WEPA Action Program in Thailand

"Development of a Technical Guidelines on Pollution Loading Control Mechanisms for Sustainable Management of River Basins in Thailand"

8 September 2025

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- Potential sources of water pollution in Chao Pharaya River
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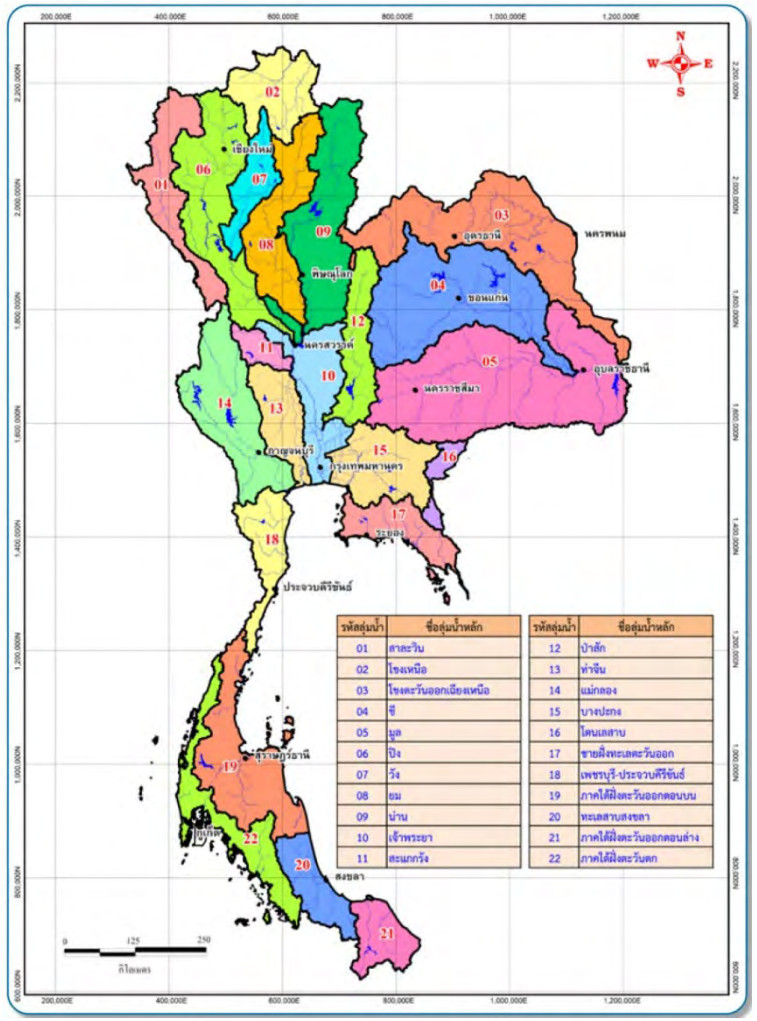
INTRODUCTION

- **Location:** A central of mainland and a heart of Southeast Asia.
- **Total area:** 513,115 km^2
- **Climate:** A warm and humid tropical country with monsoonal climate.
- **Seasons:** - Dry (March to May)
  - Rainy (June to October)
  - Cool (November to February)
- **Population:** 62 million
  (6.3 million live in the capital city)
- **Capital:** Bangkok

Thailand’s river system



รหัสลุ่มน้ำ	ชื่อลุ่มน้ำหลัก	รหัสลุ่มน้ำ	ชื่อลุ่มน้ำหลัก
01	สาละวิน	12	ป่าสัก
02	โขงเหนือ	13	ท่าจีน
03	โขงตะวันออกเฉียงเหนือ	14	แม่กลอง
04	ชี	15	บางปะกง
05	มูล	16	โตนเลสาบ
06	ปิง	17	ชายฝั่งทะเลตะวันออก
07	วัง	18	เพชรบุรี-ประจวบคีรีขันธ์
08	ยม	19	ภาคใต้ฝั่งตะวันออกตอนบน
09	น่าน	20	ทะเลสาบสงขลา
10	เจ้าพระยา	21	ภาคใต้ฝั่งตะวันออกตอนล่าง
11	สะแกกรัง	22	ภาคใต้ฝั่งตะวันตก

- **Rivers** have been instrumental in **shaping** the country’s **economic** landscape, serving as lifelines for various sectors and driving **regional development**.
- From agriculture to industry, transportation to tourism, these waterways play a multifaceted role in supporting the nation’s economic growth.
- Thailand has **22 river basins** with 254 sub-basins with **different distinct characteristics** such as hydrology, soil morphology, soil types, land uses, and land covers.

Chao Phraya River

- **Chao Phraya River** system stands out as **the most prominent**, often referred to as the "River of Kings" and the **lifeline of central Thailand**.
  - Drains a significant portion of central Thailand, including Bangkok.
  - Begins at the confluence of the Ping and Nan Rivers at Nakhon Sawan Province then, flows from north to south for 378 km from the central plains through Bangkok to the Gulf of Thailand.
  - Total catchment area is 17,270 km^2.
  - Hold a special place in the country's history, culture, and economy.
- However, **rapid urbanization**, **industrial development**, and **agricultural intensification** have led to **increased pollution** and altered the river's natural flow.

National water quality monitoring program

- The surface water quality monitoring program is conducted over 49 main rivers (398 sites) for 4 times a year.
- Monitoring period:
  1) January – March, 2) April – June, 3) July – September, 4) October - December
- Monitoring parameters:

Water quality characteristics	Parameters
Physical	Temperature, pH, Turbidity, Conductivity
Chemical	Salinity, Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Ammonia, Nitrite, Nitrate, Total solids (TS), Total suspended solids (TSS), Hardness, Elemental concentrations (Fe, Cd, Mn, Ni, Pb, Zn, Cu, Hg, As, Cr)
Biological	Total coliform bacteria (TCB), Fecal coliform bacteria (FCB)

Public communication on water quality

Water quality index (WQI)

- General description of water quality status.
- It is based on physical, chemical, and biological factors that are combined into a single value that ranges from 0 to 100.

Current WQI

WQI is evaluated based on 5 parameters.
1) Dissolved oxygen (DO)
2) Biochemical oxygen demand (BOD)
3) Total coliform bacteria (TCB)
4) Fecal coliform bacteria (FCB)
5) Ammonia (NH_3)

Water quality status	WQI score	Classification of surface water quality	Color indication
Very good	91-100	2	
Good	71-90	2	
Fair	61-70	3	
Poor	31-60	4	
Very poor	0-30	5	

National surface water classification

Class 1
Extra clean water for conservation purposes

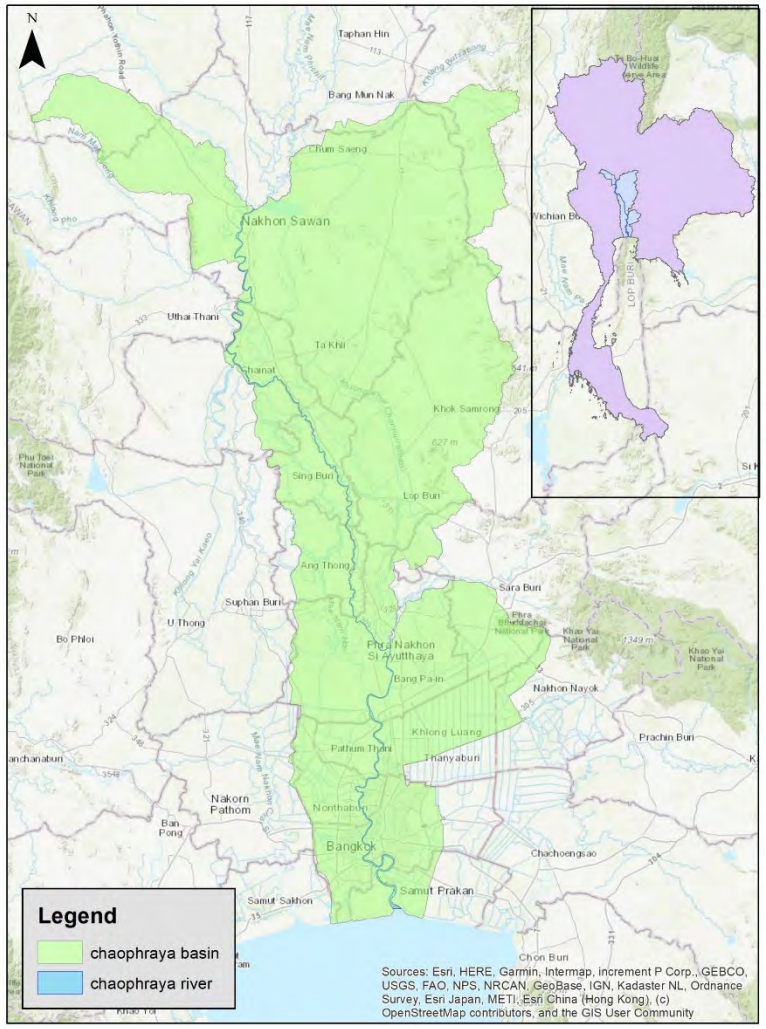
Class 2
Very clean water for 1) consumption which requires ordinary water treatment, 2) aquatic organism conservation, 3) fisheries, and 4) recreation

Class 3
Medium clean water for 1) consumption but passing an ordinary water treatment and 2) agriculture

Class 4
Fairly clean water for 1) consumption but requires special treatment process and 2) industry

Class 5
Water for navigation

PROJECT INFORMATION AND WORK PACKAGE



Chao Phraya River basin

- Catchment area: 20,441.94 km^2
- Length: 378 km
- The majority of the basin lies within the provinces of Nakhon Sawan, Uthai Thani, Chai Nat, Sing Buri, Ang Thong, Phra Nakhon Si Ayutthaya, Pathum Thani, Nonthaburi, and Bangkok.

Overall objectives for 2-year WEPA project

1) To assess the availability of pollution source inventory data and identify existing data gaps, and review current approaches to address water pollution in Thailand.
2) To review existing national regulations to prevent and control water quality pollution regulations and national and international best practice and success cases of pollution load control mechanisms and strategies.
3) To develop an integrated socioeconomic- and scientific-based loading control framework for Thailand.
4) To enhance stakeholder participation and capacity building.
5) To develop technical guidelines and draft implementation plan for pollution loading control.

Work package 1

To assess the availability of pollution source inventory data and identify existing data gaps, and review current approaches to address water pollution in Thailand.

Activities:

1) Gather different pollution sources inventory data and review current approaches to address sources of water pollution.
2) Classify and assess of major point and non-point pollution sources of water pollution.
3) Develop a detailed inventory of pollution sources, including their location, type, volume, and pollutant characteristics.
4) Evaluate the availability, quality, and gaps in existing inventory data.

Work package 2

To review existing national regulations to prevent and control water quality pollution regulations and national and international best practice and success cases of pollution load control mechanisms and strategies.

Activities:

1) Review existing national regulations to prevent and control water quality pollution and gap analysis.
2) Review national best practice and success cases of pollution load control mechanisms and strategies.
3) Review international best practice of pollution load control mechanisms and strategies in Japan, the EU, the USA, China, South Korea and other WEPA partner countries.

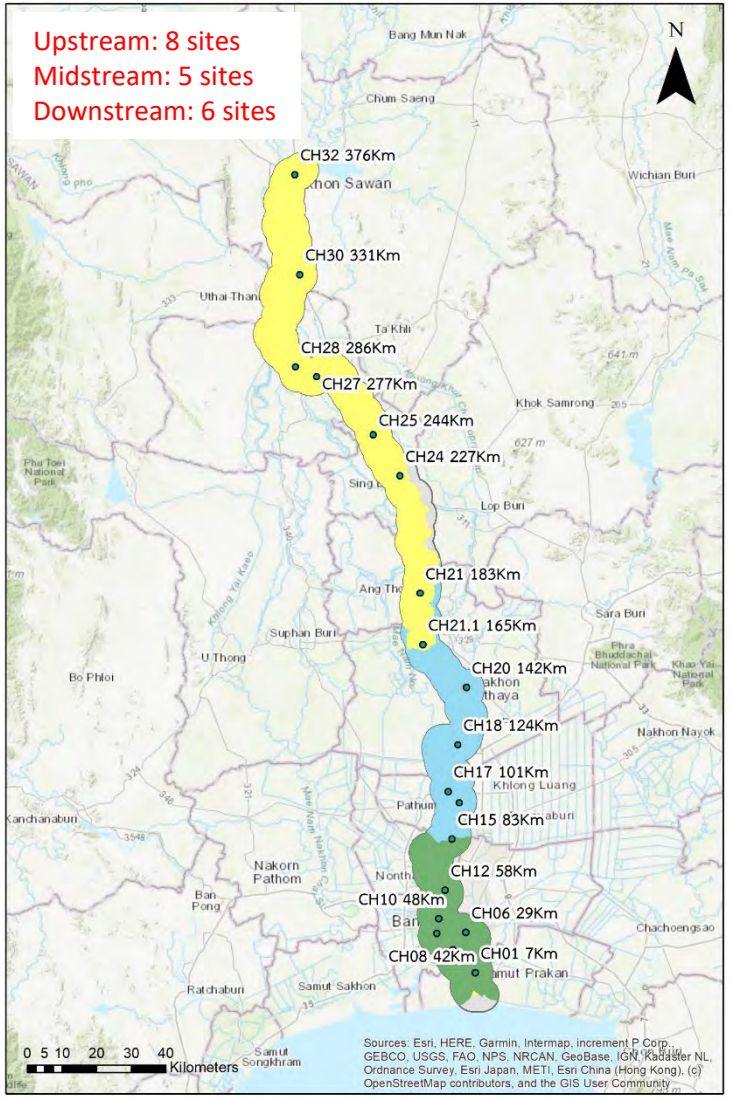
Work package 3

To develop an integrated socioeconomic- and scientific-based loading control framework for Thailand.

Activities:

1) Redefine water quality targets and water quality index (WQI) based on a classification of surface water quality in Thailand.
2) Develop a loading capacity estimation methodology, to determine the maximum allowable pollutant loads to meet water quality targets.
3) Allocate allowable loads among different pollution sources, considering equity, technical feasibility, and socio-economic factors.
4) Identify best management practices (BMPs) for controlling major pollution sources to achieve load reductions based on required effluent standards.
5) Organize knowledge-sharing workshops to collect opinions from relevant experts and stakeholder.
6) Develop a draft of framework and guideline outline for pollution load control in Thailand.

SOURCES OF WATER POLLUTION : CHAO PHRAYA RIVERS



Year	Total sample	Remark
2015	72	Not included CH21.1
2016	72	Not included CH21.1
2017	72	Not included CH21.1
2018	72	Not included CH21.1
2019	73	Not included CH21.1/CH21
2020	76	
2021	76	
2022	57	3 Sampling times
2023	76	
2024	76	

Sampling periods

Dry season: 3 times (Feb, April, May, Nov, Dec)

Wet season: 1 time (Jun, Jul, Aug)

Water quality parameters measured

National surface water quality standards

Water quality charactistics	Parameters (18 parameters)
Physical	Temperature, pH, Turbidity, Conductivity
Chemical	Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Nitrate, Ammonia, Phenols, Elemental concentrations (Cu, Ni, Mn, Zn, Cd, Cr^{6+}, Pb, total Hg, As), Cyanide, Radioactivity, Total organochloride, DDT, Alpha-BHC, Dieldrin, Aldrin, Heptachlor, Endrin
Biological	Total coliform bacteria (TCB), Fecal coliform bacteria (FCB)

Remark: Parameters measured are marked in red.

Additional parameters (9 parameters)

- Salinity
- Total phosphorus
- Nitrite
- Suspended solids (SS)
- Total solids (TS)
- Total dissolved solids (TDS)
- Hardness
- Iron (Fe)
- Total chromium (total Cr)

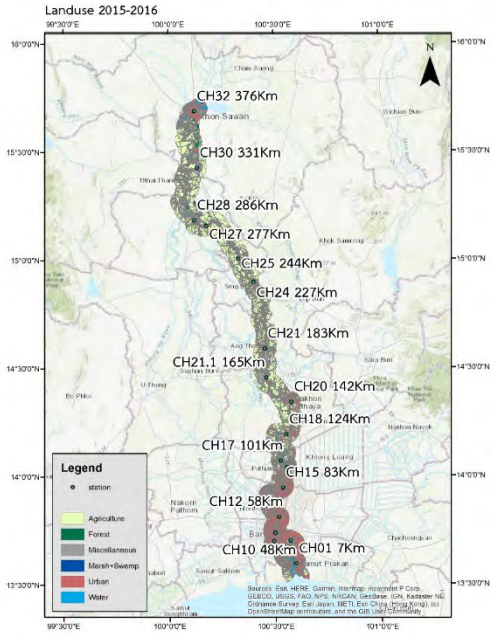
Summary of 10-year monitoring results

Parameter	Total number	Mean	Median	Mode	Parameter	Total number	Mean	Median	Mode
pH	722	7.5	7.40	7.50	Fe	157	1.58	1.00	0.80
Turbidity	680	59.7	32.0	22.0	Cd	107	0.56	0.54	0.31
Conductivity	719	3,259	287	140	Cr6+	131	5.12	3.46	0.01
Salinity	719	1.8	0	0	Mn	164	0.16	0.10	0.07
DO	722	4.5	4.6	4.8	Ni	165	3.40	2.72	2.10
BOD	709	2.5	1.7	1.2	Pb	128	7.10	5.07	10.00
TCB	713	20,061	7,900	3,300	Zn	206	0.33	0.33	0.34
FCB	713	8,178	1,400	200	Cu	133	5.19	3.62	0.01
TP	687	0.29	0.18	0.06	Hg	60	0.95	0.80	0.60
Nitrate	586	0.61	0.34	0	As	70	3.92	3.00	1.50
Nitrite	381	0.22	0.26	0.20	Cr	1	11.00	11.00	11.00
Ammonia	653	0.53	0.26	0.20					
SS	697	46.1	28.0	20.0					
TS	655	2040	226	180					
TDS	533	2173	241	185					
Hardness	388	425	98.6	82.0					

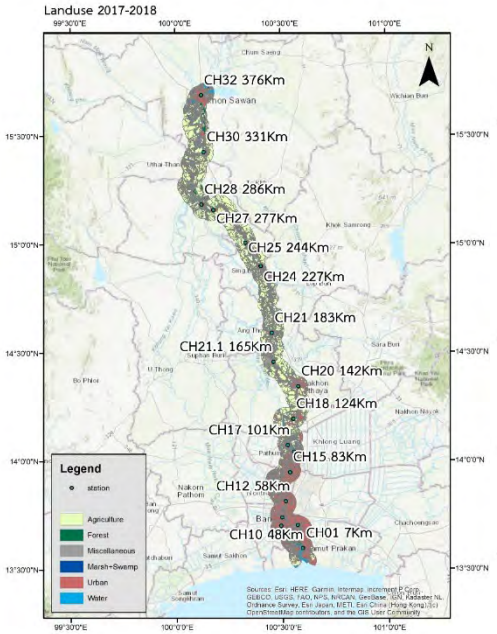
Changes in land use patterns along the Chao Phraya River

Year	Landuse Type	Agriculture (m^2)	Forest (m^2)	Miscellaneous (m^2)	Marsh+Swamp (m^2)	Urban (m^2)	Water (m^2)
2015-2016	Upper	15,026.71	286.26	1,020.08	335.99	4,020.46	2,157.93
	Middle	6,623.75	5.64	655.60	0.00	2,798.16	562.66
	Lower	846.06	0.08	269.86	0.00	6,252.68	446.17
2017-2018	Upper	15,092.04	278.47	1,048.14	329.57	4,137.22	2,184.26
	Middle	5,356.64	5.96	762.19	0.00	3,246.01	725.89
	Lower	946.33	124.53	254.17	0.00	6,901.19	465.67
2019-2024	Upper	14,845.41	282.05	1,072.87	323.31	4,168.83	2,224.61
	Middle	1,609.59	0.00	637.10	0.00	3,016.18	376.09
	Lower	860.95	115.12	231.01	0.00	7,095.45	463.93

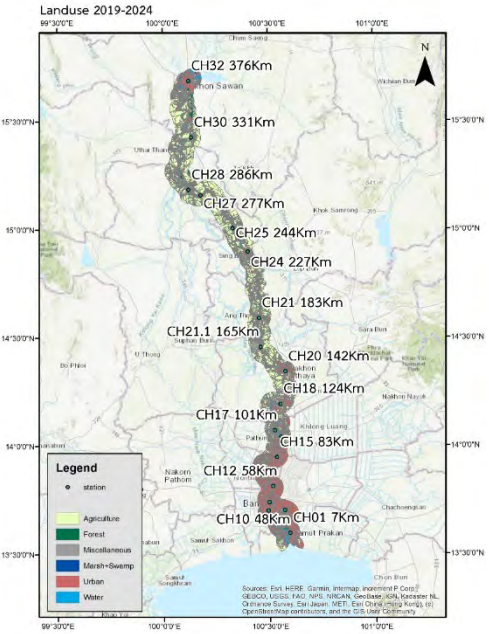
2015-2016



2017-2018



2019-2024



	River Section	First rank	Second rank
2015-2016	Up Mid Down	Agriculture Agriculture Urban	Urban Urban -
2017-2018	Up Mid Down	Agriculture Agriculture Urban	Urban Urban -
2019-2024	Up Mid Down	Agriculture Urban Urban	Urban Agriculture -

Seasonal and temporal variations in water quality

- Due to the limitations on the number of data, statistical analyses were applied to the basic water quality parameters (turbidity, conductivity, salinity, DO, BOD, TCB, FCB, TP, nitrate, nitrite, ammonia, SS, TS, TDS and hardness.
- Significant differences in the water quality among the dry and wet seasons were found in most water quality parameters except DO.
- Comparing the downstream to middle- and upstream, significant differences in the water quality of the downstream to those of the middle and upstream were found in most water quality parameters except turbidity (middle stream).
- Comparing the middle- to upstream, significant differences in the water quality of the middle stream to those of upstream were found in most water quality parameters except BOD, FCB, TP, and nitrite.

Behaviors of pollutants in the Chao Phraya River

Results of principal component analysis

Component Matrix[a]

	Component			
	1	2	3	4
pH	-.313	-.378	.424	.565
Turbidity	-.015	.334	-.506	.610
Conductivity	.860	-.433	-.098	.007
Salinity	.866	-.450	-.104	.021
DO	-.515	-.384	.040	.424
BOD	.541	.503	.321	-.057
TCB	.588	.585	.258	.168
FCB	.694	.499	.289	.161
TP	.304	-.018	.367	.505
Nitrate	.431	.045	.196	-.379
Nitrite	.418	.021	-.694	.046
Ammonia	.764	.181	.042	.119
SS	.281	.497	-.538	.156
TS	.875	-.431	-.102	.050
TDS	.873	-.436	-.098	.044
Headness	.807	-.067	.226	-.031

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Behaviors of pollutants can be simply classified into 4 groups. This can be implied to the same sources of water pollution in each group.

- Group 1 : Conductivity, salinity, TS, TDS, Hardness
- Group 2 : BOD, TCB, FCB, SS
- Group 3 : BOD, TCB, FCB, TP
- Group 4 : pH, turbidity, TP

Potential sources of water pollution

Results of correlation analysis

Correlations

		LU_A	LU_F	LU_M	LU_MA	LU_U	Conductivity	Salinity	TS	TDS	Hardness
LU_A	Pearson Correlation	1	.892**	.933**	.974**	-.388**	-.359**	-.349**	-.165**	-.335**	-.336**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	722	722	722	722	722	719	719	655	533	388
LU_F	Pearson Correlation	.892**	1	.723**	.949**	.012	-.187**	-.181**	-.111**	-.130**	-.193**
	Sig. (2-tailed)	.000		.000	.000	.752	.000	.000	.004	.003	.000
	N	722	722	722	722	722	719	719	655	533	388
LU_M	Pearson Correlation	.933**	.723**	1	.883**	-.666**	-.484**	-.472**	-.231**	-.474**	-.474**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	722	722	722	722	722	719	719	655	533	388
LU_MA	Pearson Correlation	.974**	.949**	.883**	1	-.258**	-.296**	-.287**	-.133**	-.302**	-.276**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.001	.000	.000
	N	722	722	722	722	722	719	719	655	533	388
LU_U	Pearson Correlation	-.388**	.012	-.666**	-.258**	1	.526**	.515**	.248**	.524**	.506**
	Sig. (2-tailed)	.000	.752	.000	.000		.000	.000	.000	.000	.000
	N	722	722	722	722	722	719	719	655	533	388
Conductivity	Pearson Correlation	-.359**	-.187**	-.484**	-.296**	.526**	1	.999**	.601**	.960**	.909**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	719	719	719	719	719	719	719	653	532	387
Salinity	Pearson Correlation	-.349**	-.181**	-.472**	-.287**	.515**	.999**	1	.607**	.963**	.911**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	719	719	719	719	719	719	719	653	532	387
TS	Pearson Correlation	-.165**	-.111**	-.231**	-.133**	.248**	.601**	.607**	1	1.000**	.574**
	Sig. (2-tailed)	.000	.004	.000	.001	.000	.000	.000		.000	.000
	N	655	655	655	655	655	653	653	655	466	354
TDS	Pearson Correlation	-.335**	-.130**	-.474**	-.302**	.524**	.960**	.963**	1.000**	1	.926**
	Sig. (2-tailed)	.000	.003	.000	.000	.000	.000	.000	.000		.000
	N	533	533	533	533	533	532	532	466	533	293
Hardness	Pearson Correlation	-.336**	-.193**	-.474**	-.276**	.506**	.909**	.911**	.574**	.926**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	388	388	388	388	388	387	387	354	293	388

**. Correlation is significant at the 0.01 level (2-tailed).

Group 1 :
Conductivity, salinity, TS, TDS, Hardness

Potential sources :
Urban areas

Potential sources of water pollution

Results of correlation analysis

Correlations

		LU_A	LU_F	LU_M	LU_MA	LU_U	BOD	TCB	FCB	SS
LU_A	Pearson Correlation	1	.892**	.933**	.974**	-.388**	-.361**	-.302**	-.224**	.045
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.240
	N	722	722	722	722	722	709	713	713	697
LU_F	Pearson Correlation	.892**	1	.723**	.949**	.012	-.142**	-.146**	-.105**	.112**
	Sig. (2-tailed)	.000		.000	.000	.752	.000	.000	.005	.003
	N	722	722	722	722	722	709	713	713	697
LU_M	Pearson Correlation	.933**	.723**	1	.883**	-.666**	-.504**	-.417**	-.324**	-.005
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.902
	N	722	722	722	722	722	709	713	713	697
LU_MA	Pearson Correlation	.974**	.949**	.883**	1	-.258**	-.280**	-.257**	-.180**	.074
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.051
	N	722	722	722	722	722	709	713	713	697
LU_U	Pearson Correlation	-.388**	.012	-.666**	-.258**	1	.594**	.443**	.372**	.142**
	Sig. (2-tailed)	.000	.752	.000	.000		.000	.000	.000	.000
	N	722	722	722	722	722	709	713	713	697
BOD	Pearson Correlation	-.361**	-.142**	-.504**	-.280**	.594**	1	.513**	.439**	.313**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000
	N	709	709	709	709	709	709	701	700	684
TCB	Pearson Correlation	-.302**	-.146**	-.417**	-.257**	.443**	.513**	1	.750**	.107**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.005
	N	713	713	713	713	713	701	713	704	688
FCB	Pearson Correlation	-.224**	-.105**	-.324**	-.180**	.372**	.439**	.750**	1	.156**
	Sig. (2-tailed)	.000	.005	.000	.000	.000	.000	.000		.000
	N	713	713	713	713	713	700	704	713	688
SS	Pearson Correlation	.045	.112**	-.005	.074	.142**	.313**	.107**	.156**	1
	Sig. (2-tailed)	.240	.003	.902	.051	.000	.000	.005	.000	
	N	697	697	697	697	697	684	688	688	697

**. Correlation is significant at the 0.01 level (2-tailed).

Group 2 :
BOD, TCB, FCB, SS

Potential sources :
Urban areas and forest (SS)

Potential sources of water pollution

Results of correlation analysis

Correlations

		LU_A	LU_F	LU_M	LU_MA	LU_U	pH	BOD	TCB	FCB	TP
LU_A	Pearson Correlation	1	.892**	.933**	.974**	-.388**	.180**	-.361**	-.302**	-.224**	-.172**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	722	722	722	722	722	722	709	713	713	687
LU_F	Pearson Correlation	.892**	1	.723**	.949**	.012	.135**	-.142**	-.146**	-.105**	.002
	Sig. (2-tailed)	.000		.000	.000	.752	.000	.000	.000	.005	.966
	N	722	722	722	722	722	722	709	713	713	687
LU_M	Pearson Correlation	.933**	.723**	1	.883**	-.666**	.215**	-.504**	-.417**	-.324**	-.220**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	722	722	722	722	722	722	709	713	713	687
LU_MA	Pearson Correlation	.974**	.949**	.883**	1	-.258**	.177**	-.280**	-.257**	-.180**	-.111**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.003
	N	722	722	722	722	722	722	709	713	713	687
LU_U	Pearson Correlation	-.388**	.012	-.666**	-.258**	1	-.185**	.594**	.443**	.372**	.307**
	Sig. (2-tailed)	.000	.752	.000	.000		.000	.000	.000	.000	.000
	N	722	722	722	722	722	722	709	713	713	687
pH	Pearson Correlation	.180**	.135**	.215**	.177**	-.185**	1	-.265**	-.244**	-.171**	-.073
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.055
	N	722	722	722	722	722	722	709	713	713	687
BOD	Pearson Correlation	-.361**	-.142**	-.504**	-.280**	.594**	-.265**	1	.513**	.439**	.302**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	709	709	709	709	709	709	709	701	700	677
TCB	Pearson Correlation	-.302**	-.146**	-.417**	-.257**	.443**	-.244**	.513**	1	.750**	.228**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	713	713	713	713	713	713	701	713	704	678
FCB	Pearson Correlation	-.224**	-.105**	-.324**	-.180**	.372**	-.171**	.439**	.750**	1	.253**
	Sig. (2-tailed)	.000	.005	.000	.000	.000	.000	.000	.000		.000
	N	713	713	713	713	713	713	700	704	713	680
TP	Pearson Correlation	-.172**	.002	-.220**	-.111**	.307**	-.073	.302**	.228**	.253**	1
	Sig. (2-tailed)	.000	.966	.000	.003	.000	.055	.000	.000	.000	
	N	687	687	687	687	687	687	677	678	680	687

**. Correlation is significant at the 0.01 level (2-tailed).

Group 3 :
BOD, TCB, FCB, TP

Potential sources :
Urban areas

Potential sources of water pollution

Results of correlation analysis

Correlations

		LU_A	LU_F	LU_M	LU_MA	LU_U	pH	Turbidity	TP
LU_A	Pearson Correlation	1	.892**	.933**	.974**	-.388**	.180**	.061	-.172**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.113	.000
	N	722	722	722	722	722	722	680	687
LU_F	Pearson Correlation	.892**	1	.723**	.949**	.012	.135**	.136**	.002
	Sig. (2-tailed)	.000		.000	.000	.752	.000	.000	.966
	N	722	722	722	722	722	722	680	687
LU_M	Pearson Correlation	.933**	.723**	1	.883**	-.666**	.215**	.008	-.220**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.828	.000
	N	722	722	722	722	722	722	680	687
LU_MA	Pearson Correlation	.974**	.949**	.883**	1	-.258**	.177**	.087*	-.111**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.024	.003
	N	722	722	722	722	722	722	680	687
LU_U	Pearson Correlation	-.388**	.012	-.666**	-.258**	1	-.185**	.134**	.307**
	Sig. (2-tailed)	.000	.752	.000	.000		.000	.000	.000
	N	722	722	722	722	722	722	680	687
pH	Pearson Correlation	.180**	.135**	.215**	.177**	-.185**	1	-.165**	-.073
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.055
	N	722	722	722	722	722	722	680	687
Turbidity	Pearson Correlation	.061	.136**	.008	.087*	.134**	-.165**	1	.105**
	Sig. (2-tailed)	.113	.000	.828	.024	.000	.000		.007
	N	680	680	680	680	680	680	680	650
TP	Pearson Correlation	-.172**	.002	-.220**	-.111**	.307**	-.073	.105**	1
	Sig. (2-tailed)	.000	.966	.000	.003	.000	.055	.007	
	N	687	687	687	687	687	687	650	687

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Group 4 :
pH, turbidity, TP

Potential sources :
pH – Agriculture, forest, miscellaneous, and marsch+swamp areas.

Potential sources :
Turbidity – Forest and urban areas.

Potential sources :
TP – Urban areas.

Summary on the potential sources of water pollution

Statistical analyses clearly indicated that ;

- "Urban areas" are the most significant sources of water pollution in the Chao Phraya River.
- The increases in urban areas would cause the increasing in water pollution.

A step forward …

More detailed information on the different types of urban areas will be acquired and analyzed for the source identification of water pollution.

SUMMARY ON THE PURPOSE OF WATER QUALITY INDEX

Based on the literature reviews, water quality index (WQI) are commonly developed for the following objectives;

1) General water quality (Multi-purpose)

- Vietnam
- Malaysia
- Thailand

2) Target quality, (Frequency and extent to which water quality exceeds the target value)

- Korea – Natural level
- Mekong – Human health
- Mekong – Aquatic life

Common water quality parameters used for WQI

	Vietnam	Malaysia	Thailand	Korea	Mekong *Aquatic life*	Mekong *Human health*
Group 1: Physics	pH, DO	pH, DO, SS	DO	pH, DO, SS	pH, EC, DO	pH, EC, DO
Group 2: DO consumption	BOD5, COD, TOC	BOD5, COD	BOD5	BOD5, COD		BOD5, COD
Group 3: Nutrient	$N\text{-}NH_4$, $N\text{-}NO_3$, $N\text{-}NO_2$, $P\text{-}PO_4$	$N\text{-}NH_4$	$N\text{-}NH_4$	$N\text{-}NH_4$,	$N\text{-}NH_4$, $N\text{-}NO_{2\text{-}3}$ TP	$N\text{-}NH_4$, $N\text{-}NO_{2\text{-}3}$
Group 4: Pathogen	Coliform E.coli	-	Total Coliform Fecal Coliform	-	-	-
Group 5: Heavy Metals	As, Cd, Pb, Cr^{6+}, Cu, Zn, Hg	-	-	-	-	-
Group 6: Pesticides	Aldrin, BHC, Dieldrin, DDTs, Heptachlor & Heptachlorepoxide	-	-	-	-	-

Most used: pH, DO, BOD5, COD, NH_3

DEVELOPMENT OF A NEW WATER QUALITY INDEX

A step forward …

- Development of 2 methods of WQI calculations to indicate water quality with;
  1) Consideration on 5 classes of national surface water classification.
  2) Typical/simple calculation without consideration on national surface water classification.

- Testing the application of proposed WQI to the 10-year monitoring results of all river basins in Thailand.

Thank you for your attention.