

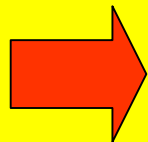
Opportunities and Risks for Thailand Water Transfer and Diversion Scheme for Irrigation Development and Poverty Reduction and Lessons Learned

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**Office of Project Management
Royal Irrigation Department
Thailand
15 October 2009**

The Case of Chi -Mun River Basin Northeast Region Thailand

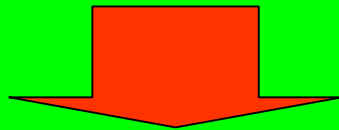
The Poverty



- Problems and Constraints
- Poverty of the Poors

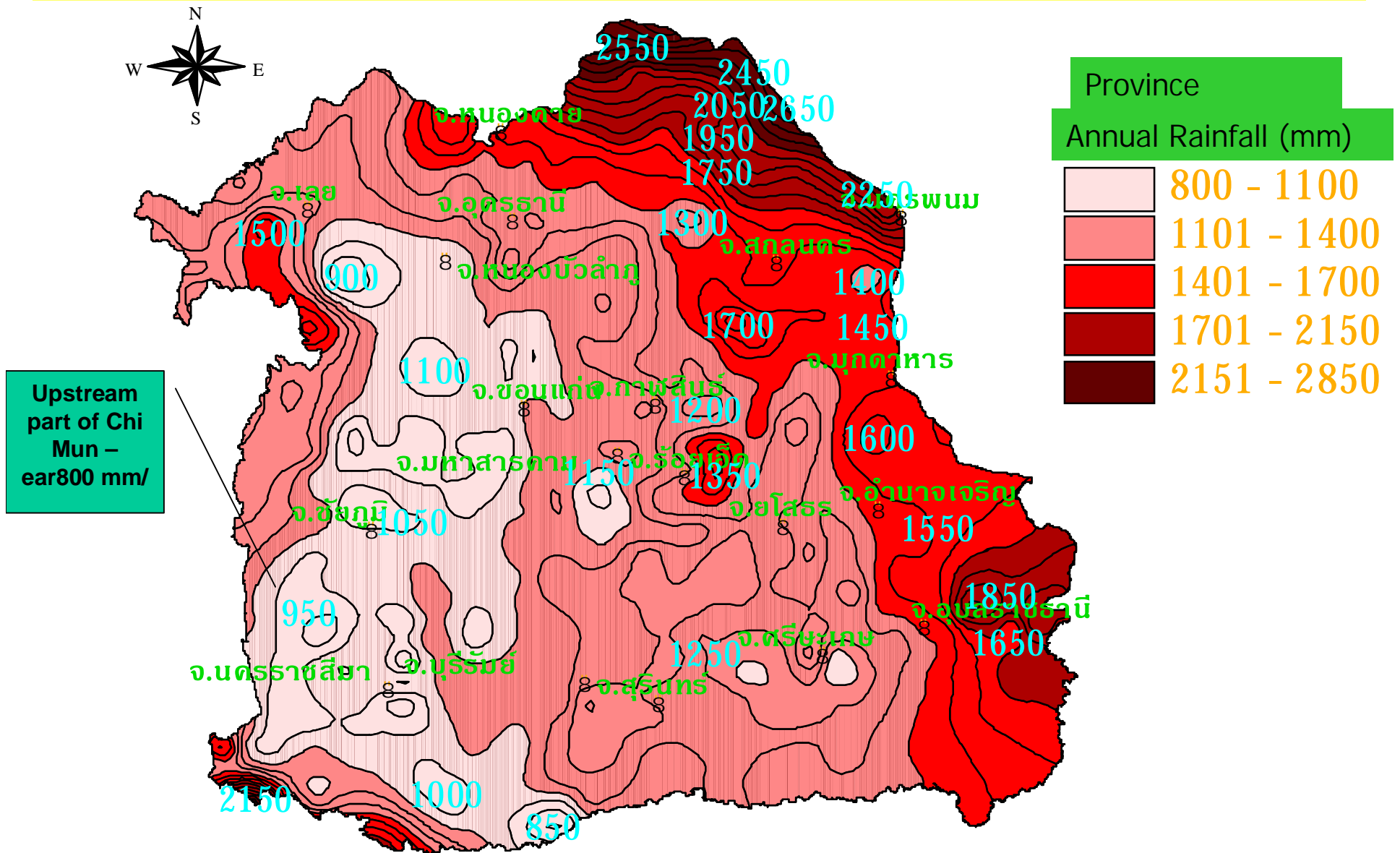
Problems and Constraints in Irrigation Development in Northeast Thailand

- Highly spatial different in Rainfall Distribution
- Long period Rain spell
- Flat and high elevated topography – Table Mountain
- Limited Gravity irrigation System – Mostly pumping irrigation
- Annual flood and drought disaster
- Low fertile soil / with high percolation
- Short period land utility - one crop a year



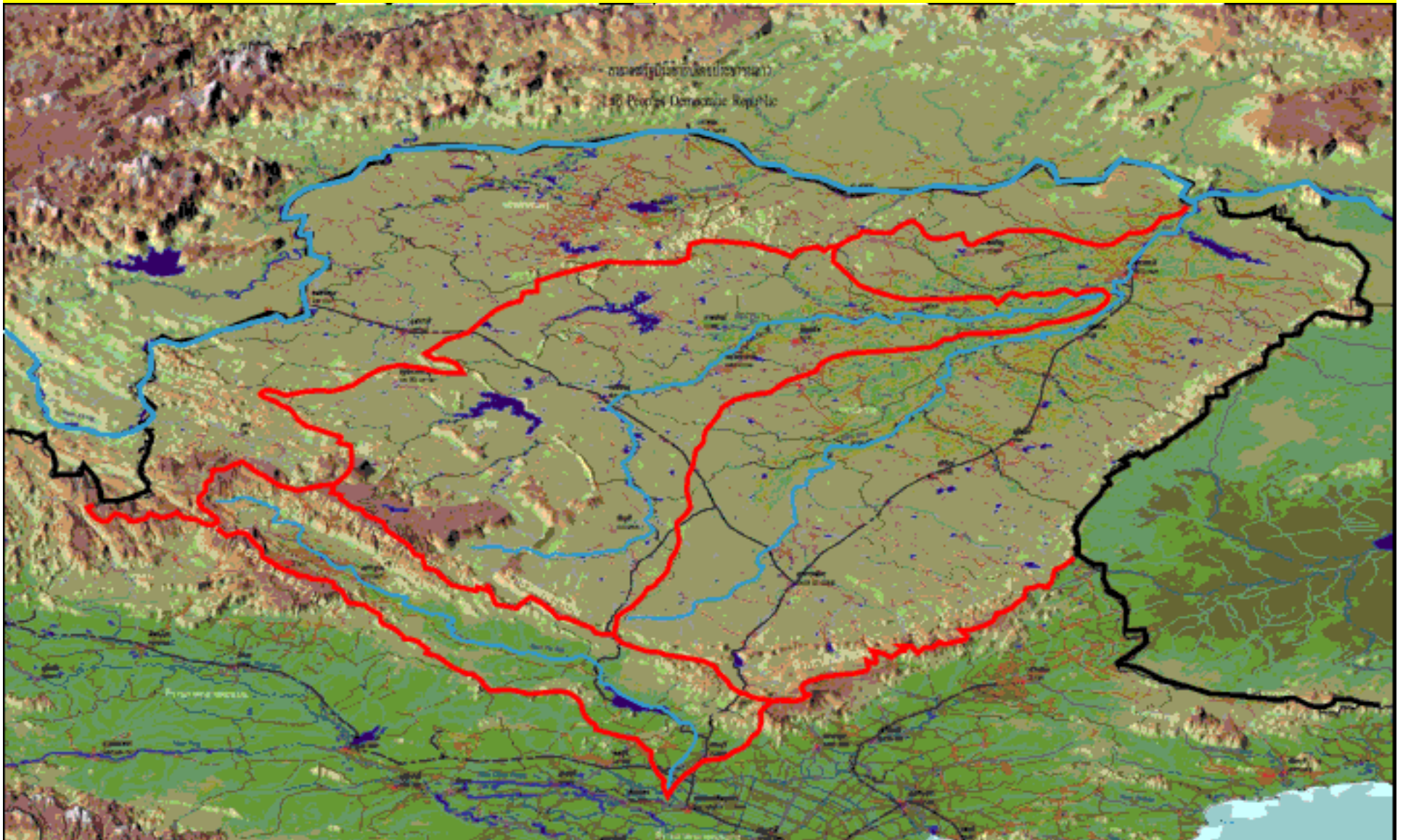
- Farmers in Northeast are the poorest Thai - average income is much lower than national average

Highly Spatial Different Rainfall Distribution in Northeast Thailand

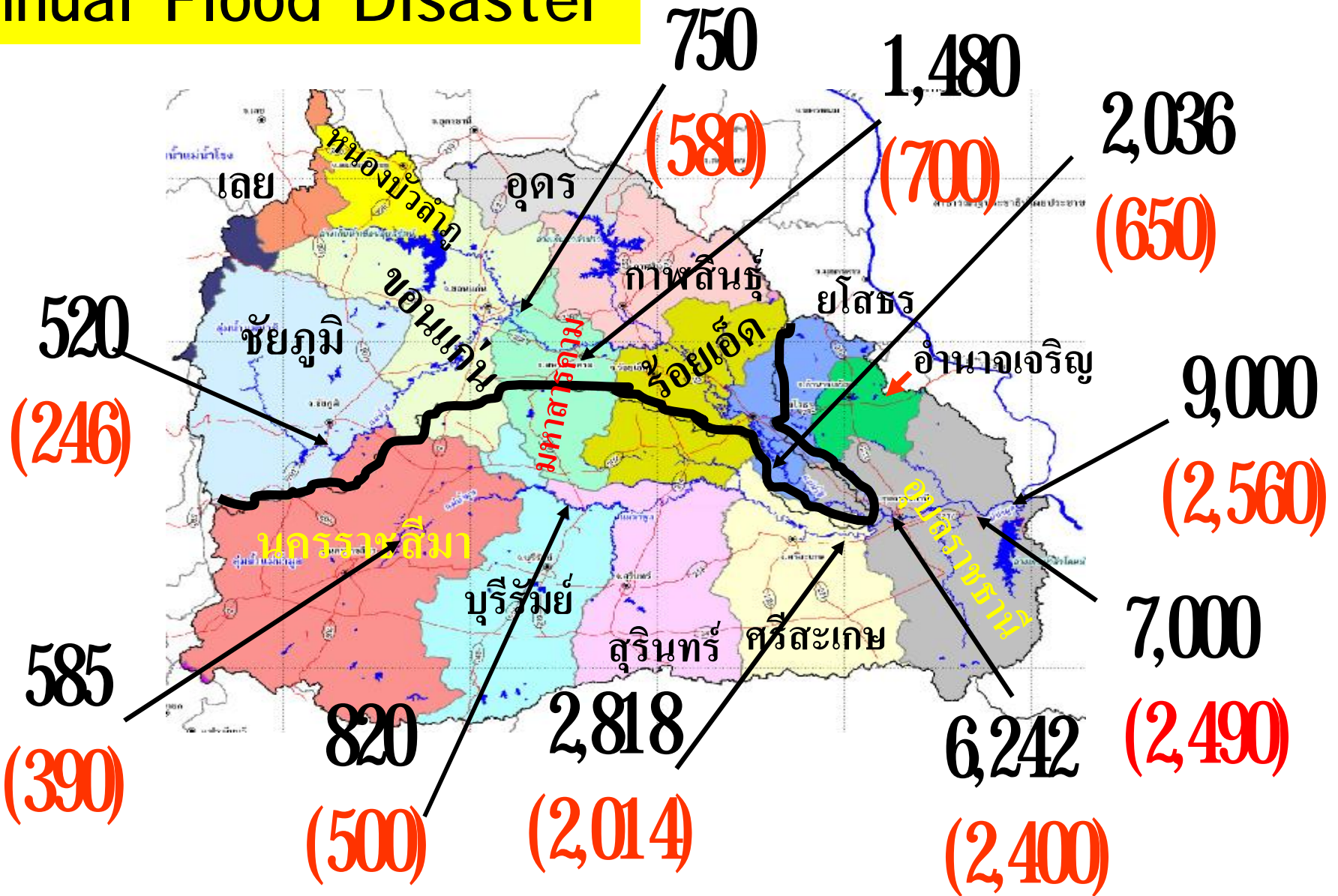


Flat and High Elevated Topography – Table Mountain

Causing regular and annually flood and drought problems



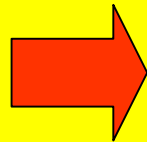
Annual Flood Disaster



(river discharge capacity) และ Peak flood of 1998 (cms)

The Poverty

- Problems and Constraints



- Poverty of the Poors

Poverty of the Poors

Socio- Economic Problems

- Population of Northeast region
37% of the whole population of Thailand
- Agricultural area in Northeast region is about
44% of whole agricultural area of Thailand
- Average Income (Baht/household/year)

National	247,352
Northeast farmers	128,464 (51.93 %)

Avg household size	4.5	persons/household
Avg income	2,379	Baht/person/month

The Poverty Reduction

- Irrigation Development -Poverty reduction 
- Present Irrigation Development
- Intensive River Basin Development Plan

Irrigation Development / Higher Yield

Paddy Yield (kg/rai)	Lam Pao Dam	Ubolrattana Dam
• Irrigation Area	439	468*
• Rainfed Area (Maha Sarakham province)	286	
• Ratio	1.54	1.64

Irrigation Development / Poverty Reduction

Farmers' Income	Lam Pao Dam	Ubolrattna Dam
• Irrigation Area	191,341	166,687
• Rain-fed irrigation	102,233	79,291
• Ratio	1.87	2.10

The Poverty Reduction

- Irrigation Development -Poverty reduction
 - Present Irrigation Development ←
- Intensive River Basin Development Plan

Irrigation Development in Chi Mun River

ประเภทโครงการ	ประเภทโครงการ	Irrigation Area (rai)					
		Wet Season			Dry Season		
		Chi	Mun	Total	Chi	Mun	Total
Large Scale	อ่าง	315,098.00	478,860.00	793,958	197,000.00	187,060.00	384,060.00
	ฝาย	55,600.00	-	55,600	-	-	-
	ระบบส่งน้ำ	261,500.00	335,854.00	597,354	170,000.00	55,851.00	225,851.00
	รวม	632,198.00	814,714.00	1,446,912.00	367,000.00	242,911.00	609,911.00
Medium Scale	อ่าง	410,639.00	656,980.00	1,067,619	60,080.60	141,720.80	201,801
	ฝาย	260,025.00	346,371.00	606,396	45,284.00	47,174.00	92,458
	ระบบส่งน้ำ	6,900.00	5,000.00	11,900	6,900.00	-	6,900
	เขื่อนทดน้ำ	60,000.00	-	60,000	11,300.00	-	11,300
	ปตร./ฝาย	33,000.00	10,000.00	43,000.00	-	-	0.00
	รวม	770,564.00	1,018,351.00	1,788,915.00	123,564.60	188,894.80	312,459.40
Small Scale	อ่าง						
	ฝาย						
	ระบบส่งน้ำ						
	ปตร./ทรบ.						
	อาคารระบายน้ำ						
	ทำนบ						
	ขุดลอก						
	ปรับปรุงอ่าง						
	สระ						
รวม			0.00			0.00	
รวม	1,402,762.00	1,833,065.00	3,235,827.00	490,564.60	431,805.80	922,370.40	
สูบน้ำด้วยไฟฟ้า	1,068,572.00	379,011.00	1,447,583.00	333,189.00	66,992.00	400,181.00	
รวม	2,471,334.00	2,212,076.00	4,683,410.00	823,753.60	498,797.80	1,322,551.40	

Benefit Area of Small Scale Development of the Chi-Mun River Basin

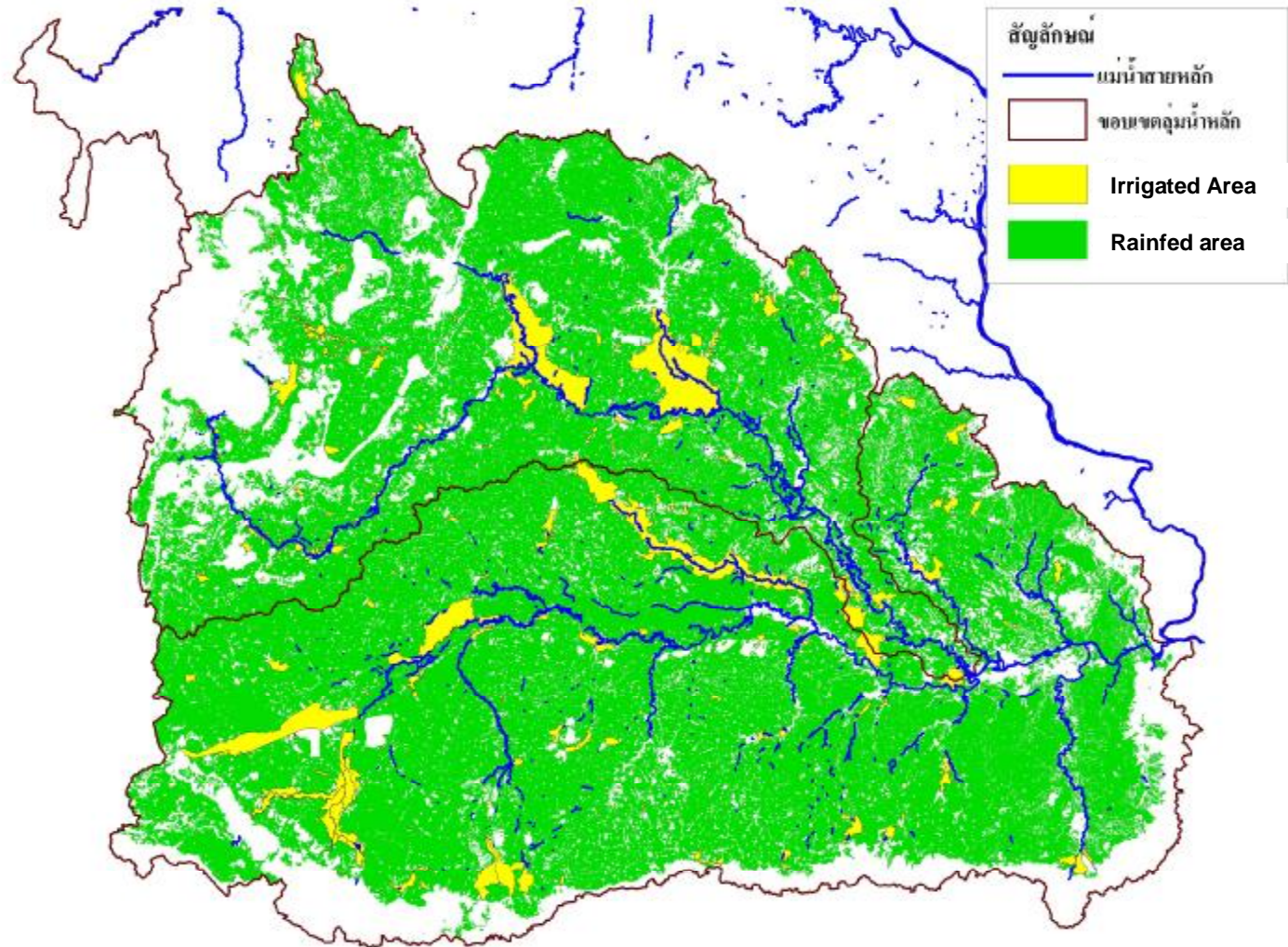
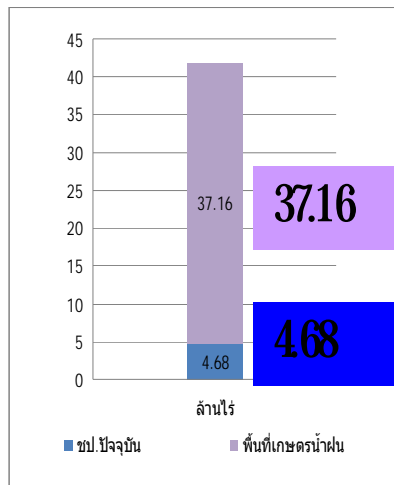
ประเภทโครงการ	ประเภทโครงการ	Benefit Area (rai) ไร่)		
		ที่	มูล	รวม
Large Scale	อ่าง			
	ฝาย			
	ระบบส่งน้ำ			
	รวม			
Medium Scale	อ่าง			
	ฝาย			
	ระบบส่งน้ำ			
	เขื่อนทดน้ำ			
	ปตร./ฝาย			
รวม				
Small Scale	อ่าง	257,745.00	682,097.00	939,842.00
	ฝาย	351,129.60	656,846.00	1,007,975.60
	ระบบส่งน้ำ	5,905.00	2,000.00	7,905.00
	ปตร./ทรบ.	12,100.00	3,950.00	16,050.00
	อาคารระบายน้ำ	-	1,500.00	1,500.00
	ทำนบ	2,977.00	7,004.00	9,981.00
	ขุดลอก	1,500.00	-	1,500.00
	ปรับปรุงอ่าง	1,000.00	-	1,000.00
	สระ	10,800.00	300.00	11,100.00
	รวม	643,156.60	1,353,697.00	1,996,853.60
รวม	643,156.60	1,353,697.00	1,996,853.60	
	Pumping Station			
รวม		643,156.60	1,353,697.00	1,996,853.60

Present Irrigated Area of the Chi - Mun River Basin

Khong- Chi- Mun 5.99 million rai

Chi- Mun 4.68 million rai (approx 11%)

Agricultural area Chi Mun **41.84** million rai

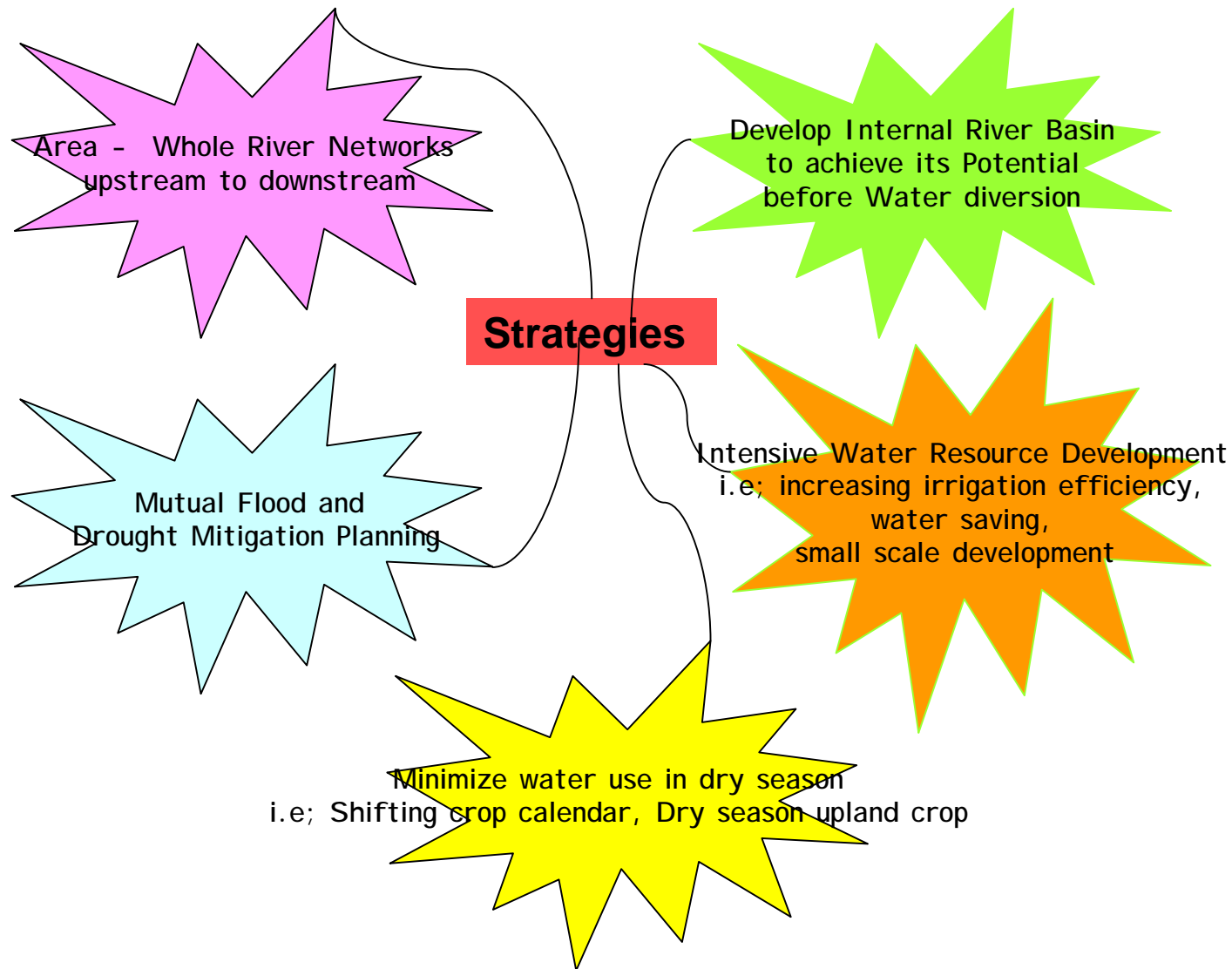


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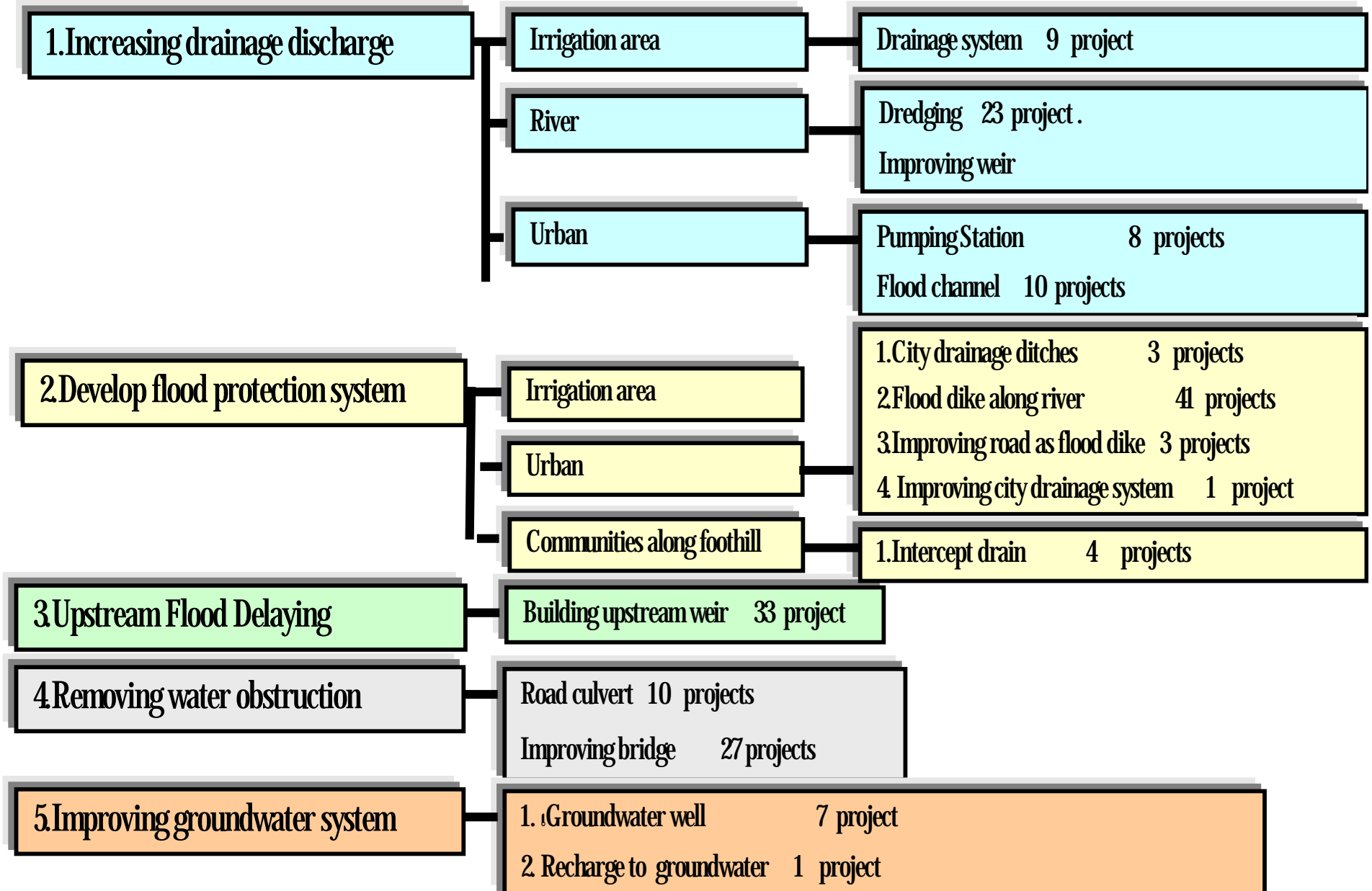
The Poverty Reduction

- Irrigation Development -Poverty reduction
 - Present Irrigation Development
 - Intensive River Basin Development Plan 

Intensive River Basin Development Plan



Structural Strategies for Flood Mitigation



Non Structural Strategies for Flood mitigation Plan

1.Upstream re-forestration	129 projects
2.Tele metering	2 projects
3.Land use control in flood retarding area	3 projects
4.Reservoir management	2 project
5. Living with Flood	18 Projects
6.Center for Flood Warning	10 projects
7.Awareness in watershed conservation	8 projects
8.City and River Basin Planning	1 project
9.Soil and Water Conservation Project	29 projects
10.Enforcing law	

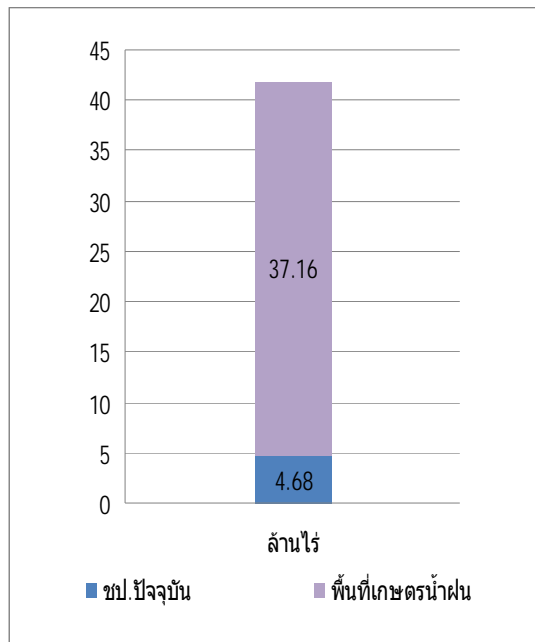
Structural Strategies for Drought Mitigation Plan

- Increasing storage capacity
- Develop water distribution system
- Developing water networks
- Water Diversion from intra basins

Non Structural Strategies for Drought Mitigation Plan

- Promoting upland crops
- Shifting cropping calendars
- Integrated farming
- Promoting water user group
- Increasing irrigation efficiency
- Increasing on farm efficiency
- Training for water saving techniques

พื้นที่ชลประทานและเกษตรน้ำฝน

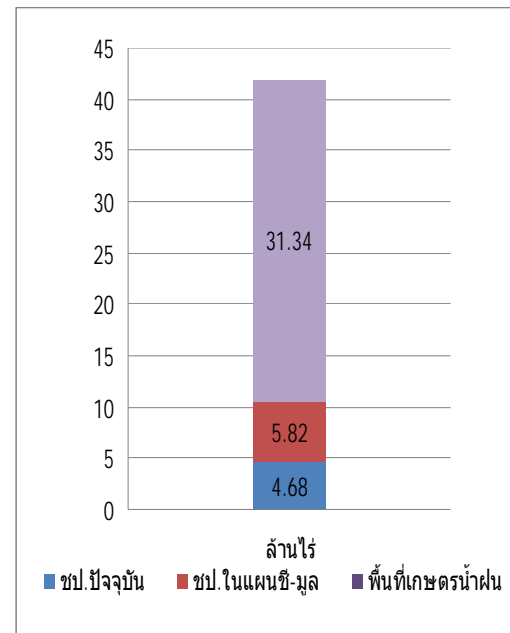


Present

Irrigation ชป. 4.68 ล้านไร่

Rainfed เกษตรน้ำฝน 37.16 ล้านไร่

Agriculture area 41.84 ล้านไร่



Plan

ชล. 10.5 ล้านไร่

เกษตรน้ำฝน 31.34 ล้านไร่

Intra River Basin Development Plan

Normal Strategies

Improving

0.92 Million rai

Developing (LS, MS,SS)

1.95 Million rai

Total

2.87 Million rai

Intensive Strategies

Developing irrigation in benefit area

0.20 Million rai

Increasing irrigation efficiency

2.68 Million rai

River networking/ diversion

0.07 Million rai

Total

2.95 Million rai

Grand total

5.82 Million rai

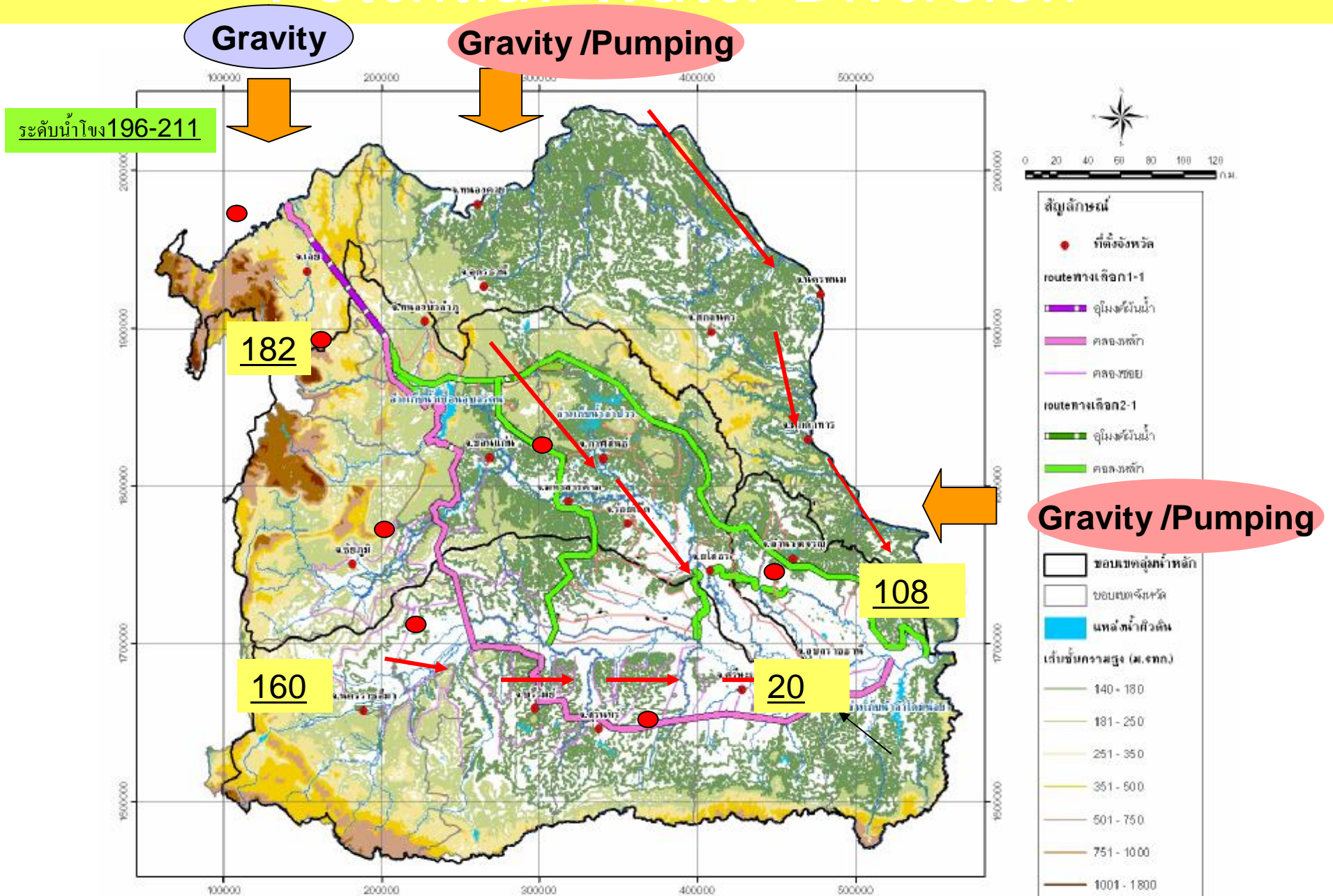
Intra River Basin Development of Chi-Mun Basin

Planned Irrigation area	5.82 million rai	13.91%
Present irrigation area	4.68 million rai	11.19%
Total	10.50 million rai	25.09%
Agricultural Area	41.84 million rai	
Rainfed area	31.34 million rai	74.9%

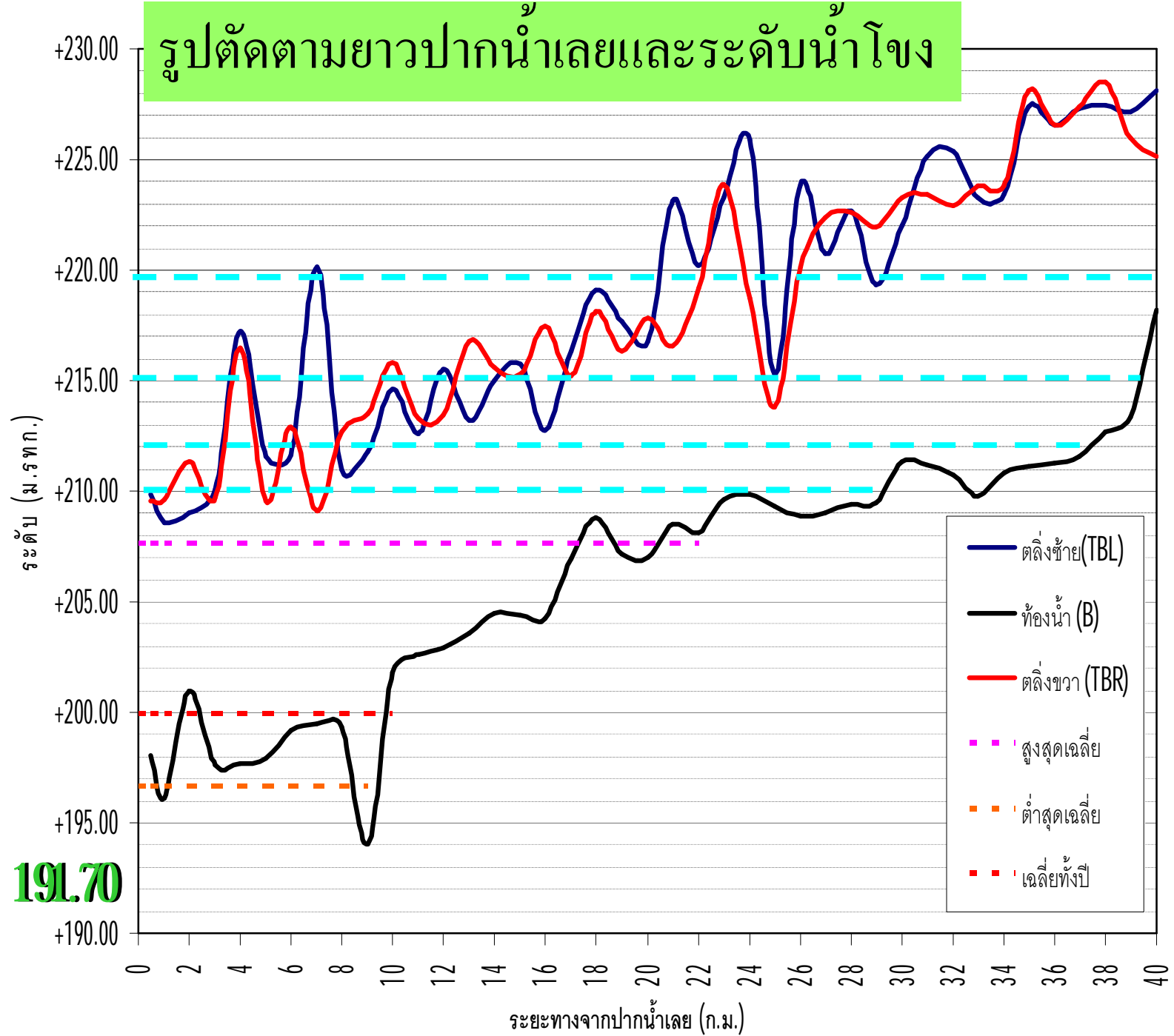
Opportunities / Risks in Water Diversion and Lesson Learned

- Opportunities and Risks 
- Lessons Learned

Potential Water Diversion

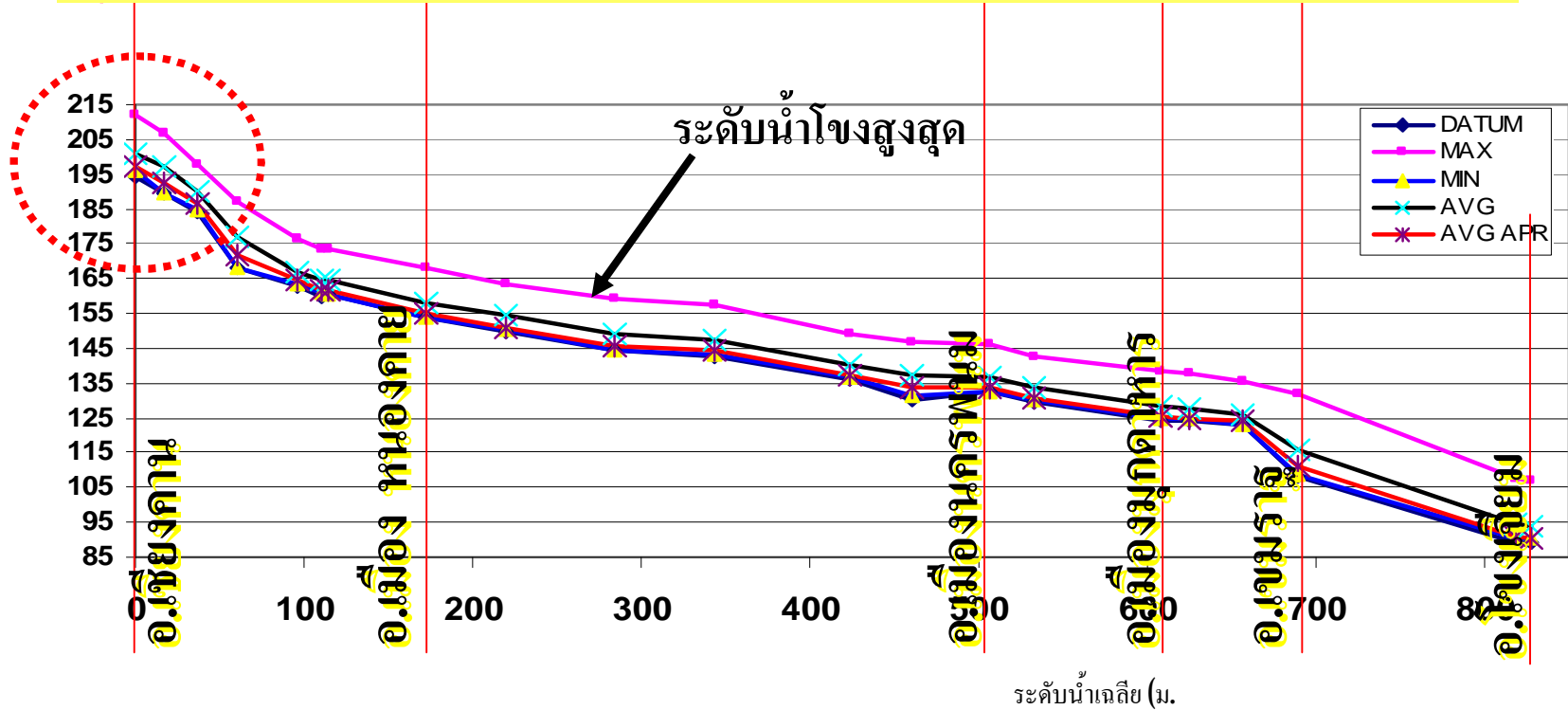


รูปตัดตามยาวปากน้ำเลยและระดับน้ำโขง



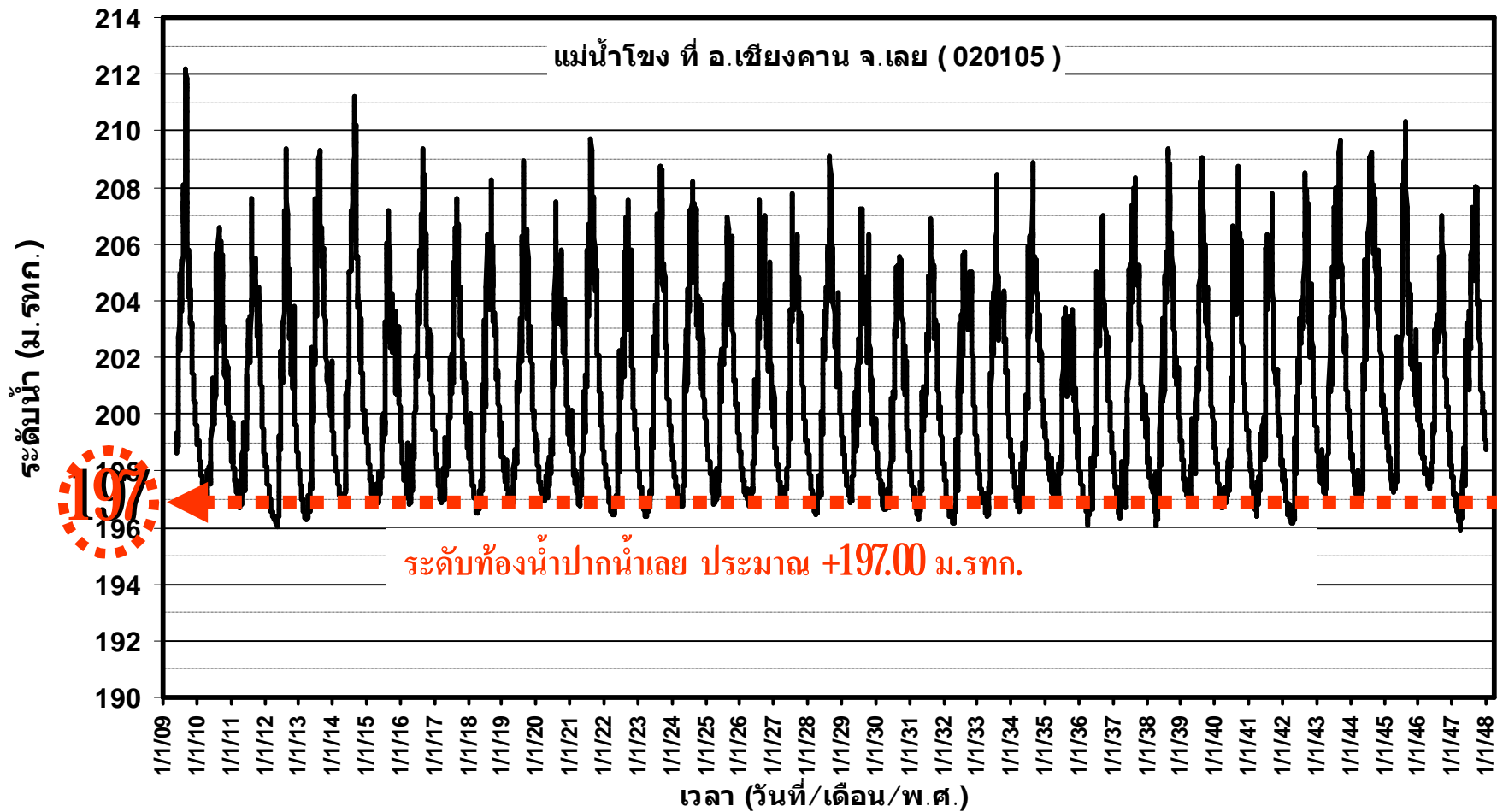
191.70

Long Profile of Mekong River

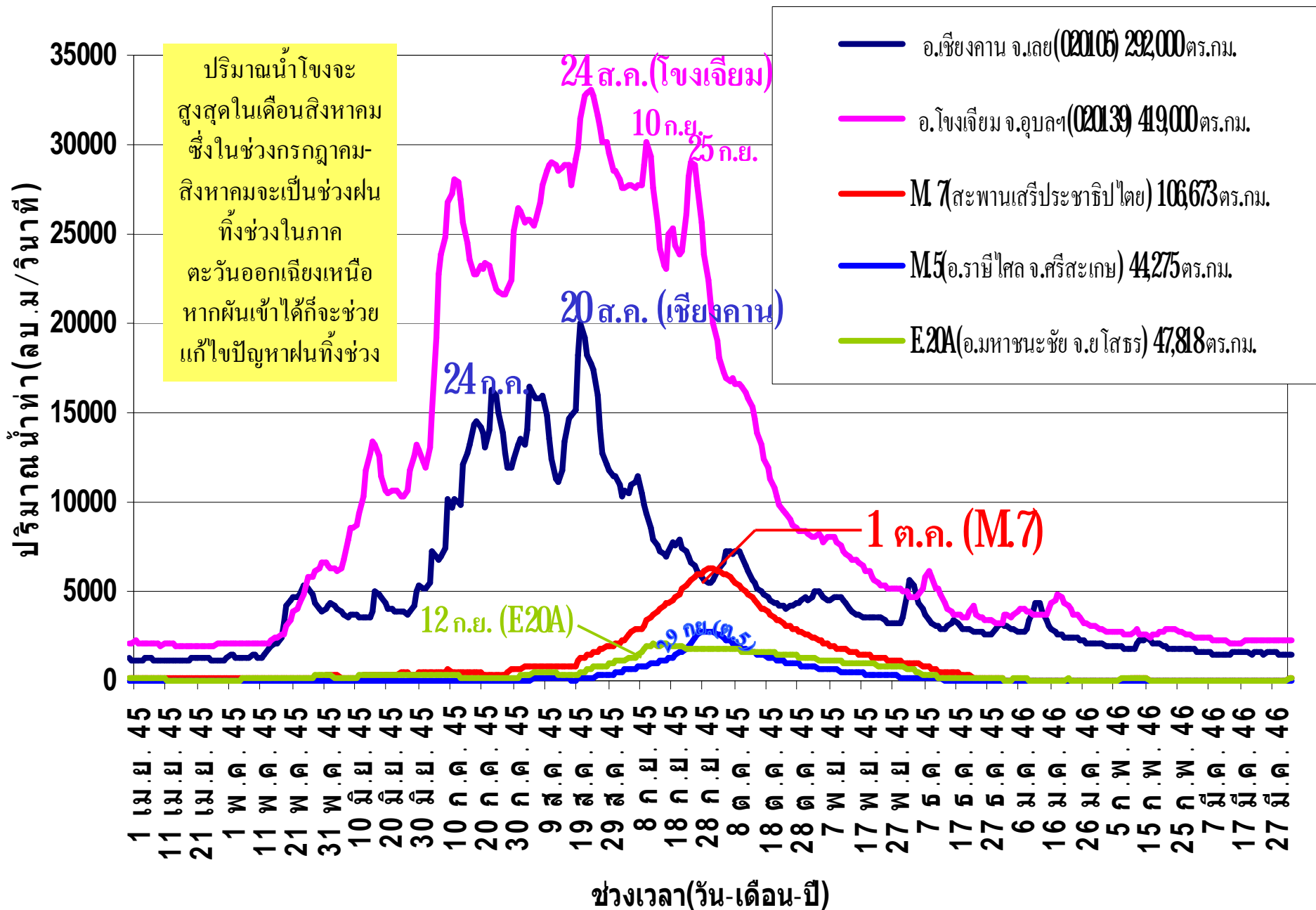


ระดับน้ำสูงสุด (ม.รทก.)			ระดับน้ำต่ำสุด (ม.รทก.)			รทก.)	
เฉลี่ย	สูงสุด	ต่ำสุด	เฉลี่ย	สูงสุด	ต่ำสุด	ทั้งปี	เมษายน
208.10	211.24	203.78	196.63	197.38	195.90	200.65	196.99
204.03	206.77	199.76	191.32	192.95	189.22	196.90	192.45

Daily Mekong Water Level at Chieng Khan, Loei

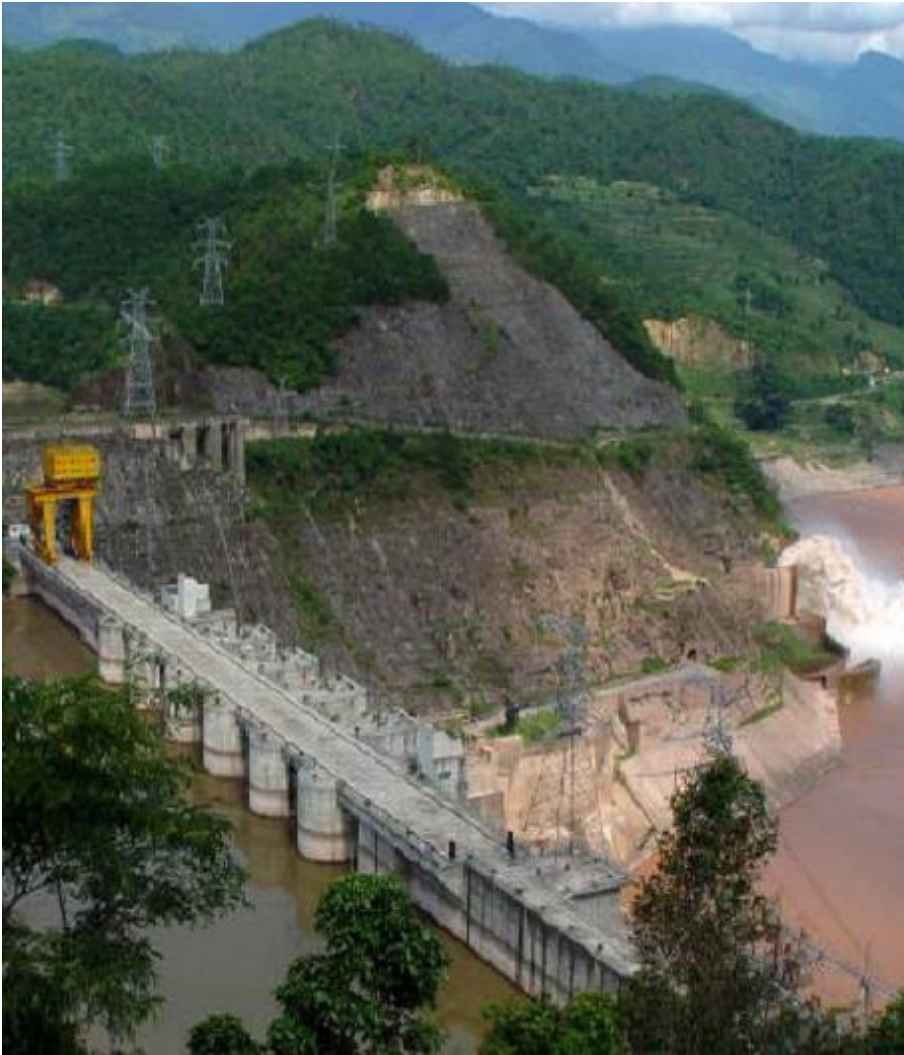


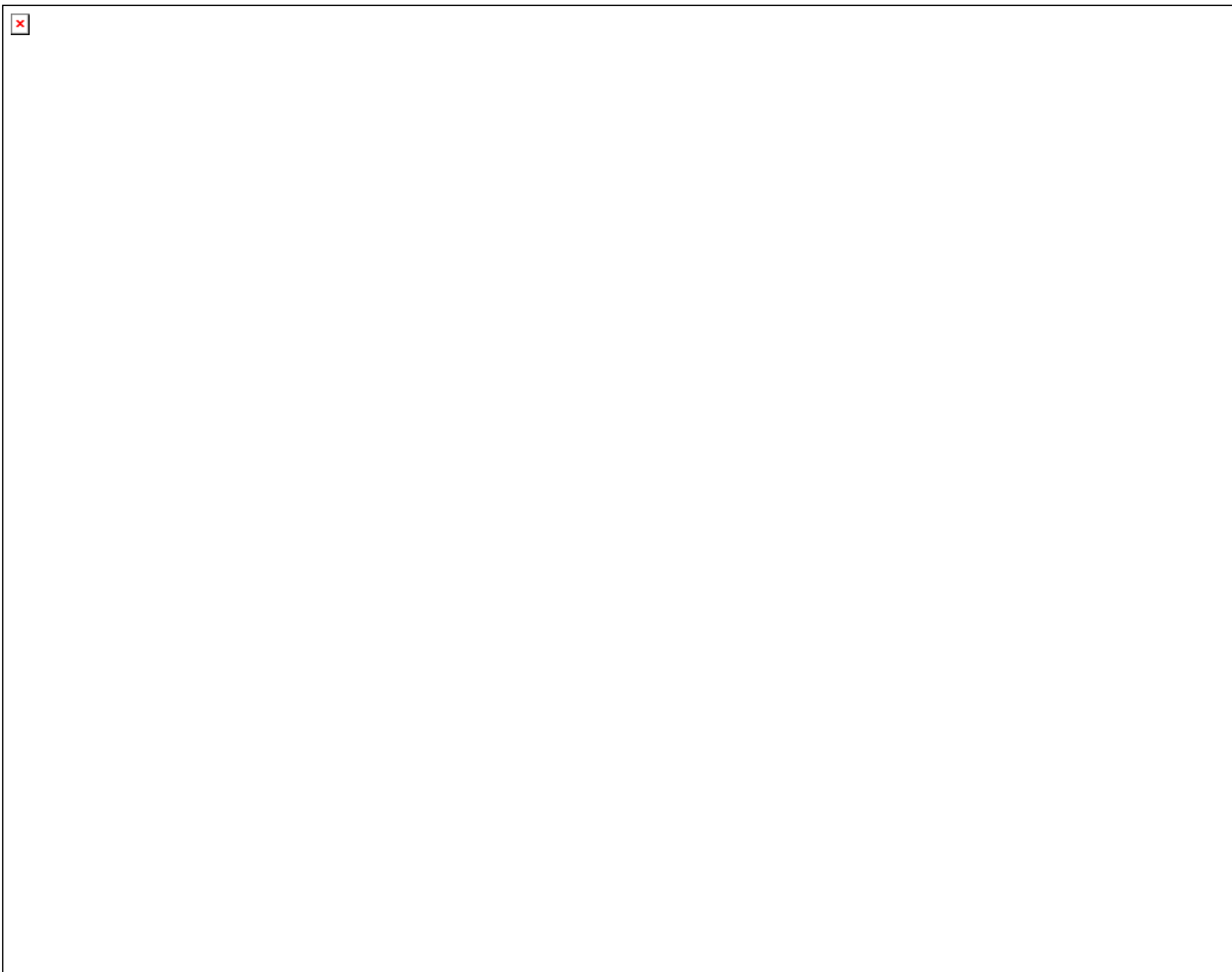
1966-1994 - 38 years

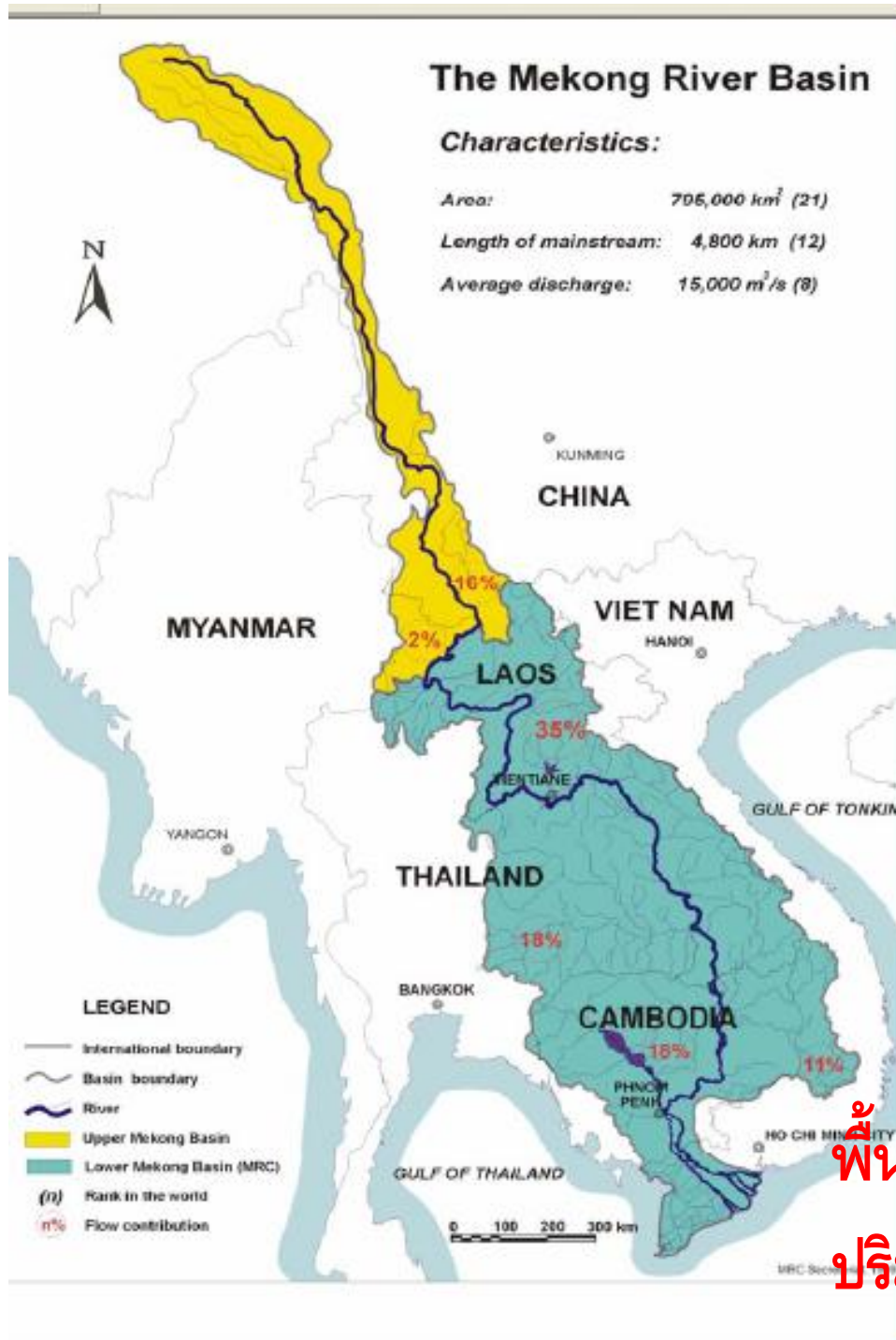


Time lag of peaks in Mekong river and Mun River

Mekong Water uses in Lower Mekong Region







Runoff

Upper Mekong (18%)

- China – 16%
- Myanmar – 2%

Lower Mekong (82%)

- Cambodia – 18%
- Lao PDR – 35%
- Thailand – 18%
- Viet Nam – 11%

พื้นที่ลุ่มน้ำโขง ประมาณ 795,000 ตร.กม
 ปริมาณน้ำท่าเฉลี่ย 475,000 ล้านลบ.ม.

Mekong Water Uses for Irrigation

Land Cover (%)	Lao PDR	Cambodia	Thailand	Viet Nam Delta	Viet Nam Highlands
Forest	41.22	56.18	15.74	1.09	47.46
Woodland /grassland	42.07	15	3.47	0.34	22.65
Agriculture (% Irrigation)	14.01 (8)	23.41 (10)	79.28 (8)	83.99 (87)	29.46 (36)
Wetland/water	0.96	5.15	1.4	10.34	0.27
Other	1.74	0.26	0.12	4.24	0.16
	100	100	100	100	100

Agriculture and Irrigaion

Irrigation	Laos	Thailand (NE)	Laos	VN (Delta)
No. of projects	2,532	8,764	1,012	85
1 st : Wet season paddy (1000 rai)	1,401	4,800	1,555	10,519
2 nd crop : Dry season paddy (1000 rai)	950	451	1,134	8,860
3 ^{ed} crop (1000 rai)	0	0	0	2,197
พื้นที่ทำนาทั้งหมด+ (รวมพท.ชล.)				
นาปี(1000 ไร่)	3,943	30,000	11,538	9,063
นาปรัง (1000 ไร่)	544	862	1,456	12,088
นาครั้งที่3(1000 ไร่)	0	0	0	3,769
รวม (1000 ไร่)	4,488	30,081	12,994	24,919
ผลผลิต(1000 กก.)	2,094	9,507	4,041	16,281
ผลผลิต(กก.ต่อไร่)	467	315	310	653



**AGREEMENT
ON
THE COOPERATION
FOR THE
SUSTAINABLE
DEVELOPMENT OF
THE MEKONG
RIVER
BASIN
5 APRIL 1995**

MEKONG RIVER COMMISSION

Article 5

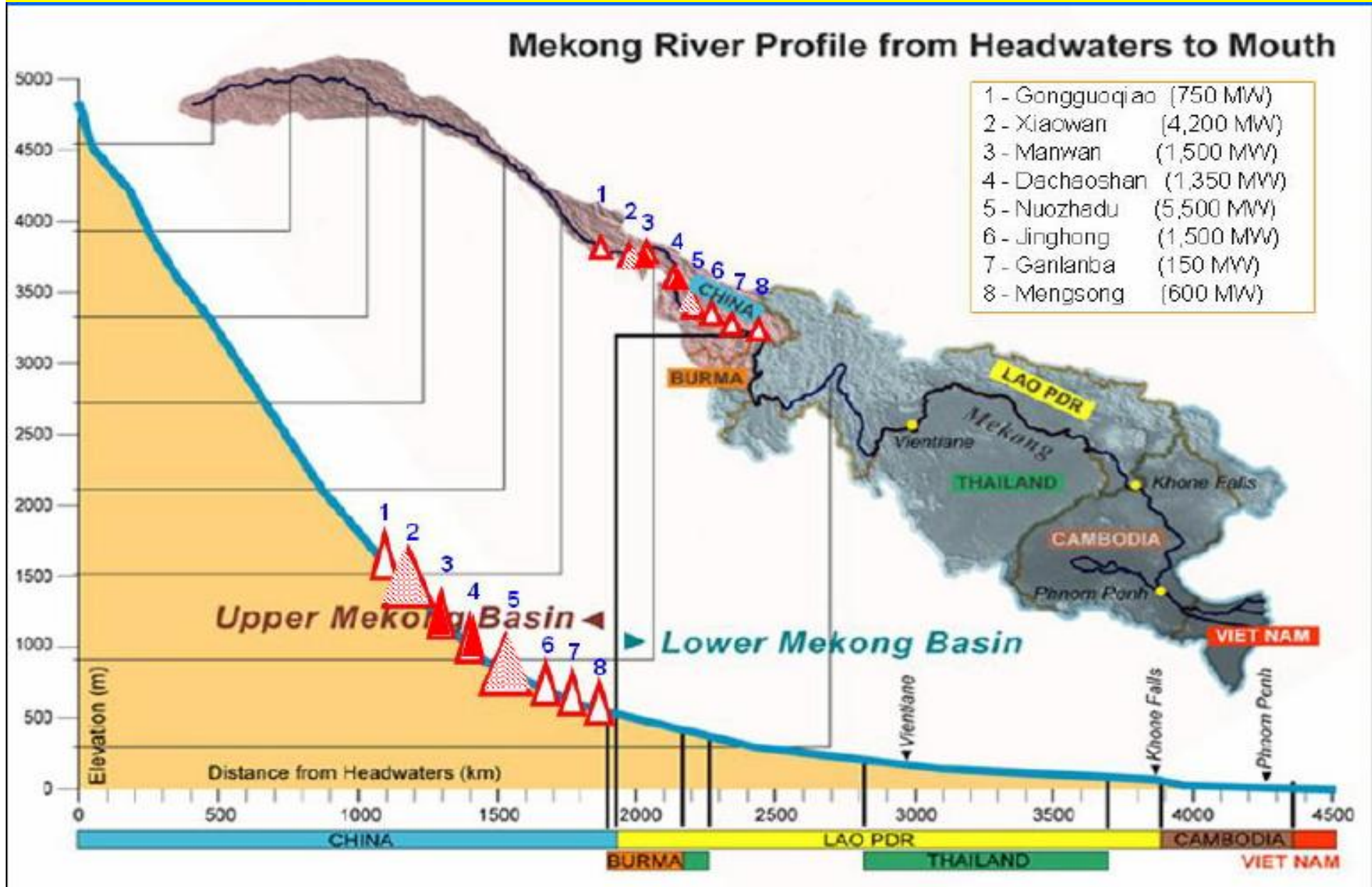
มาตรา 5 การใช้น้ำอย่างสมเหตุสมผลและเป็นธรรม

การใช้น้ำ	การแจ้ง	การปรึกษาหารือล่วงหน้า	ข้อตกลง
	notification	Prior Consultation	Agreement
1. Tributary and Tonele Sap	/		
2. Mekong			
2.1 Wet Season			
2.1.1 Within Mekong Basin	/		
2.1.2 Other Basin		/	
2.1 Dry Season			
2.2.1 Within Mekong Basin		/	
2.2.2 Other Basin			/

Upstream Mekong – Dam Construction in China



Hydropower Dams in Upstream Mekong - China



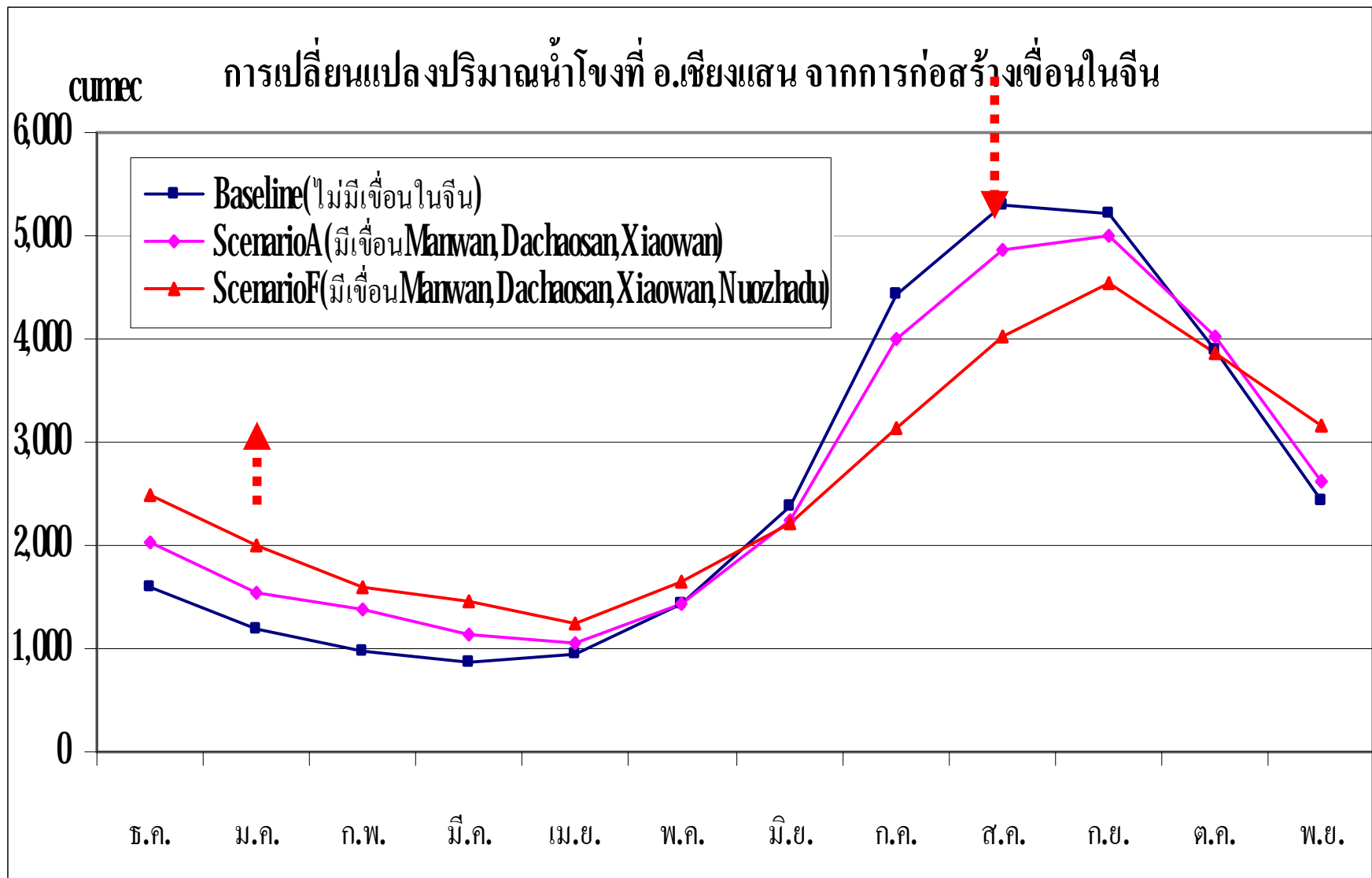
Hydropower Dams in Upstream Mekong - China

ชื่อโครงการ	กำลังผลิต (MW)	Power (Gwh/year)	Storage Capacity (mcm)	Drainage Area (km ²)	ปริมาณน้ำไหลผ่าน (ม ³ /วินาที)	ปีที่เริ่มใช้งาน (ค.ศ.)
Gongguoqiao	750	4,670	510	97,300	985	
Xiaowan	4,200	18,540	15,130	113,300	1,220	2010-12
Manwan	1,500	7,870	920	114,500	1,230	1993
Dachaoshan	1,350	7,090	880	121,000	1,230	2001
Nuozhadu	5,500	22,670	24,670	144,700	1,750	2013-16
Jinghong	1,500	8,470	1,040	149,100	1,840	2012-13
Ganlanba	150	1,010		151,800	1,880	
Mengsong	600	3,740		160,000	2,020	

Simulation of BDP Phase 1

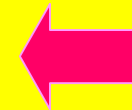
- Baseline (Scenario B) กรณีไม่มีเขื่อนในประเทศจีน
- Assured Dam (Scenario A) มีเขื่อน Manwan, Dachaosan และ Xiaowan
- Foreseeable Dam (Scenario F) กรณีมีเขื่อนตาม A และเขื่อน Nuozhadu

Simulation BDP Phase 1 - Change of Water Level Downstram



Opportunities / Risks and Lesson Learned

- Opportunities and Risks
- Lessons Learned



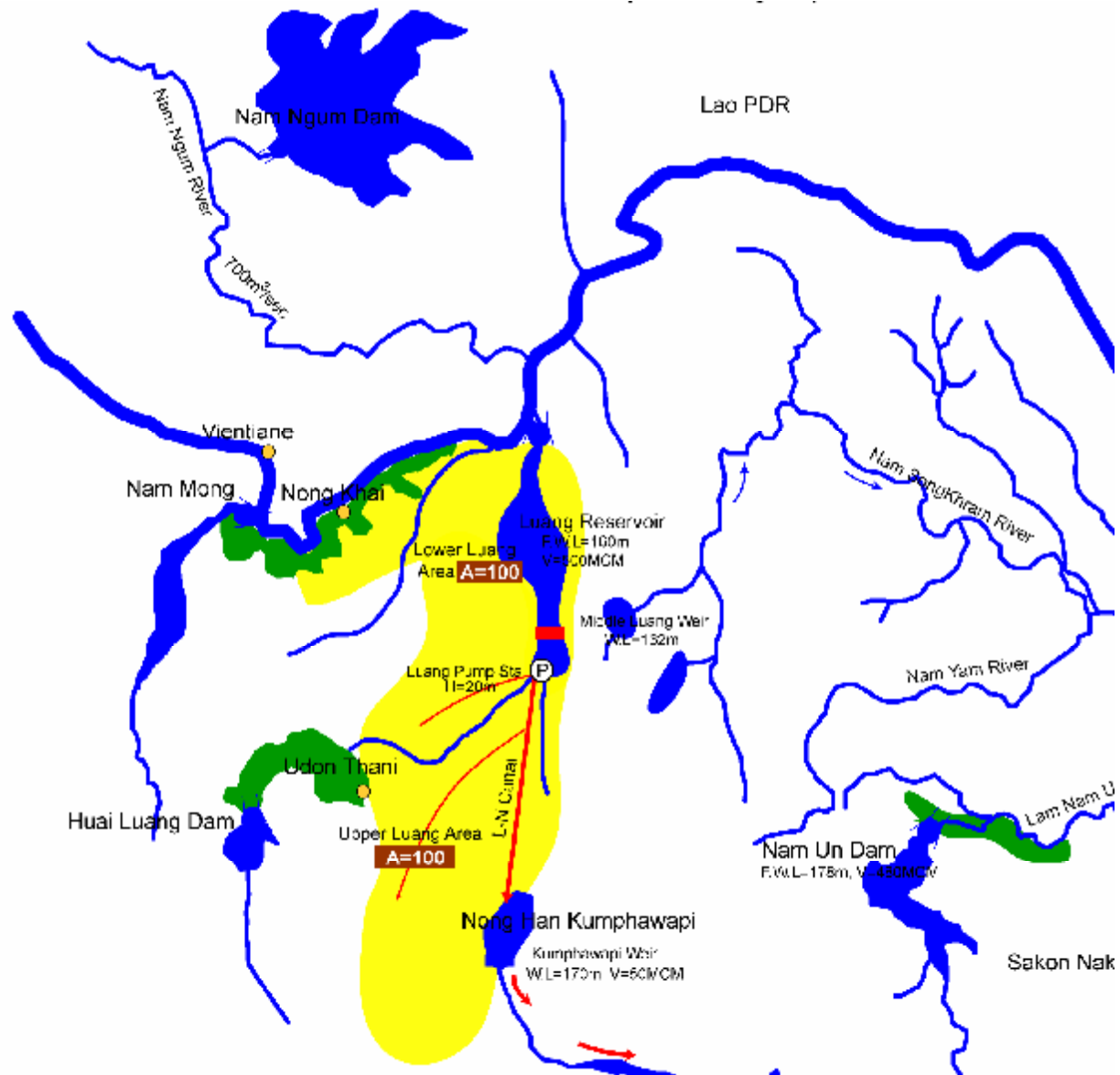
The Khong Chi Mun Development Project

Lessons Learned and Ways Moving Towards

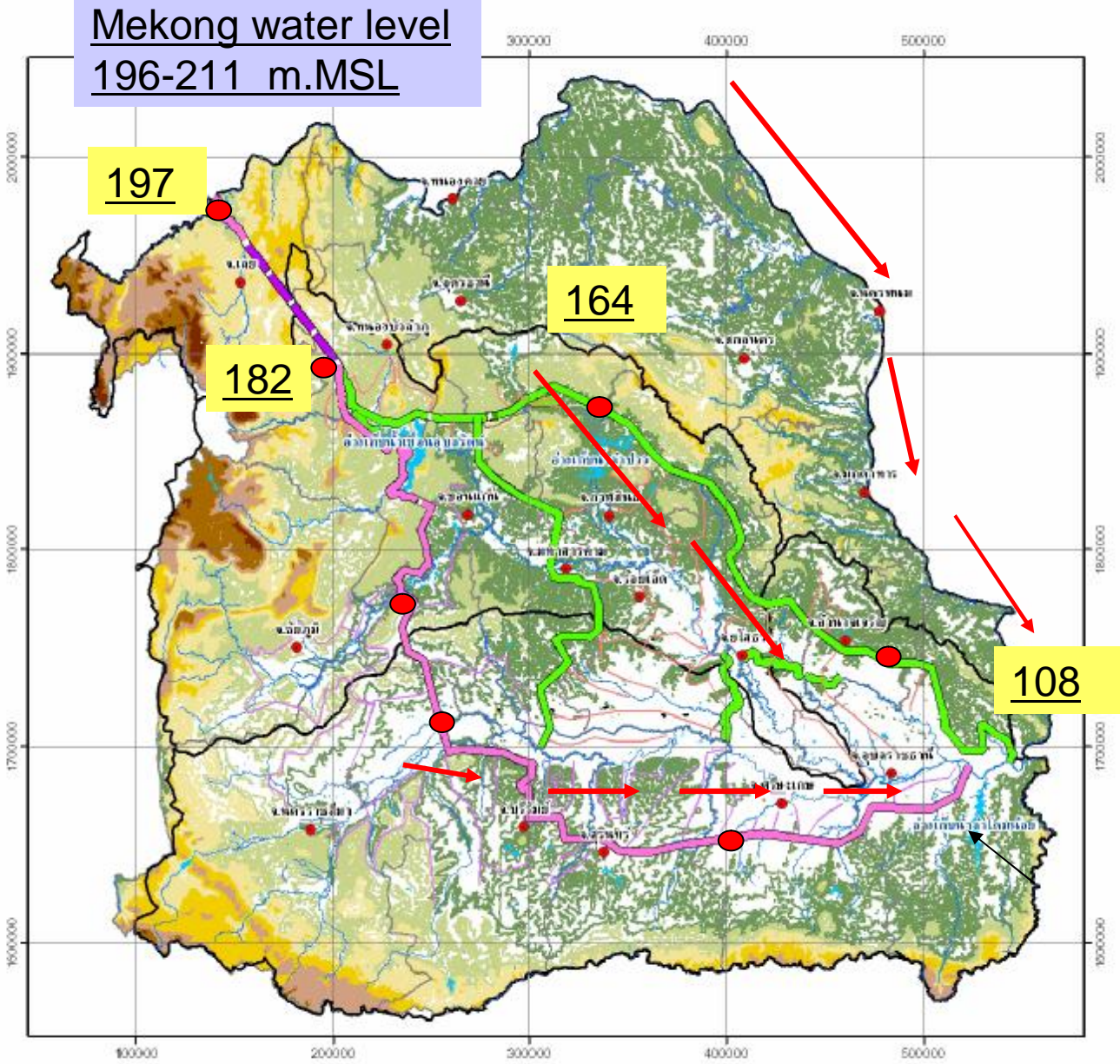
- Diversion after intra basin
- Energy saving
- Gravity
- Integrated planning upstream/downstream
- Incremental Steps of Development
- Land and Water resource Planning
- Shifting crop calendar to water availability
- Water Saving strategies
 - improving irrigation efficiencies
 - More upland crop
- People Participation
- Transboundary water – MRC BDP 1 & II
- Diversion through tributaries

Gravity Diversion At Tributary level - Huai Luang

Gravity Diversion At Tributary level - Huai Luang River



Gravity Diversion - Tributary Level - Loei River



The End

Thank you
for your Attention

