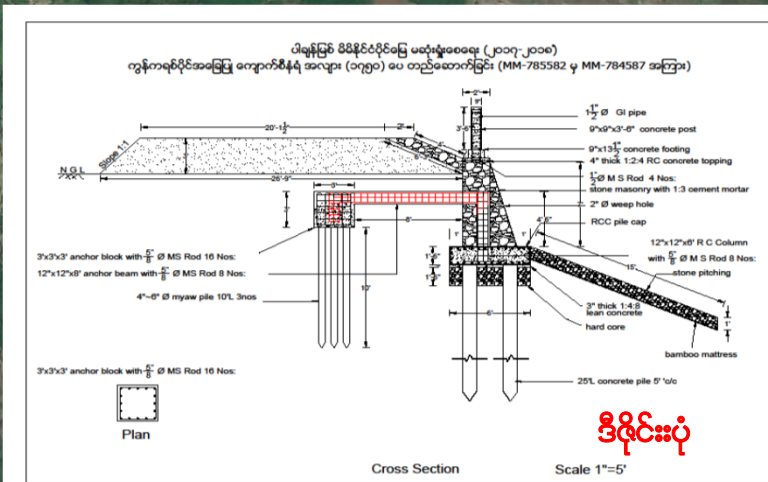


ကျေးရွာများ၊ မြို့များ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊ မြေအောက်ရေ၊  
 ကော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ ဖော့သုတ်ကျေးရွာ

MM-790577 မှ MM-786580  
 အလျား ( ၁၇၅၀ ) ပေ



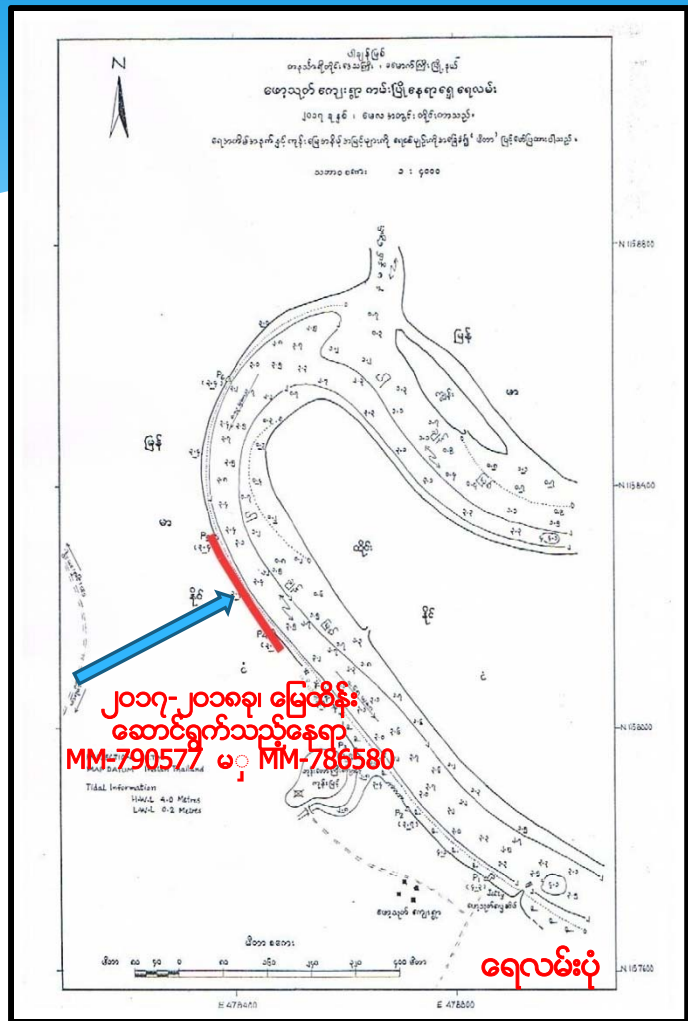
ဖော့သုတ်ကျေးရွာ



ဒီဇိုင်းပုံ



# ပါချန်မြစ်ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း (၂၀၁၇-၂၀၁၈) ကျော့သောင်းခရိုင်၊ ခမောက်ကြီးမြို့၊ ဖော့သုတ်ကျေးရွာ



လုပ်ငန်းမဆောင်ရွက်မီတွေ့မြင်ရပုံ



လုပ်ငန်းမဆောင်ရွက်မီတွေ့မြင်ရပုံ

ဘဏ္ဍာရေးနှစ်	တည်နေရာ	အမျိုးအစား	ပမာဏ	ရန်ပုံငွေ (ကျပ်သန်း)	ပြီးစီးမှု ရာခိုင်နှုန်း	မှတ်ချက်
၂၀၁၇-၂၀၁၈	ဆိပ်ဖူးကျေးရွာအနီး ခန့်မှန်းမြေပုံညွှန်း MM-790577 မှ MM- 786850	ကွန်ကရစ်ပိုင်အခြေပြု ကျောက်စီ မြေထိန်းတံဆောက်ခြင်း	(၁၇၅၀)ပေ	၈၁၀.၀၀	-	တိုင်းဒေသကြီးငွေလုံး

တာချီလိတ်မြို့နယ်၊ ဝမ်ပုံအပြည်ပြည်ဆိုင်ရာဆိပ်ကမ်း(မဲခေါင်မြစ် ) အောက်ဘက်  
ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း တည်နေရာပြပုံ





## Myanmar Ports in the Mekong River



Figure 2.2-15 Wan Seng Port



Figure 2.2-14 Part of Soploi Port



Figure 2.2-16 Wan Pong Port



(၂၀၀၉-၂၀၁၀ ဘဏ္ဍာရေးနှစ်) ကျောက်စီကမ်းထိန်းတံ အလျား (၆၀)ပေ



# China - Myanmar

## Border Rivers Cooperation Myanmar

# Border Post , N 21 , N 22 Maintenance





၃။ ချီဖွေမြို့နယ် ၊ ကန့်ဖန်ဒေသ ၊ ငေါချန်းခရောင်း ၊ မြန်မာ-တရုတ် နယ်နိမိတ်မှတ်တိုင်အမှတ် N-21နှင့် N-22 ကြား လက်ရှိမြေပြင်အနေအထား မှတ်တမ်းဓာတ်ပုံ









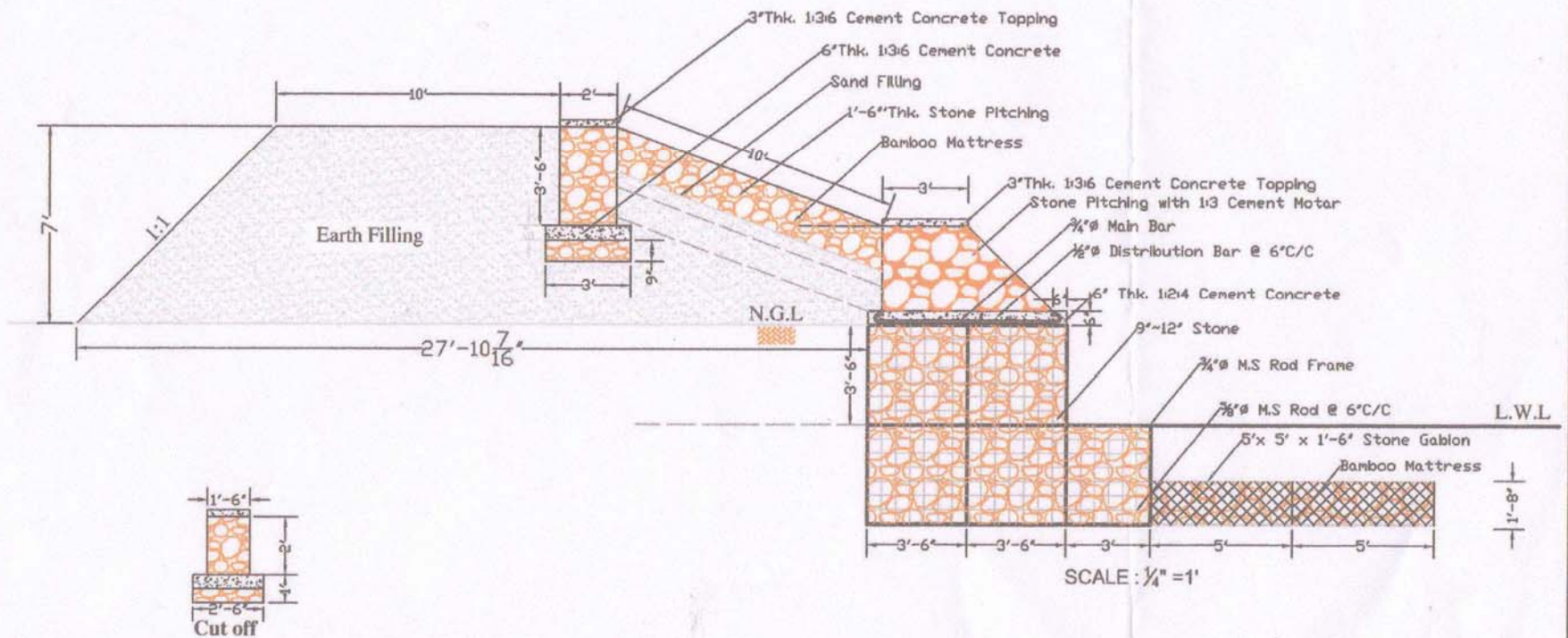
၄။ မြန်မာ-တရုတ်နယ်နိမိတ်မှတ်တိုင်အမှတ် S-52 မှ S-53 ကြားနယ်စပ်မြစ်ကမ်းပြု  
ကာကွယ်ရေးကွင်းဆင်းစစ်ဆေးမှုမှတ်တမ်းဓာတ်ပုံများ



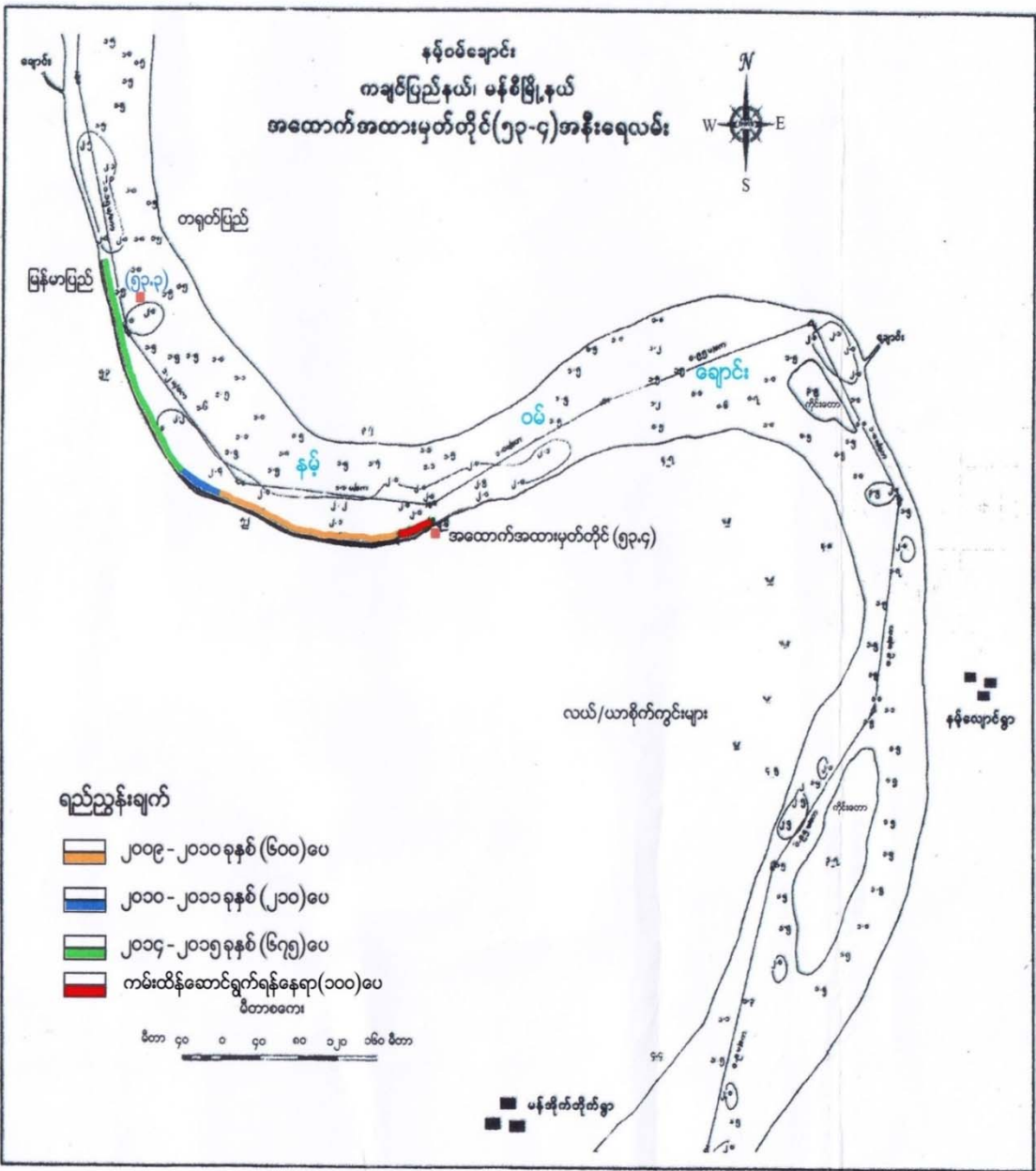


၄။ မြန်မာ-တရုတ်နယ်နိမိတ်မှတ်တိုင်အမှတ် S-52 မှ S-53 နယ်ခြားချောင်း Steel Basket အခြေပြု ကျောက်စီမြေထိန်းနံရံ တည်ဆောက်ခြင်းလုပ်ငန်း ဒီဇိုင်းပုံ

မြန်မာ-တရုတ် နယ်နိမိတ်မှတ်တိုင်အမှတ် S-52 မှ S-53 နယ်ခြားချောင်း  
Steel Basket အခြေပြု ကျောက်စီမြေထိန်းနံရံ တည်ဆောက်ခြင်းလုပ်ငန်း



# Location map of border post 53-4



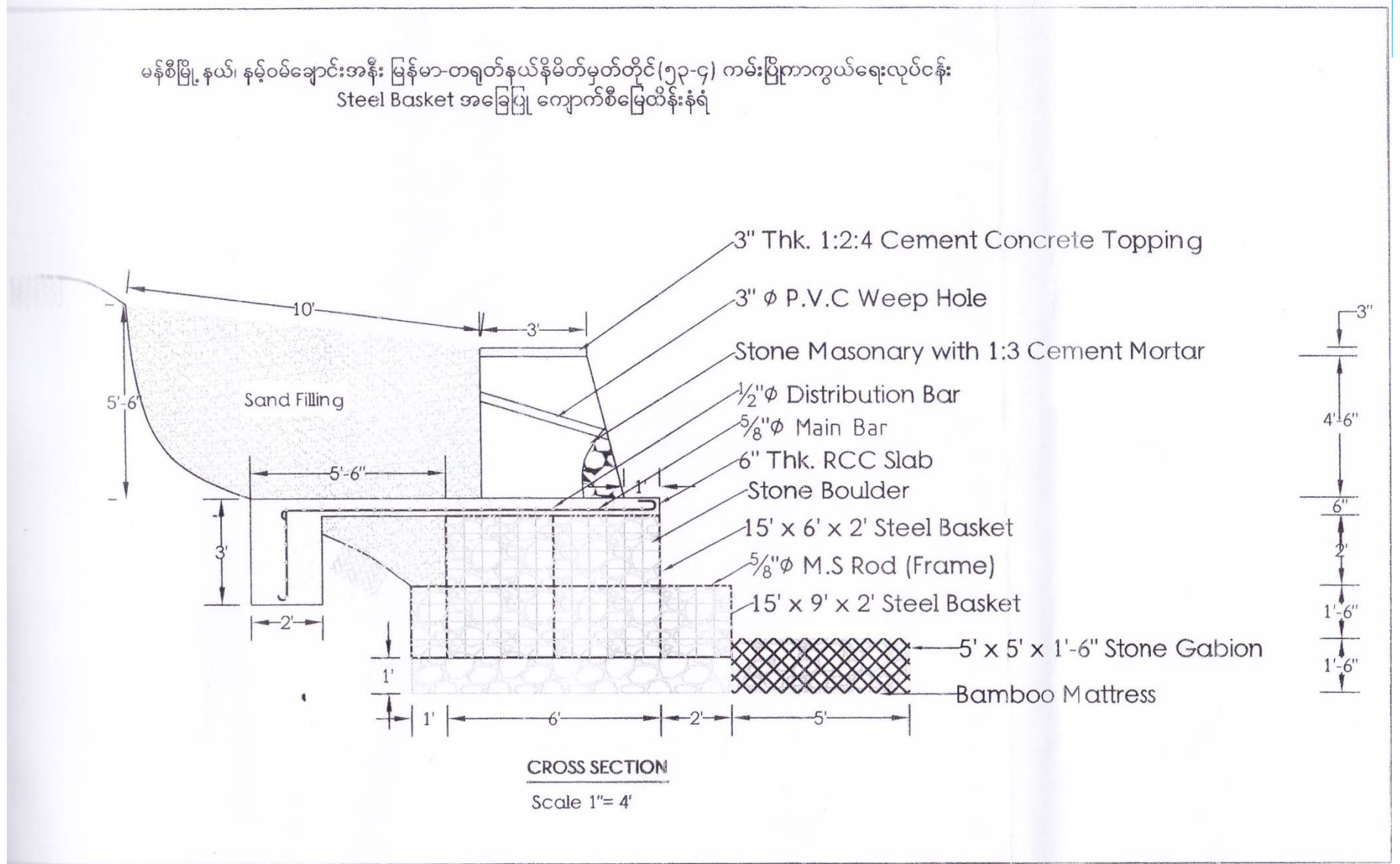


## Investigation of border post 53-4



# ၅။ မန်စီမြို့နယ်၊ နမ့်ဝမ်ချောင်းအနီး မြန်မာ-တရုတ်နယ်နိမိတ်မှတ်တိုင်(၅၃-၄)ကမ်းပြိုကာကွယ်ရေး လုပ်ငန်း Steel Basket အခြေပြုကျောက်စီမြေထိန်းနံရံတည်ဆောက်ခြင်း

မန်စီမြို့နယ်၊ နမ့်ဝမ်ချောင်းအနီး မြန်မာ-တရုတ်နယ်နိမိတ်မှတ်တိုင်(၅၃-၄) ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း  
Steel Basket အခြေပြုကျောက်စီမြေထိန်းနံရံ



နယ်နိမိတ်မှတ်တိုင် (၅၃-၄)တွင် တည်ဆောက်ရန်



နမ့်ဝမ်ချောင်းနယ်စပ်မှတ်တိုင်(၅၄/၁) ကမ်းပြိုကာကွယ်ရေးလုပ်ငန်း

(၂၀၁၀-၂၀၁၁) ဘဏ္ဍာရေးနှစ် Steel Basket အခြေပြုကျောက်စီနံရံအလွှား (၂၂၅) ပေ



(၂၀၁၃-၂၀၁၄) ဘဏ္ဍာရေးနှစ် ၊ သံခြင်းအခြေပြုကျောက်စီမြေထိန်းနံရံ အလွှား (၄၇၀)ပေ





**THANK YOU**

**FOR YOUR KIND ATTENTION**

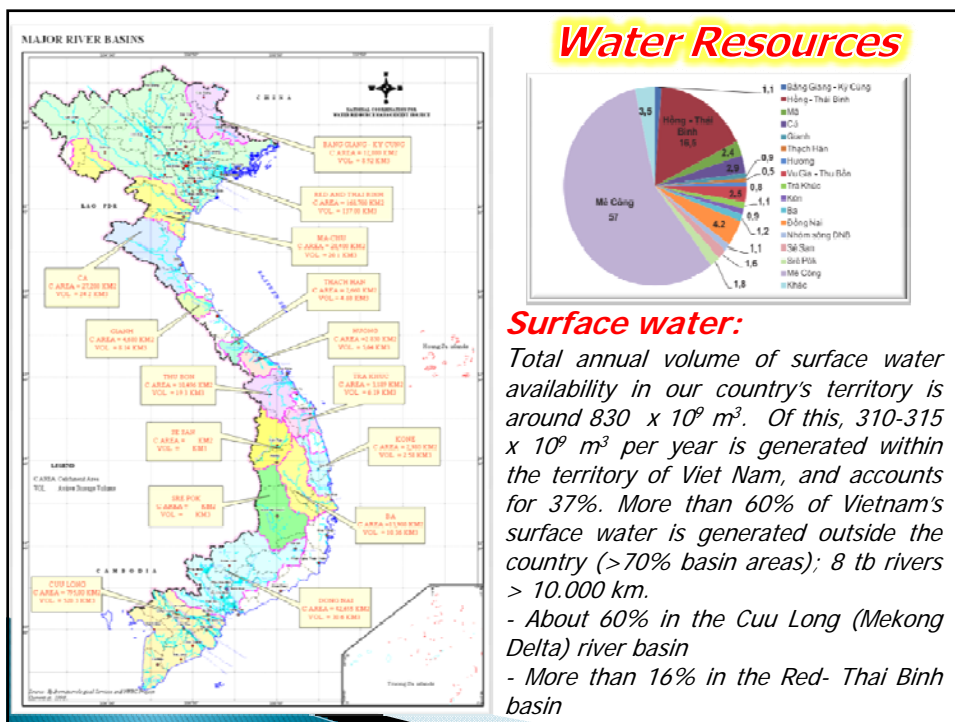


**Viet Nam**

International Conference "Transboundary Water Resources and Related Resources Cooperation"  
2 March 2018, Chiang Rai, Thailand



## Transboundary Water Resources Cooperation of Viet Nam



## *Transboundary water issues in Mekong river in Viet Nam and bilateral cooperation with Cambodia*



### Background – 2S

- ▶ The sub-basins of the Sesan, Srepok and Sekong rivers (3S) basin, which takes a **significant role in the LMB** (social, economic, cultural and environmental factors). The Sesan and Srepok catchment area comprises the two countries of Cambodia and Viet Nam
- ▶ Catchment area: 49,830 km<sup>2</sup> ; Respective discharge contribution of about 20% to the Mekong's flow.
- ▶ **Population: 190,000 living in Cambodia; 2.3 million people inhabit the Viet Nam territory**







## Solutions

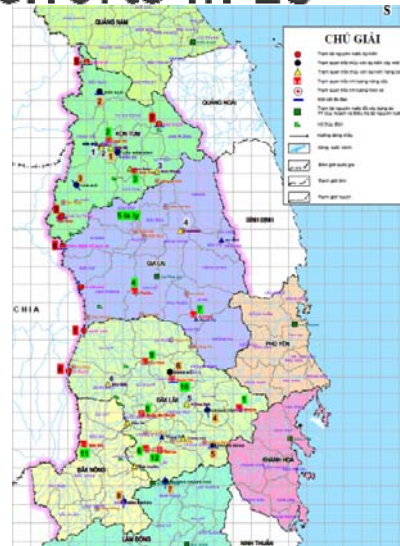
- ▶ Dialogue set up: In Viet Nam, the Advisory Committee of Vietnam for the Operation of Hydropower Scheme of Sesan River was established while the Cambodia counterpart was the Cambodian Committee for the Management of the Sesan Water Utilization. MRC Secretariat attended these bilateral meetings as observer.
- ▶ Agreed on set of mitigation measures.

## Agreed Mitigation measures for 2S

- ▶ Smooth water release from hydropower cascades in Viet Nam, maintaining minimum env flows to Cambodia parts.
- ▶ Regular sharing of info on water release from hydropower cascades to Cambodian side.
- ▶ Reducing flood, minimizing flood damages to downstream and avoiding sudden flow change at Cambodia-Viet Nam border areas.
- ▶ Structure and non-structure measures for avoiding sudden change in water release to border areas due to hydropower operation: construction of re-regulation reservoir (Sesan4A) and smooth operation of Srepok 4.
- ▶ Conducting transboundary EIAs of the hydropower cascades in Sesan and Srepok basins.
- ▶ Maintaining regular communication channels and dialogues for resolving concerns of two sides.

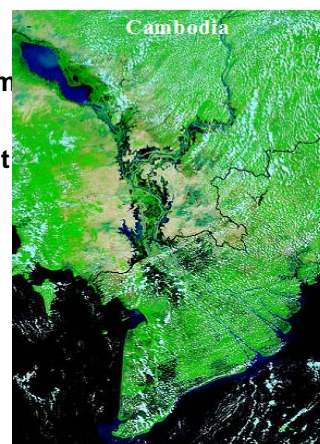
## Recent continued efforts in 2S

- ▶ Improvement of transboundary water resources monitoring network (4 new tb WR monitoring stations in 2018).
- ▶ Establishment of RBOs of 2 sides including the cooperation mechanism of 2 sides.
- ▶ Proposing joint projects.
- ▶ Linked Decision Support Systems.

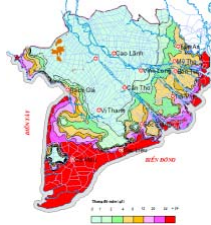


## Background – Mekong delta


- ✓ **Gross Area:** 3.94 million ha.
- ✓ **Population:** 17.5 million people (2014)
- ✓ **Production:** Sharing over 53% rice production (90% rice export), 65% fishery production, 70% fruit production of Viet Nam
- ✓ > 90% flow coming from other countries; highly dependent on upstream development



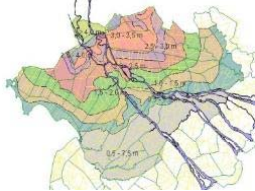
## Background - Mekong delta




▪ Salinity intrusion



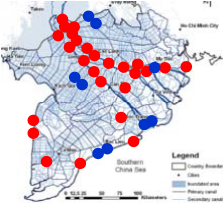
▪ Acid sulphate soils




▪ Flooding




▪ Droughts & fresh water shortage



▪ Erosion on rivers & canals



▪ Forest fire and Water resources pollution



▪ Sea level rise

## Solutions for Water resources management

1. Cross-border cooperation
2. Integrated planning (update Delta Master Plan)
3. Strategies and measures to adapt to climate change and sea level rises
4. Measures for flood mitigation and management
5. Solutions for Erosion and Sedimentation Control
6. Environmental and ecological management
7. Strengthening institutional capacity



### **Joint transboundary issues**

1. Shortage of water in border river.
2. Inappropriate solution of infrastructure to cause inundation and bank erosion, instability and risks to safety for residential routes.
3. Water pollution due to agriculture development, aquaculture, navigation, industry and urbanization etc.
4. Change of flow and reduction of sediment and nutrient in mainstream and transboundary tributaries due to hydropower development, other development and and climate change.
5. Lack of solution for joint integrated management.

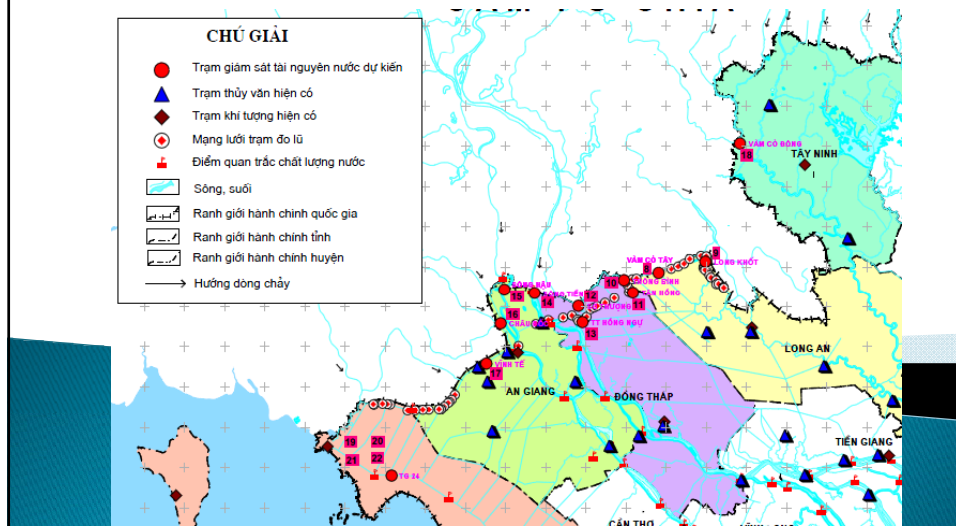
### **Recommendation on coordination mechanism for Mekong Delta**

1. Working Group for drafting and negotiating for the procedures for water use of border rivers.
2. Working group for concrete technical aspects of planning, designing and operation of water infrastructure systems.
3. Bilateral provincial and ministerial cooperation.
4. Bilateral high level cooperation/Government.
5. Multilateral and regional cooperation (Triangle of Economic Cooperation...).
6. Strengthening cooperation between CNMC and VNMC (Memorandum of Understanding between VNMC and CNMC signed in October 2005).



**Newly built water resources monitoring stations in border area  
(WB loan project)**

6 new stations in the Mekong Delta in 2018



**THANK YOU**

**International Conference on “ Transboundary Water Resources and Related Cooperation”**

**March 2, 2018, Chiang Rai, THAILAND**

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## Organizers



**Department of Water Resources  
Ministry on Natural Resources and Environment  
Thailand.**

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## Acknowledgement

**Mekong-Lancang Cooperation Member Countries**



**International Conference on “ Transboundary Water Resources and Related Cooperation”**

**March 2, 2018, Chiang Rai, THAILAND**

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