Joint Collaboration in Research and Educational Exchange Between Thuyloi & Kyoto Universities

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Kyoto - 22, March, 2017

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2. Collaborative research between Thuyloi and Kyoto University
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1. INTRODUCTION ABOUT THUYLOI UNIVERSITY (TLU)

Main campus in Hanoi, since 1959

New campus in Hung Yen province: in progress

175 Tay Son street, Dong Da district, Hanoi

- 9 specialized faculties;
- 5 Institutes;
- Consultant Company/Office
- 4 Centers;
- Supporting departments

Institute of Education and Scientific Application

In Central Region: Developed since December 1986

Main office: 115 Tran Phu,Phan Rang-Thap Cham, Ninh Thuan

Branches: Dalat, Lam Dong Province; Quy Nhon, Binh Dinh Province; and Phan Thiet, Binh Thuan Province.

Thuy loi University – The Southern Campus :

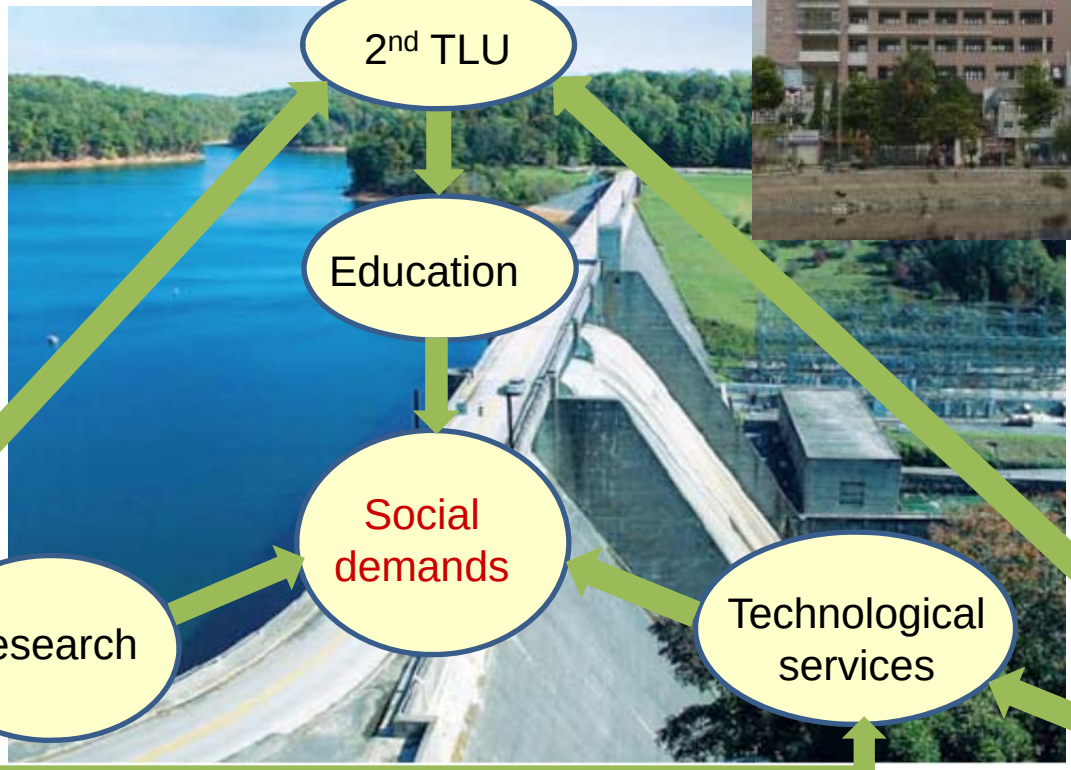
- Hochiminh City
- Binh Duong province

- 2th Campus of TLU;
- Institute for Water and Environmental Research;
- Company for Consultant and transfer water engineering.

- Development of the organizations

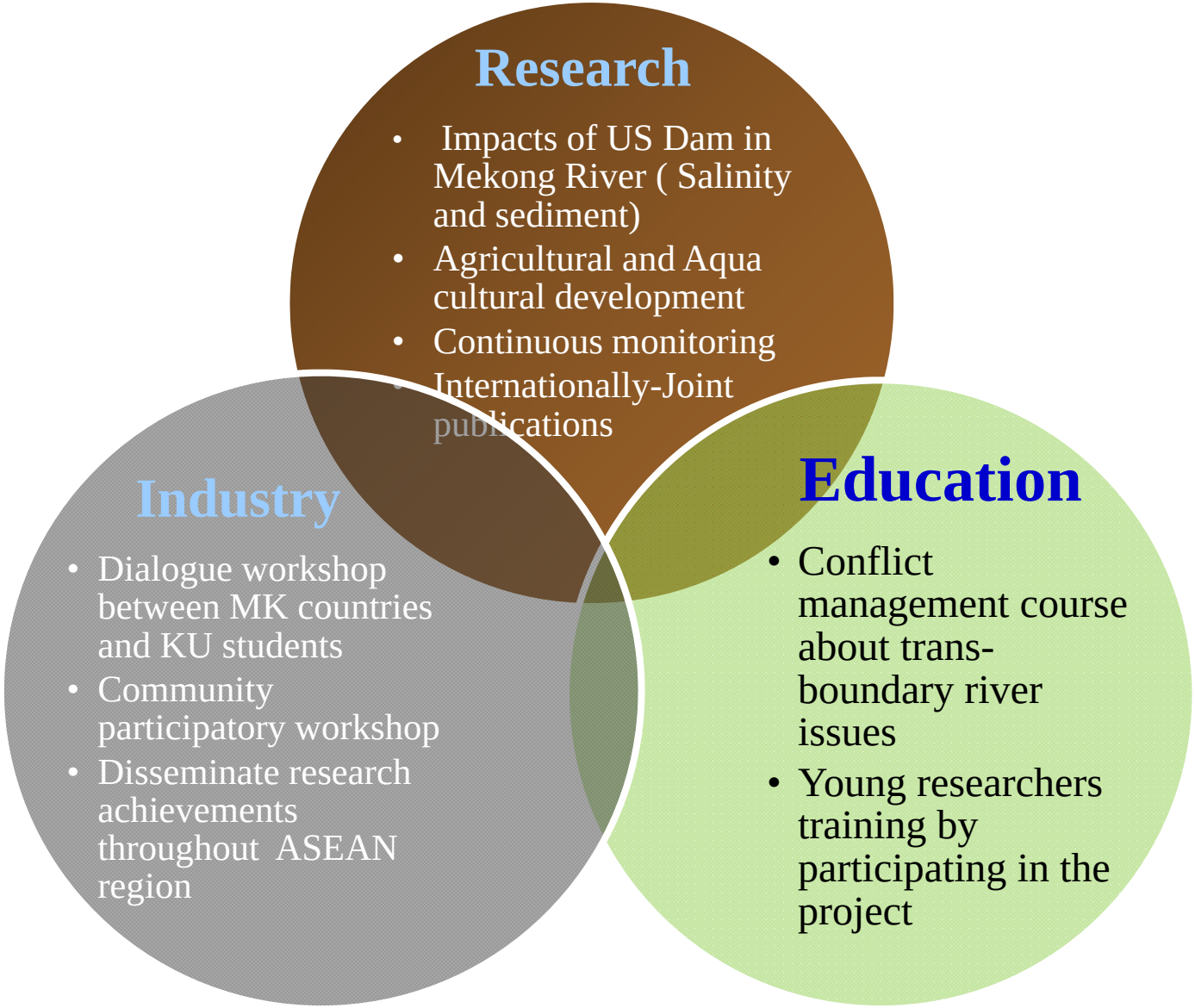
1976	1986	1997	2003	2007
DH1 Association	Center of DH 1	The 2th Base of Water Resources University	The 2th Base	The 2th Campus
			The Company	The Company
				The Institute

Tripod development model:



TLU: International Cooperation Network

Overall Goals and Plans of JASTIP project: Research, Education and Industry



2. COLLABORATIVE RESEARCH BETWEEN THUYLOI AND KYOTO UNIVERSITY

Motivation of MD project

Mekong river basin

Upper Mekong

- 24% of total area

- Length: 4,880 km
- Annual suspended sediment: 160 Mt/year

Lower Mekong

- 76% of total area

Mainstream and tributary dams

6 existed Lancang cascade dams

Dam	Catchment area (km^2)	Annual inflow (m^3/s)	Normal storage water level (m)	Dam height (m)	Total storage ($10^8 m^3$)	Active storage ($10^8 m^3$)	Installed capacity (MWh)	Guaranteed capability (MW)	Annual generation (10^4 MWh)	Reservoir filling
Gongguoqiao	97 300	985	1319	130	5.10	1.20	750	390	406	Sep. 2011
Xiaowan	113 300	1220	1240	292	151.32	98.95	4200	1854	1889	Dec. 2008
Manwan	114 500	1230	994	132	10.60	2.57	1500	807	781	Mar. 1993
Daochaoshan	121 000	1340	899	120.5	8.84	3.67	1350	712	670	Nov. 2001
Nuozhadu	144 700	1750	812	260	223.68	121.95	5500	2403	2378	Nov. 2011
Jinghong	149 100	1840	602	107	12.33	2.49	1500	833	806	Apr. 2008
Total					411.87	230.83	14800	6999	6929	

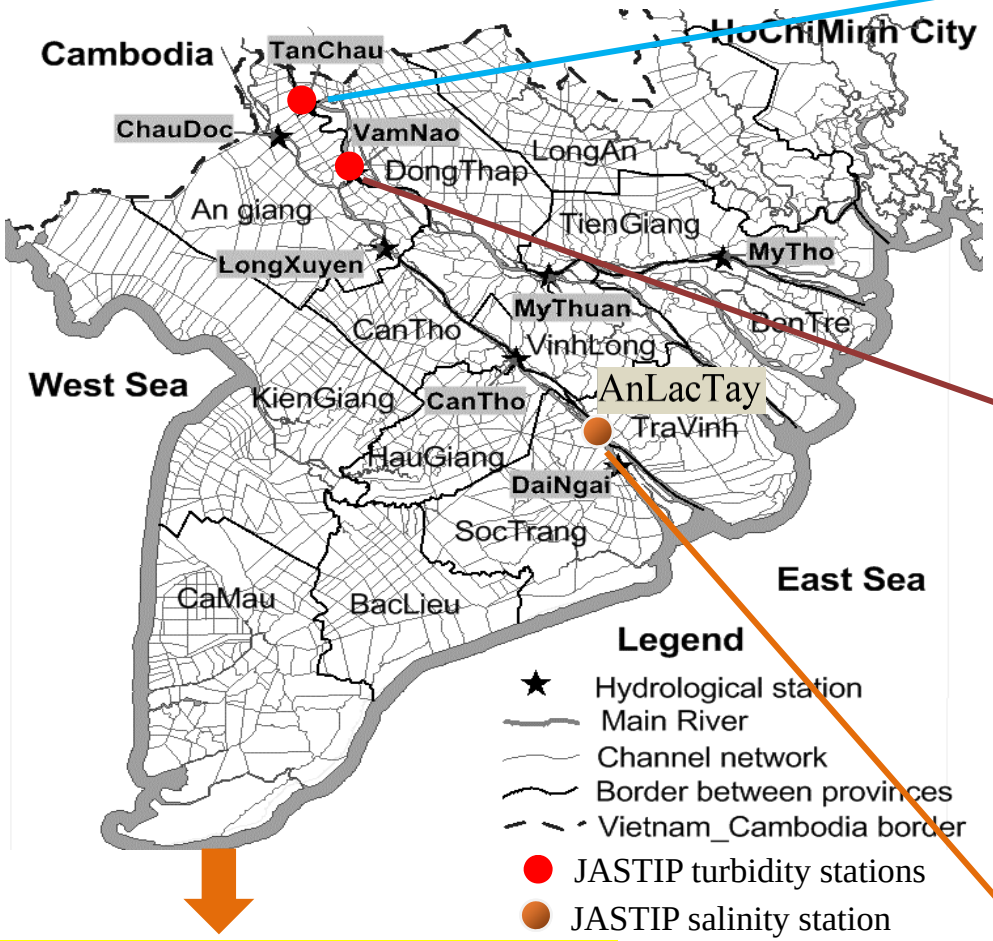
construction along Mekong River and its tril

11 mainstream proposed dams in LMB

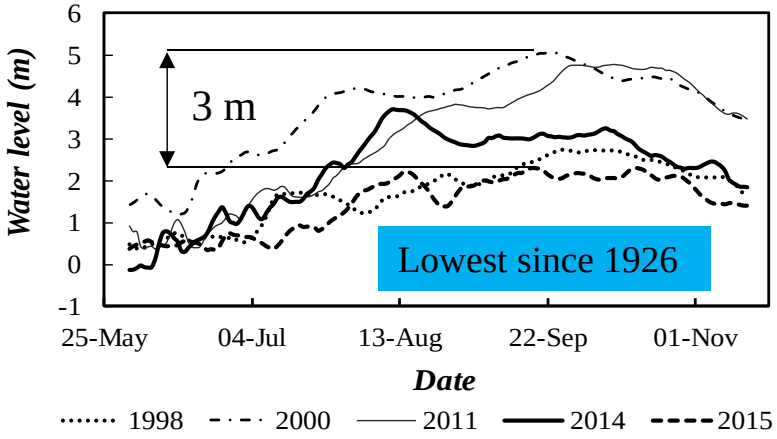
Project ID	Location	Design specifications									
		Rated head (m)	Plant design discharge (m3/s)	Installed capacity (MW)	Mean annual energy (GWh)	Full supply level (mams)	Low supply level (mamsl)	Live storage (mcm)	Reservoir area (Km2)	Dam length (m)	Dam height (m)
Pak Beng	Lao PDR	31	7,250	1,230	5,517	345	340	442	87	943	76
Luang Prabang	Lao PDR	25.1	5,095	1,100	5,437	310	300	734	56	823	46.8
Xayaburi	Lao PDR	28.5	5,000	1,260	6,035	275	270	678	49	810	63
Pak Lay	Lao PDR	26	4,500	1,320	6,460	240	235	384	108	630	35
Sanakham	Lao PDR	25	5,918	700	5,015	215	210	206	81	1,144	38
Pakchom	Lao PDR Thailand	22	5,720	1,079	5,318	192	190	441	74	1,200	55
Ban Koum	Lao PDR Thailand	19	11,700	1,872	8,434	115	110	652	133	780	53
Lat Sua	Lao PDR	10.6	10,000	686	2,668	98	90	550	13	1,300	27
Don Sahong	Lao PDR	17	2,400	240	2,375	75	71	115	290 (ha)	1820-720-2730	10.6-8.2-8.3
Stung Treng	Cambodia	8.8	N/A	900	N/A	52	51	151	211	2,502	10
Sambor	Cambodia	16.5	N/A	2,600	N/A	40	38	1,450	620	18,002	56

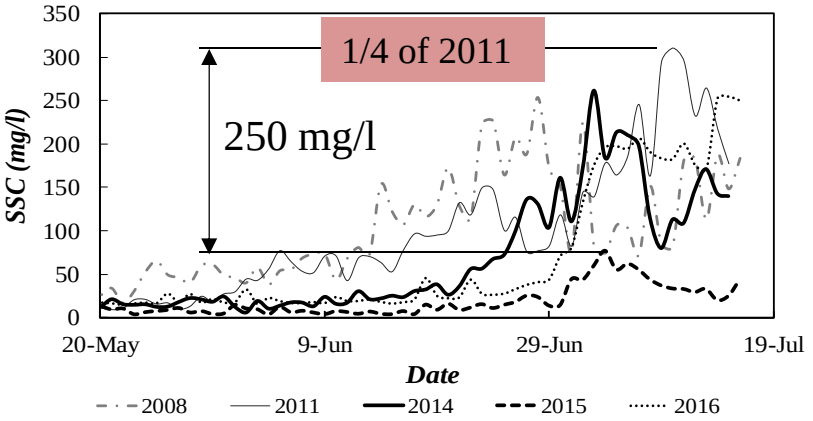
Keskinen et al., 2012

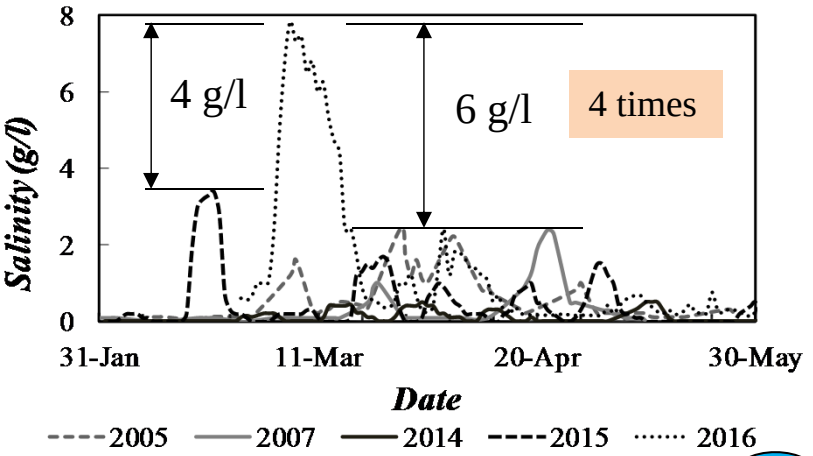
STUDY AREA – Vietnamese Mekong delta



- Area: 39,000 km^2
- Population: 17 million
- Livelihood: agro-aquaculture based

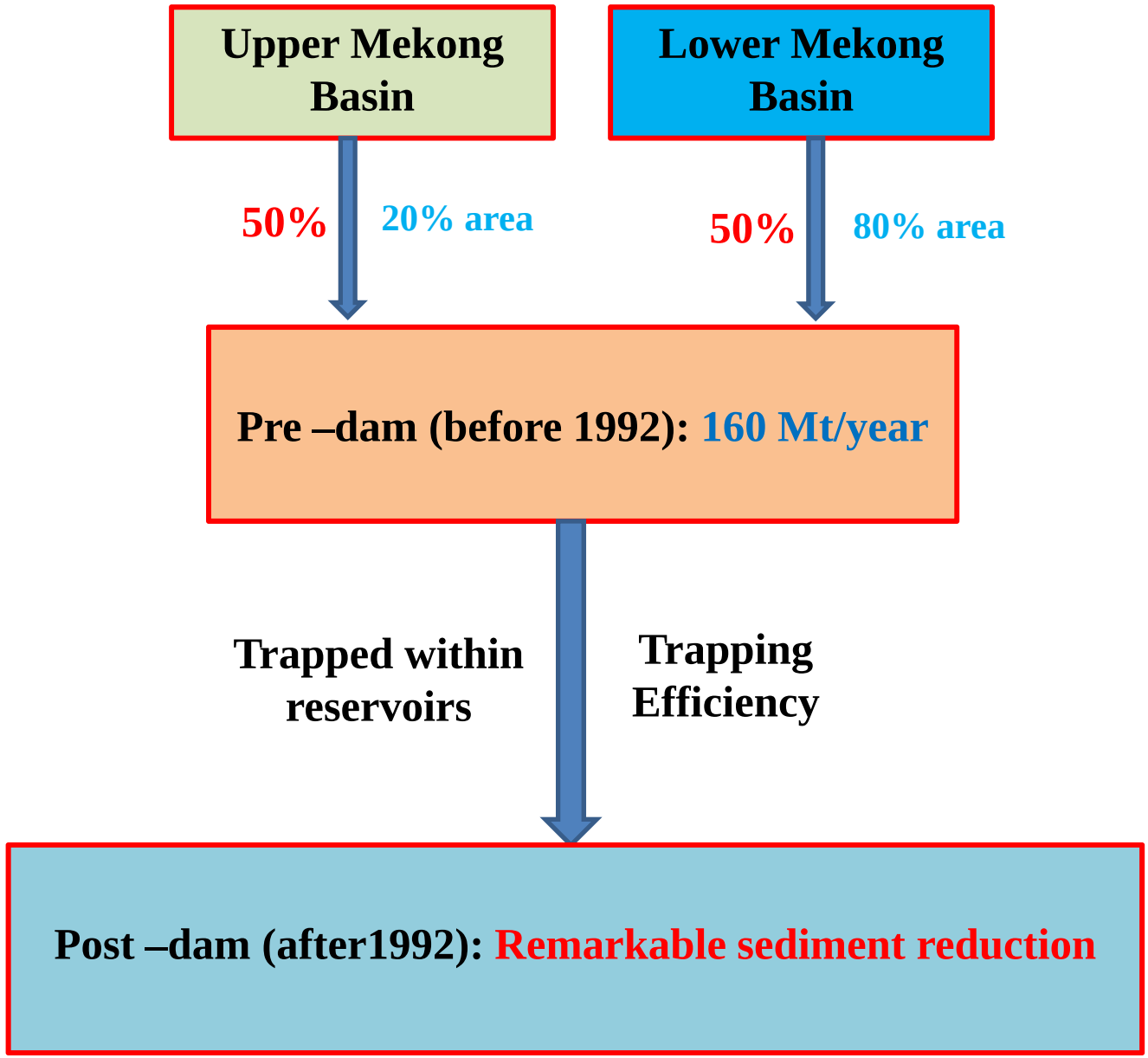






- 159,000 ha paddy field were damaged
- 195,217 households lacked fresh water

Sediment in Mekong river

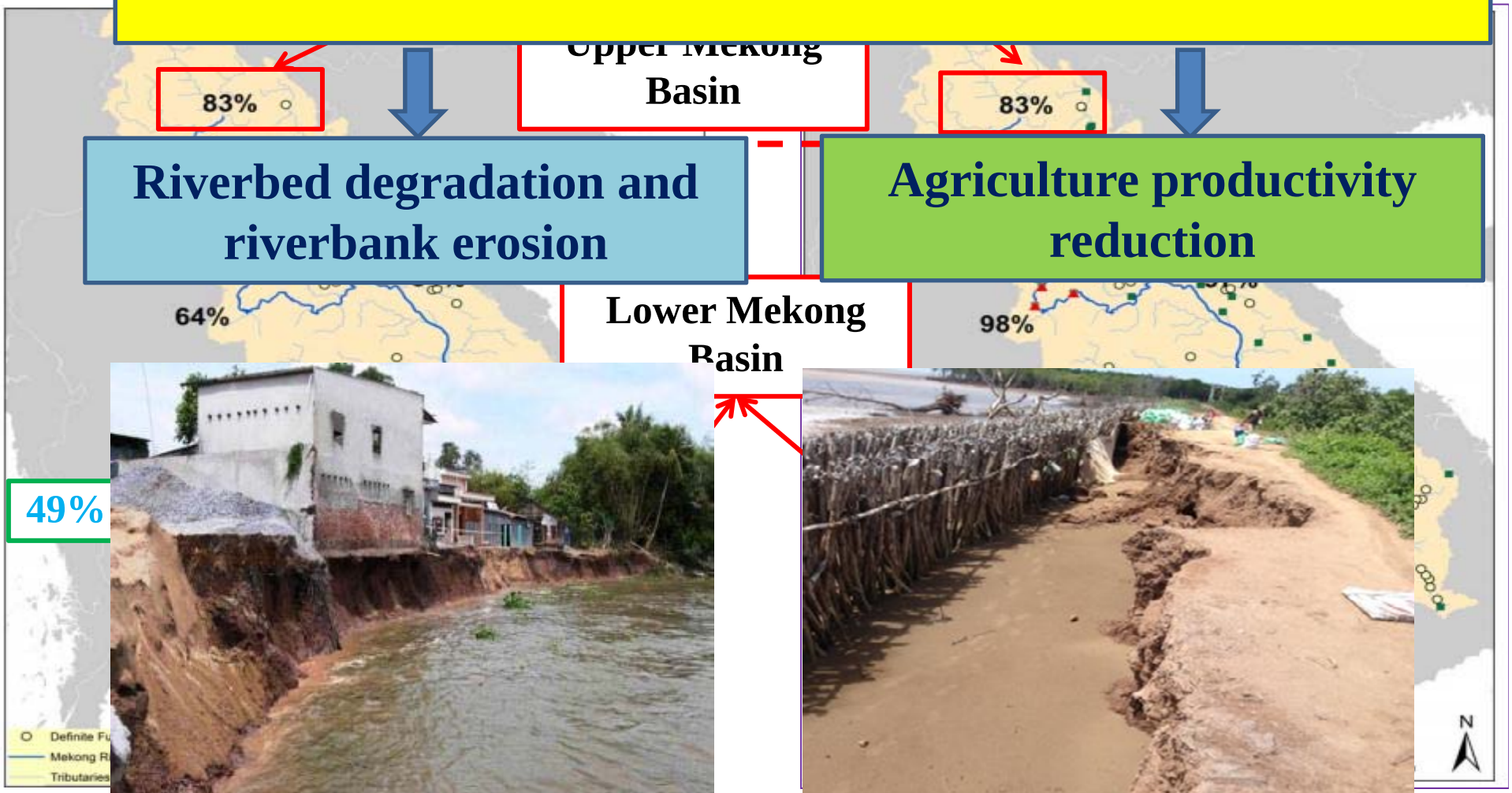


Sediment trapping efficiency

Sediment starvation in rivers

Riverbed degradation and riverbank erosion

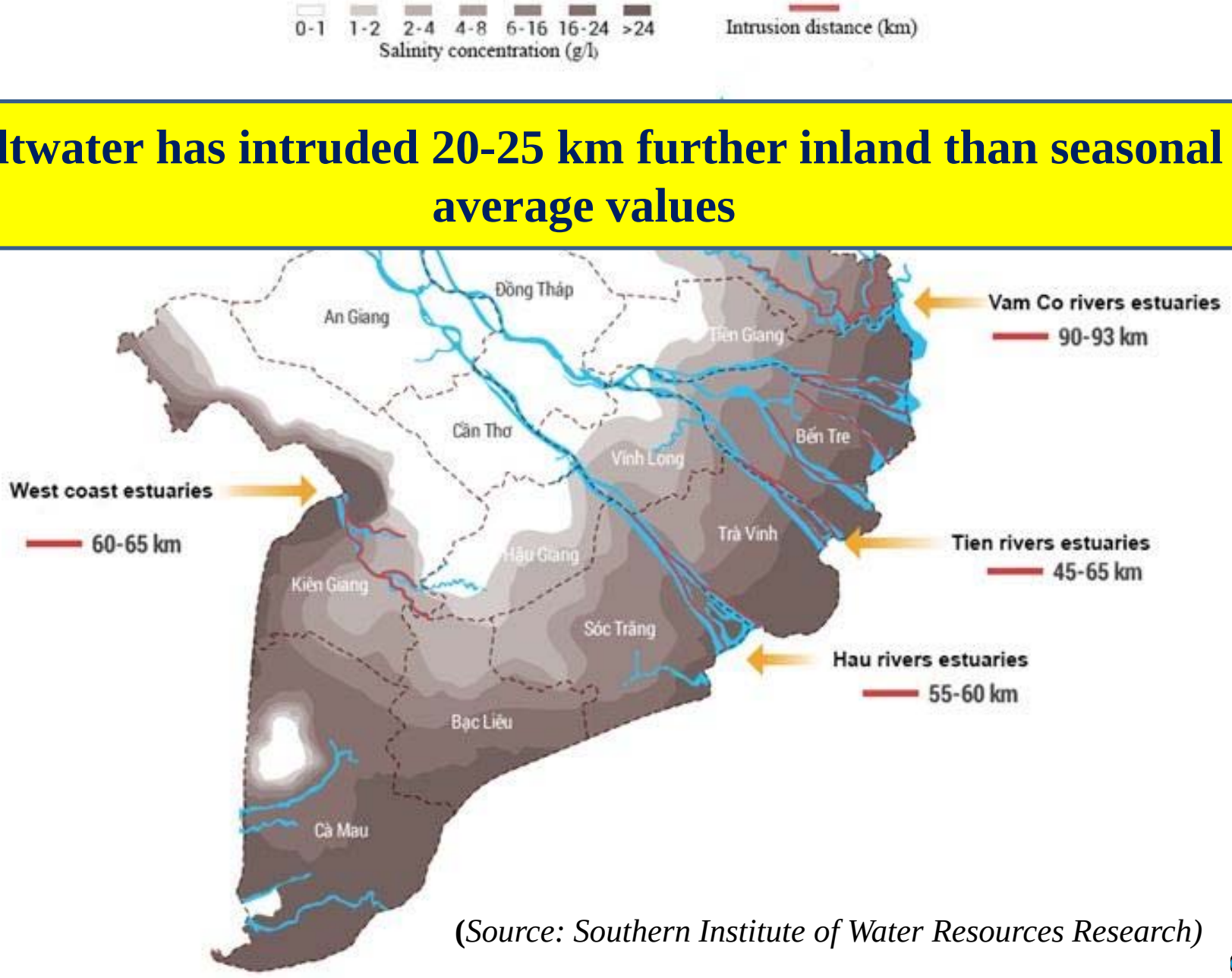
Agriculture productivity reduction



(Kondolf et al., 2014)

built

Map of Salinity Intrusion in the Vietnamese Mekong Delta (March, 2016)



Saltwater has intruded 20-25 km further inland than seasonal average values

(*Source: Southern Institute of Water Resources Research)*

Damaged rice crop area due to drought and salinity intrusion (March, 2016)

Lost estimation 2016:
7900 billion VND
~ 360 million USD

Research Project: Impacts of Upstream Dam Developments on Mekong Delta

Sediment reduction

- Evaluate the impact of upstream dams on sediment flux along main rivers in Vietnamese Mekong Delta
- Correlate the erosion rate of Mekong and Bassac riverbanks with the development of upstream dams
- Evaluate the combined influence of upstream dams and dyke system on lateral flow and sediment interchange between rivers and floodplains

Salinity Intrusion

- Define and classify flood flow characteristics (flood factors) under controls of upstream dams
- Integrate flood factors into salt intrusion simulation to extend advance time of forecasting

Expected outcomes of the project

- Better understanding of the impacts of dams upstream on sediment reduction and salinity intrusion, and the consequence upon agricultural (rice) productivity
- Raising the awareness among community of Mekong Countries about dam impacts and transboudary river issues
- Collaborative research, data and experience sharing for sustainable development.
- Joint publications and research proposal

Proposed framework for the project in the term of 5 years

Activity	Year						
	2015	2016	2017	2018	2019	2020	2021
Available data collection and analysis							
Equipment installation and monitoring							
Numerical simulation set-up							
Conflict management course							
Outcome analysis and paper publication							
Final recommendation and proposition of mitigative measures							

MD project achievements

Achievements from research activities

- Representative Office of Kyoto University in the Southern Campus of Thuyloi University.
- Meetings and discussions among TLU and KU researchers at TU (in years 2015 and 2016).
- Field trips for equipment installations and measurements: monitoring turbidity and salinity concentration at 5 stations (in years 2015-2017).
- Hydro-Asia in Lao PDR: networking, research results sharing.
- Visit KU by researchers of TU (in 2016).

Representative Office

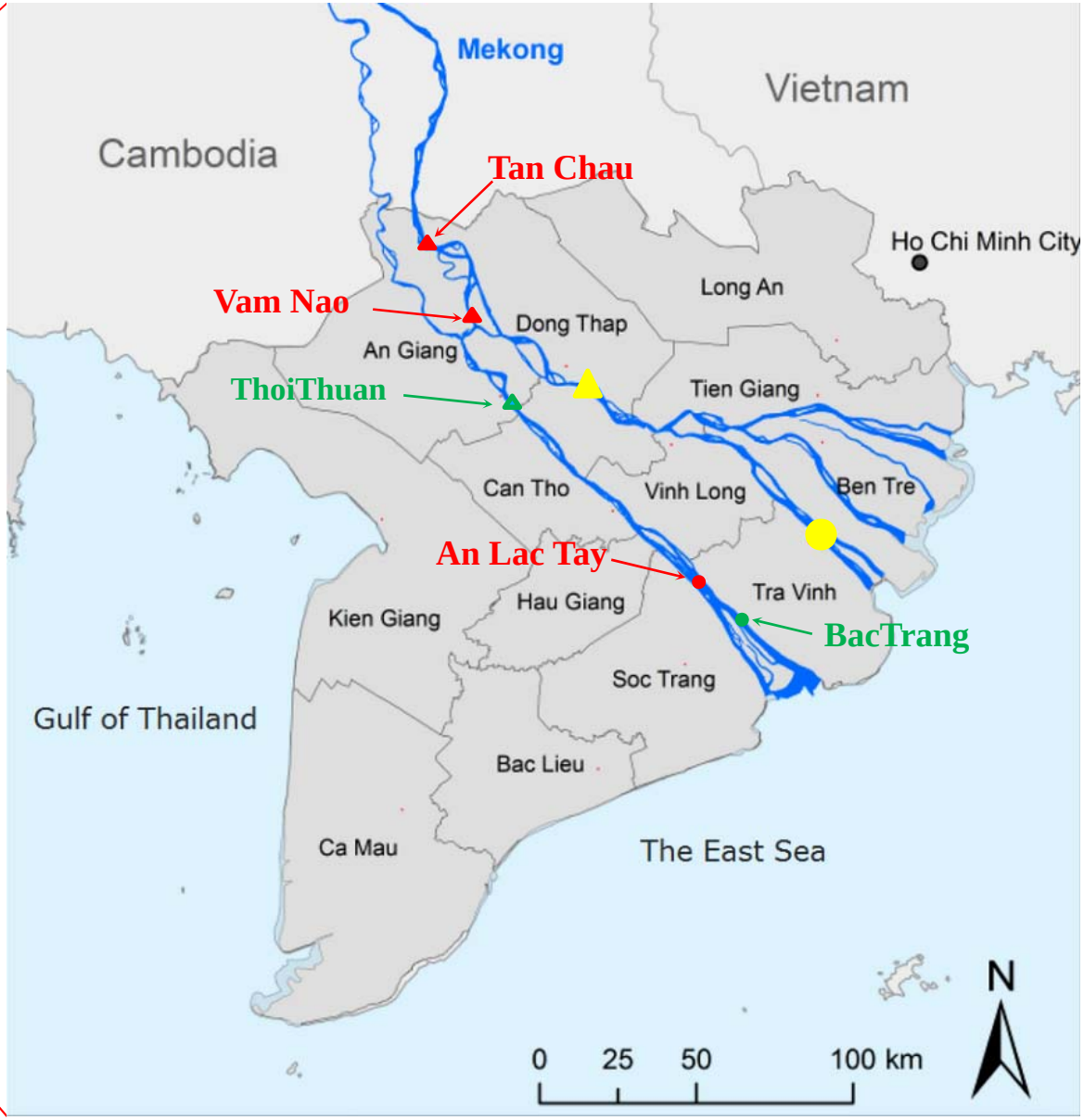
KYOTO UNIVERSITY
DISASTER PREVENTION RESEARCH INSTITUTE
(DPRI)
Kyoto University PROJECT OFFICE at TLU
Japan –ASEAN Science and Technology Innovation Platform (JASTIP)
Strategic International Collaborative Research Program (SICORP)

Meetings and discussion

Fieldtrip and installation

Hydro-Asia in Laos

Map of equipment installation sites



Legend:

- Turbidity (Feb.2016)
- Turbidity (Feb.2017)
- Turbidity (future)
- Salinity (Feb.2016)
- Salinity (Feb.2017)
- Salinity (future)

MD project achievements

Achievements from education and activities

- International course “Conflict Management in Transboundary Mekong River” for KU undergraduate students (in years 2015&2016).
- One Vietnamese PhD student is taking course in KU.
- Workshop dialogues by students and researchers of TLU and KU.

Conflict course

Workshop dialogue

Outcome and on-going works

Outcome

Accepted paper: Kantoush, S., Binh, D. V., Sumi, T., and Trung, L. V: Impact of upstream hydropower dams and climate change on hydrodynamics of Vietnamese Mekong Delta, *Annual Journal of Hydraulic Engineering*, JSCE, Vol. 61, 2017.

Submitted abstract to: 10th Symposium on River, Coast and Estuarine Morphodynamics

On-going steps

1. • **CALL FOR DIALOGUES WITHIN 6 RIPARIAN COUNTRIES OF MEKONG RIVER**
2. • Second PhD candidate are preparing required publications and documents to apply for RONPAKU this year.
3. • Analyzing collected and monitored data as well as establishing 2D numerical simulation for the whole Vietnamese Mekong Delta
4. • Preparing manuscripts submitting to some international journals and conferences.
5. • Establishing International workshop on “Sediment Bypass Tunnels” on May 9-12, 2017
6. • Having International exchange course “Conflict Management (Global Water Issues)” in 09/2017

3. Request for supports from JASTIP

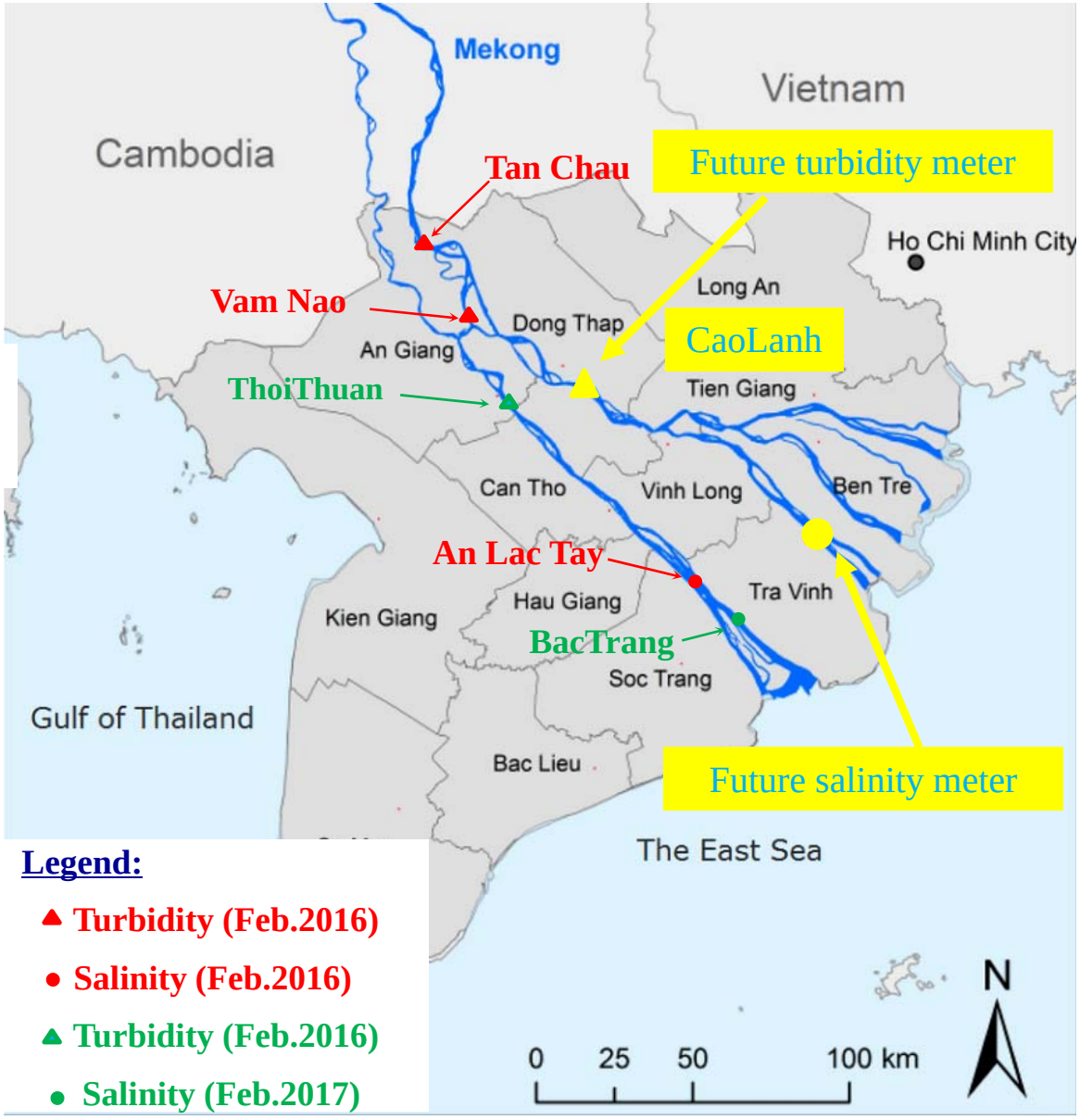
Necessary fund

1. Turbidity: ATU75W2-USB
   Price: 1,180,000 yen

2. Handheld turbidity: AAQ171
   Price: 1,870,000 yen

3. Salinity: ACTW-USB
   Price: 870,000 yen

TOTAL NECESSARY FUND
4,000,000 yen



4. New approved project in Vietnam funded by DPRI

1. Project name: Integrated study on sedimentation problems for sustainable reservoir management in Vietnam.

2. Project location: Vietnam

3. Project period: April. 1, 2017 – March. 31, 2019

4. Funded by: Disaster Prevention Research Institute, Kyoto University

5. Research objectives:

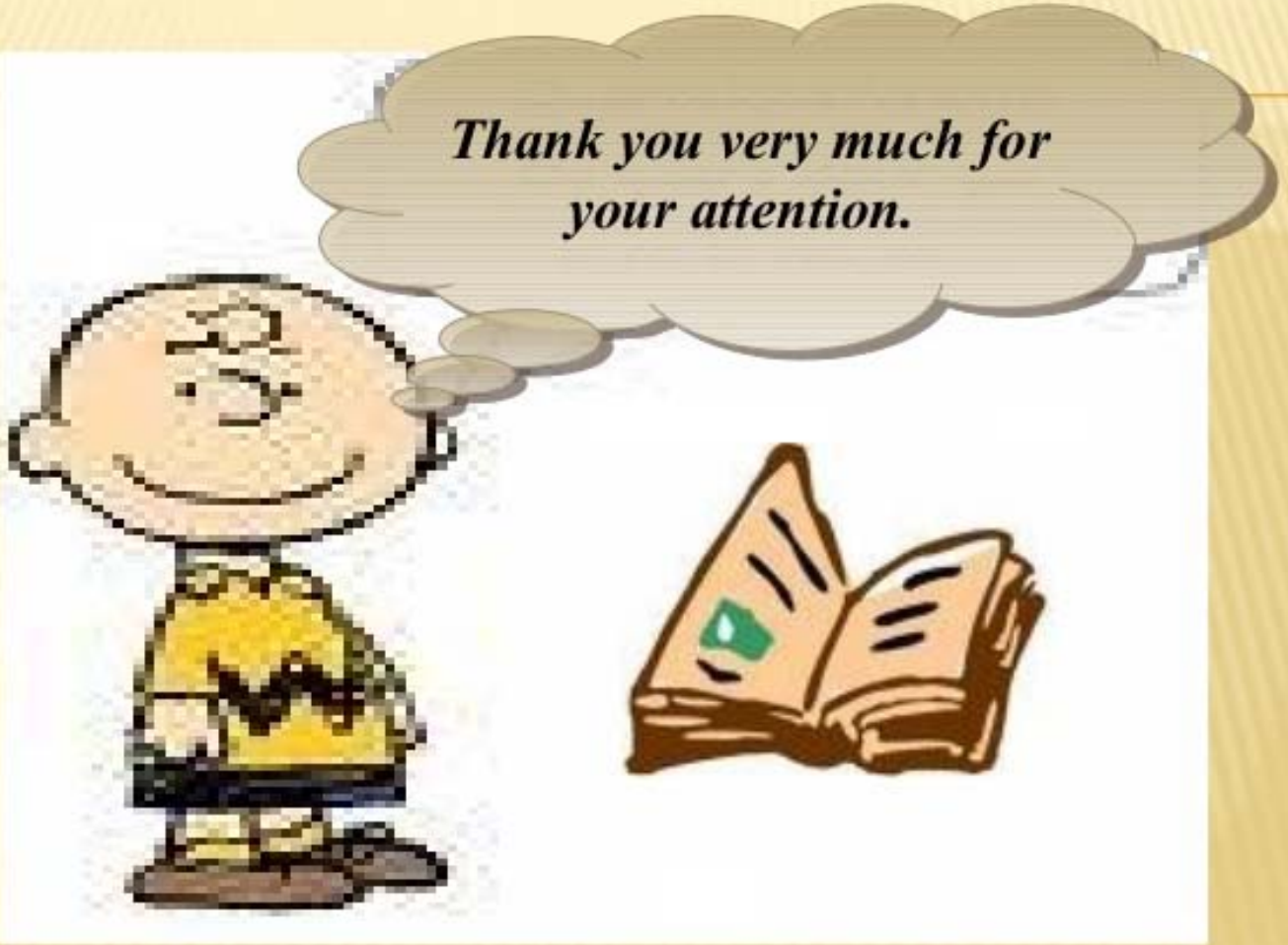
- To investigate, analyze, evaluate the current situation and cause of sedimentation in the reservoirs of Vietnam;
- To develop an indicator for reservoir classification based on sedimentation rate and reservoir longevity;
- To propose technical solutions for removing accumulated sediment in reservoirs (a case study in small/mid-reservoir in Central Vietnam); to develop an annual updated accumulated sediment database used for future reservoir sedimentation management.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude to:

1. **"Japan-ASEAN Science, Technology and Innovation Platform (JASTIP)"** project for financial and technical supports to project "***Impacts of Upstream Dam Development on Mekong Delta***" (MD project);

2. **Prof. Kaoru Takara –** Director of the **"Disaster Prevention Research Institute"** of Kyoto University for approving new project "***Integrated study on sedimentation problems for sustainable reservoir management in Vietnam***".


Thank you very much for
your attention.