



RESEAU INTERNATIONAL DES ORGANISMES DE BASSIN  
INTERNATIONAL NETWORK OF BASIN ORGANIZATIONS

7EME ASSEMBLEE GENERALE MONDIALE

DU 07 AU 09 JUIN 2007 A DEBRECEN (HONGRIE)

## **Mekong River transboundary water quality monitoring (learnings from a case study)**

par

**Dominique Fougeirol**

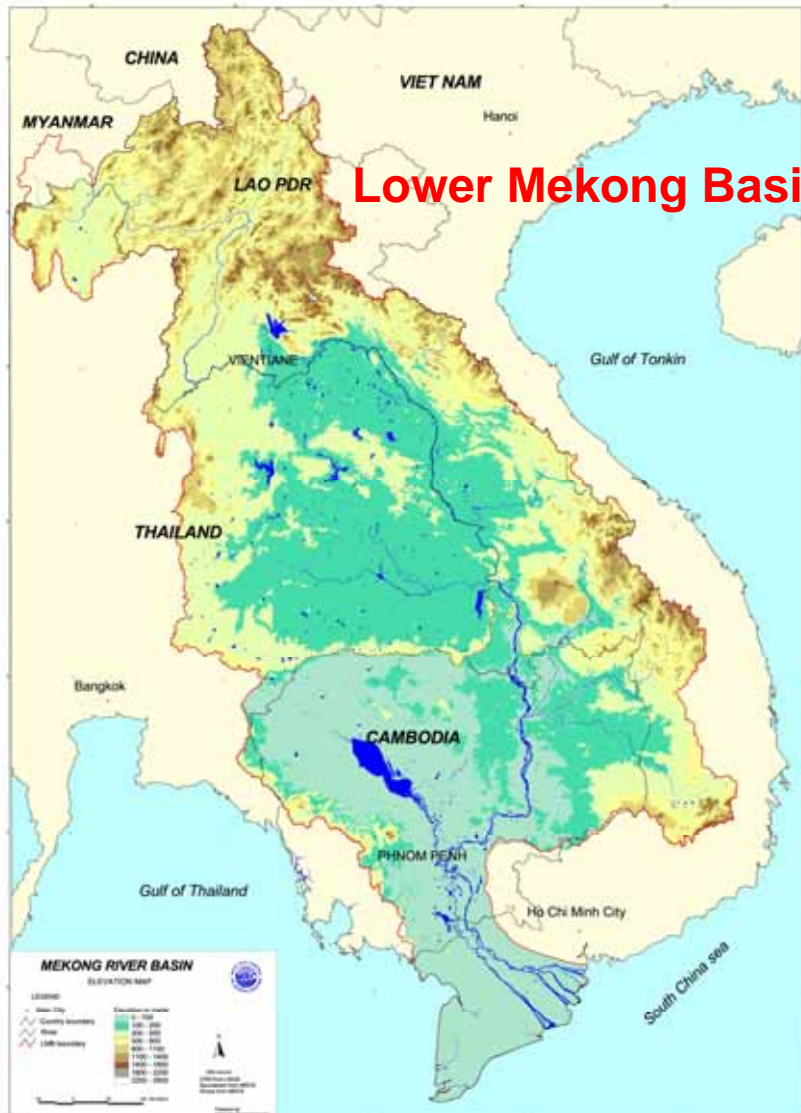
**Responsable gestion intégrée des ressources en eau  
BURGEAP, Département International**



## **CONTENTS**

- 1. Mekong River: a transboundary River Basin**
2. Water quality monitoring for non routine parameters
3. Conclusions

## Mekong River transboundary water quality monitoring (learnings from a case study)



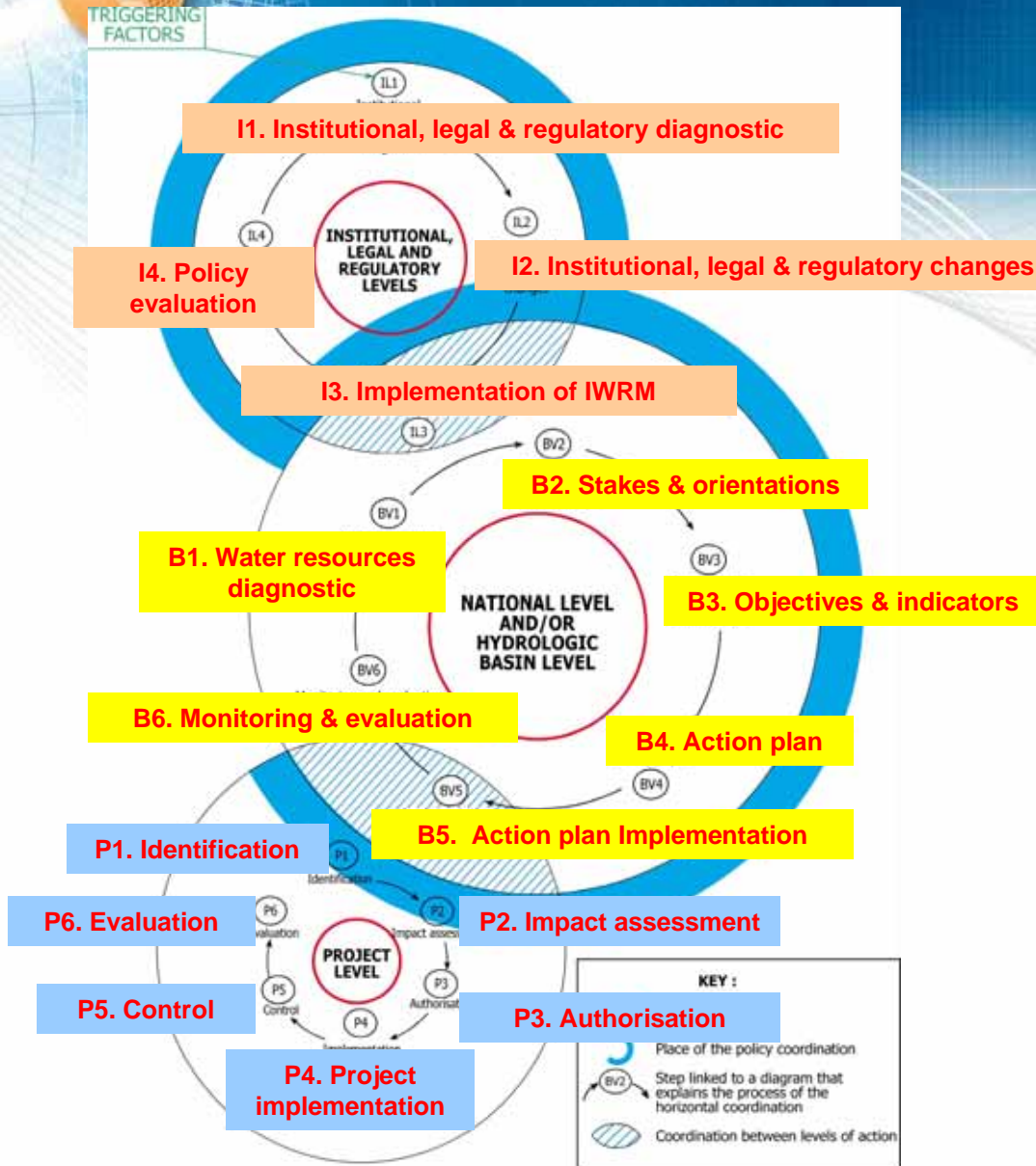
Source: Mekong River Commission

The Mekong River: a transboundary basin which extends over 6 countries:

- China
- Myanmar
- Lao PDR
- Vietnam
- Thailand
- Cambodia

With big cities such as Vientiane in Lao and Phnom Penh in Cambodia

## Mekong River transboundary water quality monitoring (learnings from a case study)



## Guidelines for Policy coordination

(established for the METAP\* Water Quality Management Program) :

**IWRM = three levels of action:**

- The Institutional, legal regulatory level
- The Hydrologic basin level
- The Project level

\* METAP : Mediterranean Environmental Technical Assistance Program (a World Bank multi-funded program)

## Mekong River transboundary water quality monitoring (learnings from a case study)

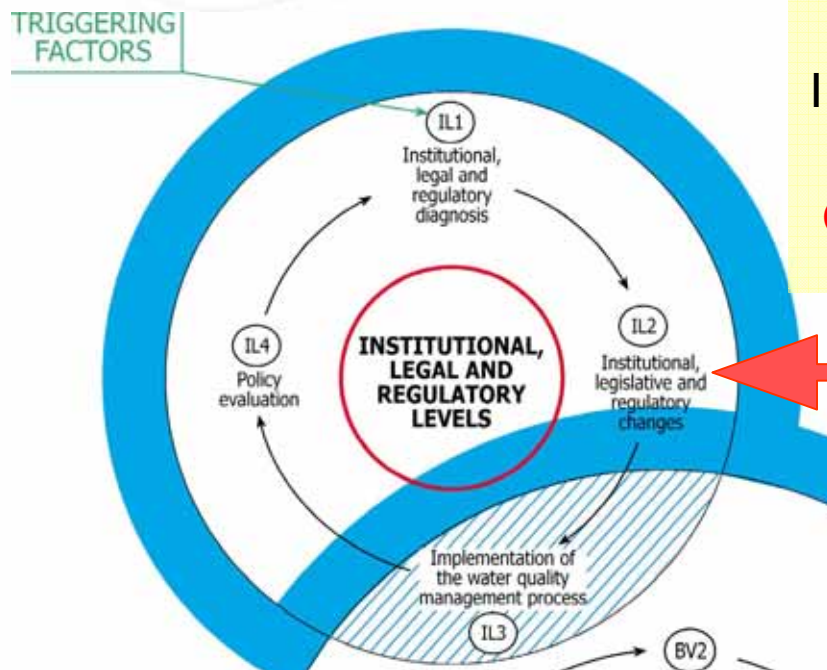
### Guidelines for Policy coordination

(established for the METAP\* Water Quality Management Program) :

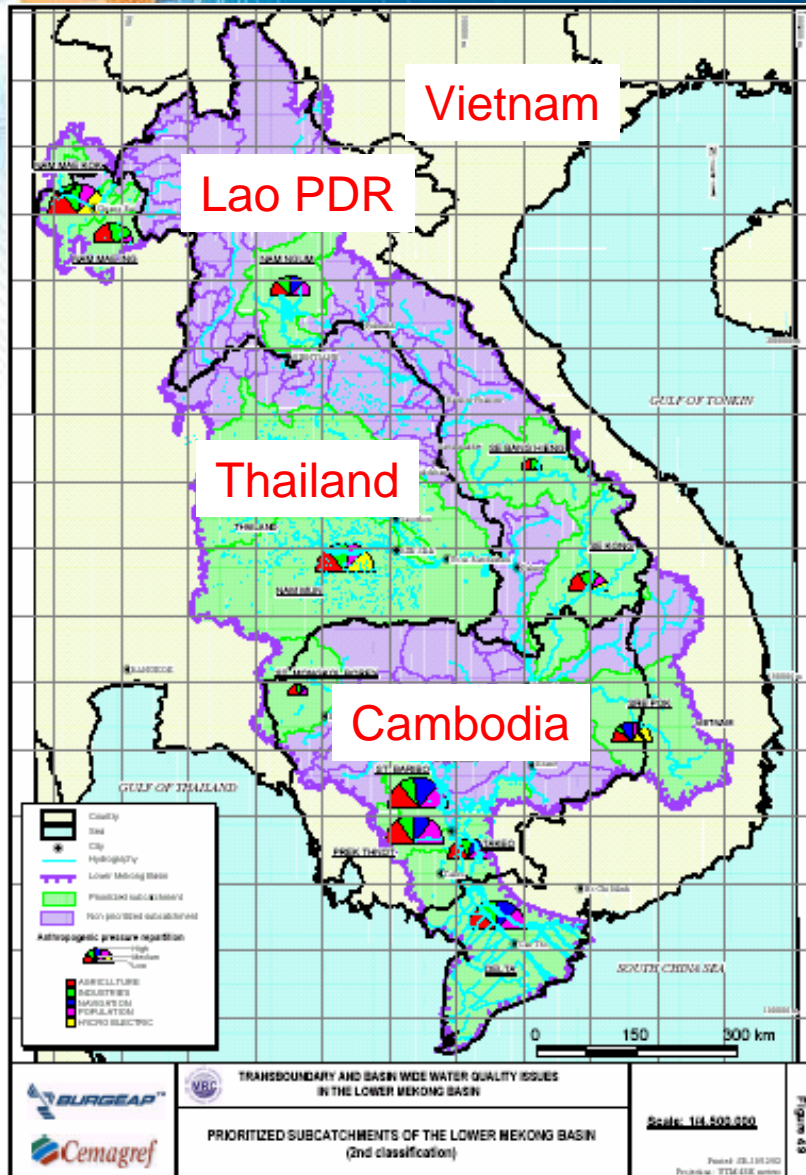
### Level 1: The Institutional, legal, regulatory level

Institutional change for the Mekong River Basin case :

**Creation of the Mekong River Commission**



## Mekong River transboundary water quality monitoring (learnings from a case study)



The Mekong River Commission (MRC):

- 1957: Mekong River Secretariat
- 1995: Mekong River Commission

**4 countries (Lower Mekong Basin) are currently members of the MRC:**

- **Cambodia**
- **Lao PDR**
- **Thailand**
- **Vietnam**

*Source: Mekong River Commission  
BURGEAP- CEMAGREF*

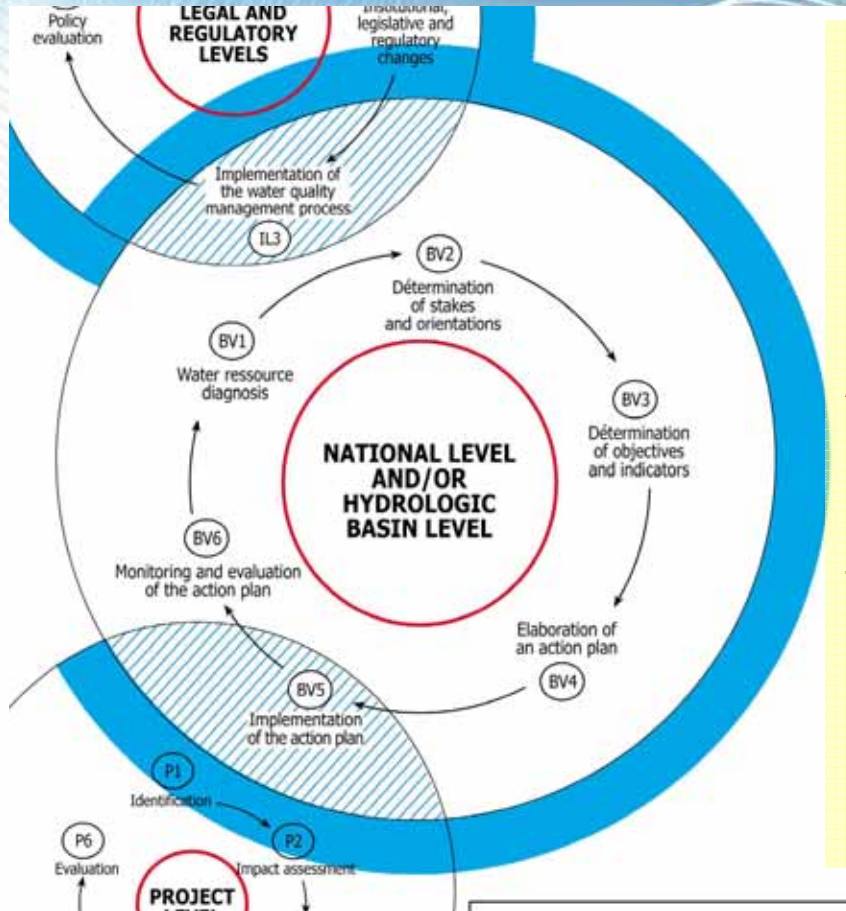
## **CONTENTS**

1. Mekong River: a transboundary River Basin
- 2. Water quality monitoring for non routine parameters**
3. Conclusions

**Partenaires:**

***Mekong River Commission  
BURGEAP - CEMAGREF***

## Mekong River transboundary water quality monitoring (learnings from a case study)



Guidelines for Policy coordination  
(established for the METAP\* Water Quality Management Program) :

**Level 2: The Hydrologic Basin level:  
A continuous improvement process**

Mekong River Basin case :

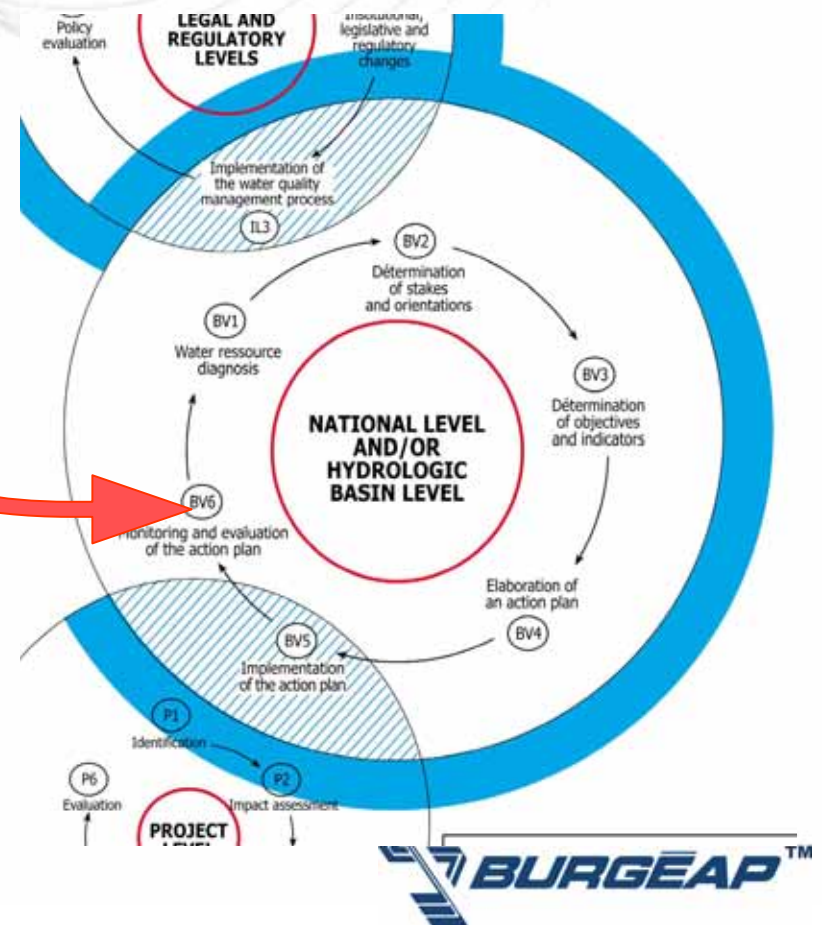
The 4 countries involved in the MRC are implementing joint actions within the Lower Mekong Basin (LMB)

**Example of action : water quality monitoring**

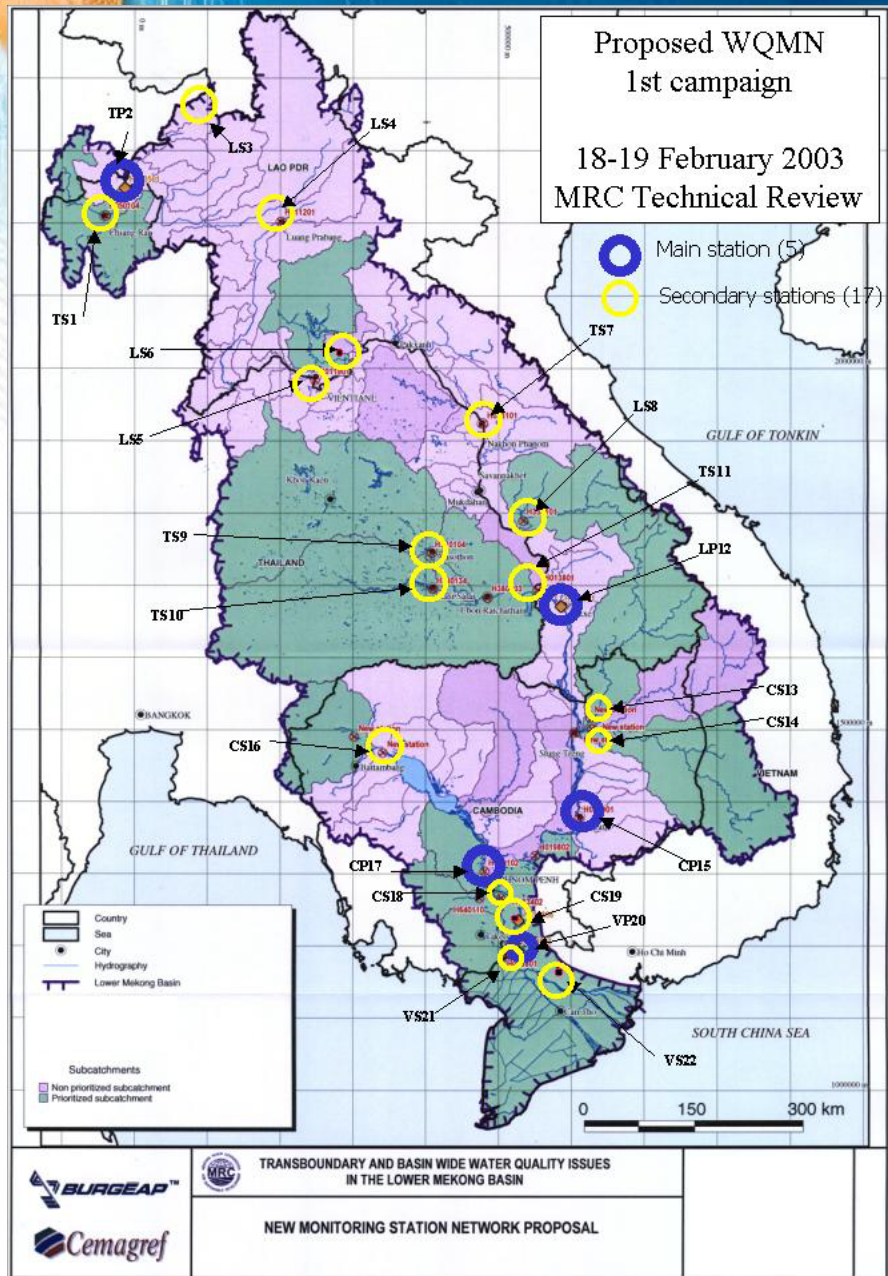


## Example of action within the Lower Mekong River Basin: Water quality monitoring

- In 2003, 98 permanent water quality sampling sites were being used by MRC in Lao PDR, Thailand, Cambodia and Vietnam.
- Routine water quality parameters  
Physico-chemical parameters routinely analysed: flow, TSS, pH, Temp., Cond., Ions, Nutrients (N, P), DO, COD and some trace metals
- **Need for non-routine water quality parameters analysis (pesticides and heavy metals) was identified**



## Mekong River transboundary water quality monitoring (learnings from a case study)



Sampling and analyses were conducted on:

- River water
- Sediments
- Bioassays & Diatom

from relevant locations selected in each of the four countries members of MRC, taking into account:

- Pressure of human activities
- Transboundary issues

Source: Mekong River Commission  
BURGEAP- CEMAGREF



**Mekong River transboundary water quality monitoring (learnings from a case study)**



**MeKong River water quality sampling and analysis**

**Source: Mekong River Commission  
BURGEAP- CEMAGREF**



• **Interpretation of routine analyses :**

• **The « SEQ-Eau » methodology**

• Methodology used by the French water basin agencies and mentioned in the European Water Framework Directive as a relevant system to determine a class of aptitude of the water bodies for ecological, drinking water and recreational activities.

• **Interpretation of non-routine analyses:**

• Threshold effect concentration (TEC) and

• Probable effect concentration (PEC) (MacDonald & al, 2000) were used in the absence of any guidelines developed specifically for the Mekong region

## Mekong River transboundary water quality monitoring (learnings from a case study)

« SEQ Eau »  
for routine  
parameters

Class of water quality	Blue	Green	Yellow	Orange	Red
ORGANIC MATTER AND OXYDABLES					
DO (mg/L)	8	6	4	3	
COD (mg/L O <sub>2</sub> )	5	7	10	12	
NH <sub>4</sub> <sup>+</sup> (mg/L NH <sub>4</sub> )	0.5	1.5	2.8	4	
NITROGENEOUS MATTER					
NH <sub>4</sub> <sup>+</sup> (mg/L NH <sub>4</sub> )	0.1	0.5	2	5	
NITRATES					
NO <sub>3</sub> (mg/L NO <sub>3</sub> )	2	10	25	50	
PHOSPHOROUS MATTER					
TP (mg/L)	0.05	0.2	0.5	1	
PO <sub>4</sub> <sup>3-</sup> (mg/L PO <sub>4</sub> )	0.1	0.5	1	2	
SUSPENDED MATTER					
TSS (mg/L)	5	25	38	50	
TEMPERATURE					
T (°C)	21.5	23.5	25	28	
MINERALIZATION					
Conductivity (microS/cm)	2500	3000	3500	4000	
ACIDIFICATION					
pH	Min	6.5	6.0	5.5	4.5
	Max	8.2	8.5	9.0	10

Standards and thresholds used for classification of the water quality of the Mekong river and tributaries

Source: Mekong River Commission  
BURGEAP- CEMAGREF



## Mekong River transboundary water quality monitoring (learnings from a case study)

Organic matter

Nitrates

TSS

Mineralisation

Nitrogenous matter

Phosphorous matter

Temp.

pH

Station Code: H380103  
 Station Name: Ubon  
 Country: THAILAND  
 Water Body: Nam Mun

ALTERATION	Organic matter	Nitrogenous matter	Nitrates	Phosphorous matter	Suspended matter	Temperature	Mineralisation	Acidification
SDATE	DO + COD + NH4	NH4	NO3	PO4 + TP	TSS	TEMP_°C	COND	pH
1985								
1986								
1987								
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								
2000								

	DO_mg/L	CODMN_mg/L	NH4_mg/L	NO3_mg/L	PO4_mg/L	TOTP_mg/L	TSS_mg/L	TEMP_°C	COND_microS/cm	pH
MIN	3,88	0,10	0,001	0,142	0,003	0,003	2,0	20,0	710,00	6,44
MAX	10,00	6,50	0,231	2,839	0,098	0,137	352,0	34,5	6480,00	8,71
MEAN	7,48	2,95	0,070	1,051	0,034	0,047	55,0	28,9	2620,80	7,45

Source: Mekong River Commission  
 BURGEAP- CEMAGREF



## **Results:**

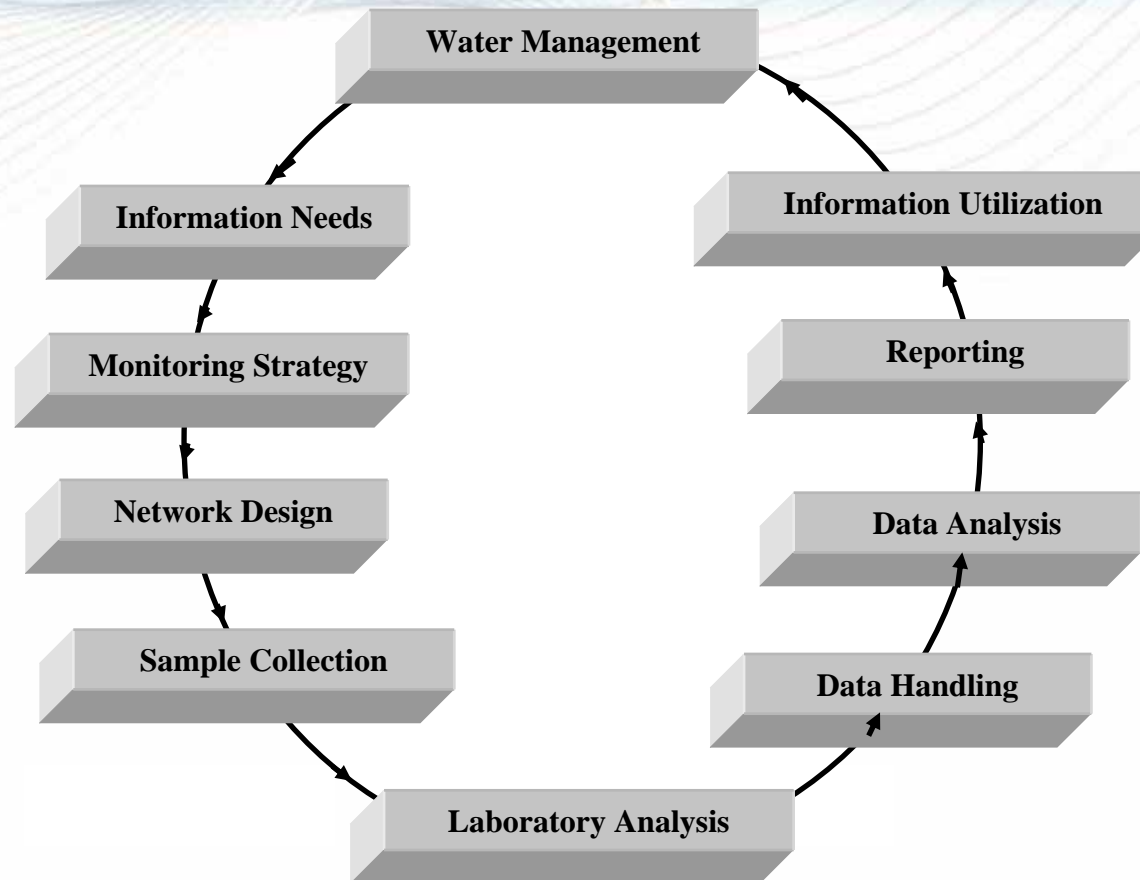
- Water quality is generally good in the Lower Mekong Basin
- No transboundary pollution has been identified **within the LMB**
- Heavy metals found in sediments close to big cities, but disappear rapidly downstream
- The boundary site between China and Lao PDR requires further work and monitoring (source of heavy metals)
- Toxicity of sediments not conclusive however based on a single bioassay
- **However, the MRC and member countries will have to remain vigilant in the future, as urban and industrial development and expansion of agriculture proceeds in the Lower Basin, and as development accelerates in the upper Chinese portion of the basin**

## CONTENTS

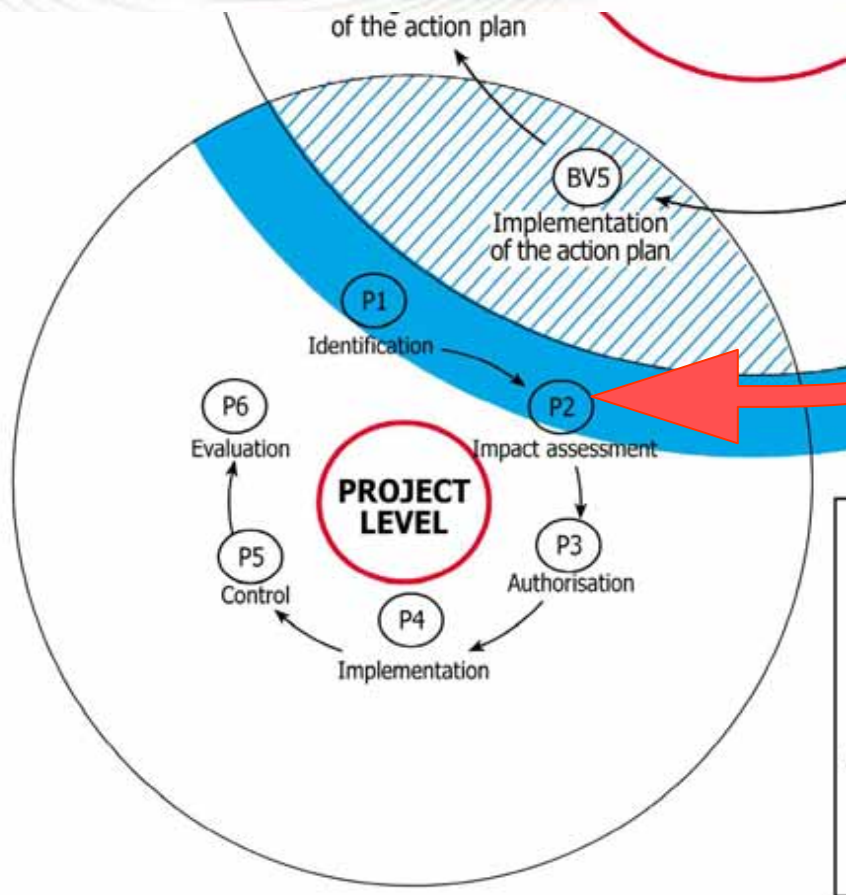
1. Mekong River: a transboundary River Basin
2. Water quality monitoring for non routine parameters
- 3. Conclusions**



**Conclusion 1/3 : Next steps = to use the monitoring results for River basin management**



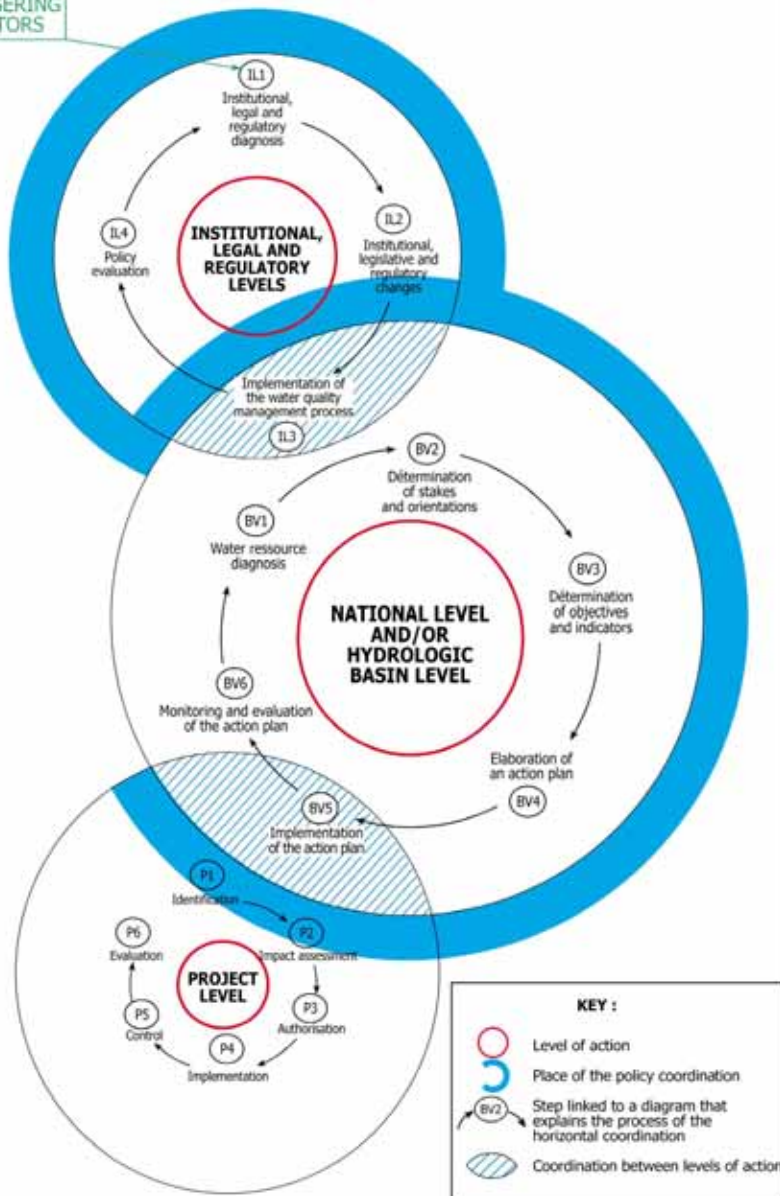
**Conclusion 2/3 : Monitoring results to be used at project's level for Environmental Impact Assessments.**



**Level 3: The Project's level:  
Authorisations, control, evaluation**

## Mekong River transboundary water quality monitoring (learnings from a case study)

TRIGGERING FACTORS



**Conclusion 3/3 :** for integrated river basin management, action must be implemented at the three levels simultaneously :

- The Institutional, legal regulatory level
- The Hydrologic basin level
- The Project level

*Mekong River transboundary water quality monitoring (learnings from a case study)*

Thanks for your attention !

