The First Symposium on JASTIP Disaster Prevention International Cooperation Research
(JASTIP-WP4 Symposium)

March 22-23, 2017, Kihada Hall, Obaku Plaza, Uji Campus,
Kyoto University, Japan

Activities in Vietnam

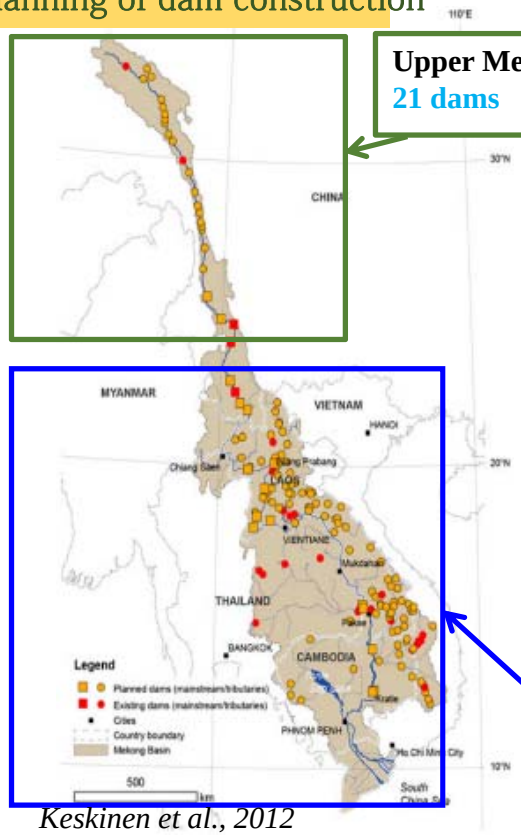
~ Introduction of Vietnam Project ~

Tetsuya Sumi and Yasuhiro Takemon
DPRI, Kyoto University

Project objectives

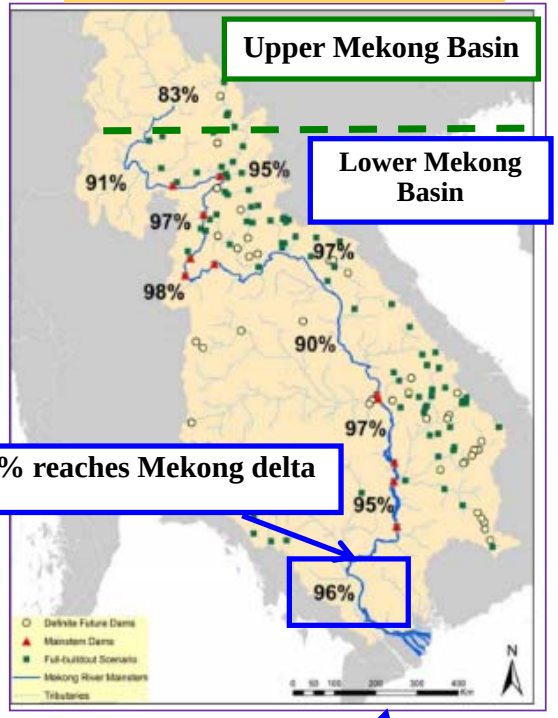
To create network with Thuy Loi Univ. in Vietnam on the Mekong River water management focusing on
1) Influence of upstream dam development on flow and sediment regimes,
2) Recent severe drought damages.

Planning of dam construction



Keskinen et al., 2012

Sediment trapping efficiency

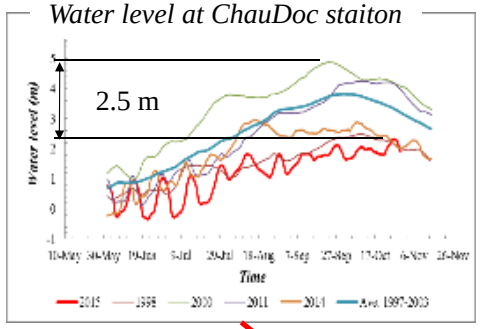


(Kondolf et al., 2014)

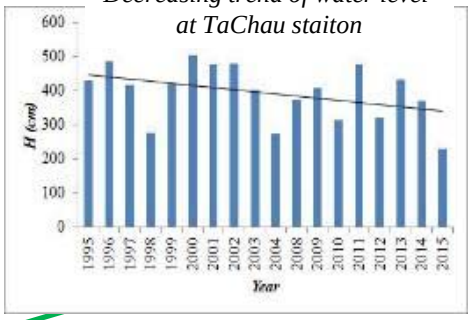
Lower Mekong: 136 dams
+ 31: under construction
+ 82: completed within next 20 years
+ 136: completed within next 40 years
(Kondolf et al., 2014)

Drought event 2015-2016

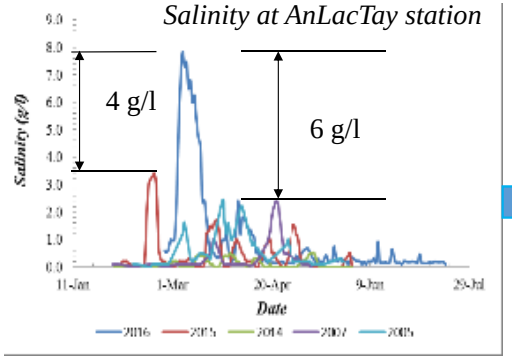
Water level at ChauDoc staiton



Decreasing trend of water level at TaChau staiton



Salinity at AnLacTay station



Mangosteen was died and replace by mango

Project activities in Vietnam

Kyoto University's office at Thuyloi University, Vietnam

International exchange course "Conflict Management (Global Water Issues)" in Vietnam

Research exchange meeting in Thuyloi University

Filed visit to Mekong Delta

Instrument installations

Legend:

▲ **Turbidity (in operation)**

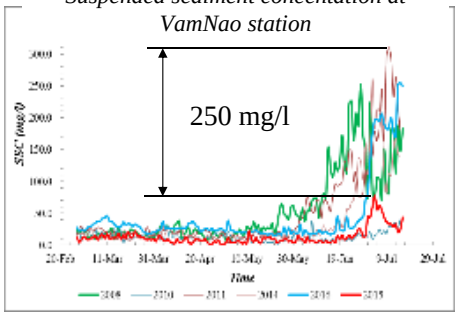
● **Salinity (in operation)**

Data collection at monitoring stations

Salinity collection at AnLacTay station

Turbidity collection at VamNao station

Suspended sediment concentation at VamNao station



Kyoto University's office at Thuyloi University, Vietnam

Director: Dr. La Vinh Trung

Purposes

1. Meeting place for researchers of Thuyloi Univ and Kyoto Univ.
2. Research place for PhD students
3. Storage of equipment and stationary stuff
4. Place for Vietnamese students and researchers to learn the project on Mekong Delta.

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)

Thuyloi University (TLU)

International exchange course “Conflict Management (Global Water Issues)” in Vietnam: 10 days Summer course program

Lecturers

Prof. Dr. Sumi Tetsuya AND Dr. Sameh A. KANTOUSH

International exchange course “Conflict Management (Global Water Issues)” in Vietnam: 10 days Summer course program

Filed visit to Ship Lock, Tidal Control Thi Nghe Culvert and Mekong Delta

Readings and Report

- The topic of the report is to read, discuss one of the following four topics regarding challenges facing Mekong River Basin with focusing on Vietnam. You will need to select a topic and summarize the current situation problems and How do we find the 18th Camel for the Mekong River?
- You will need to obtain relevant information and data for the presentation, and a short presentation 23rd **of July** (You will have **15 minutes**)
- The four topics are as following:
  1- Climate change
  2- Agricultural and irrigation
  3- Flooding and Water-related Diseases
  4- Mekong River commission and legalization

- Please discuss the following questions:

1- What are main problems and challenges?

2- What actions do the countries need to undertake to improve the current situation? to reduce uncertainty about future conditions; to minimize levels of risks in policy development, planning strategies and management of water and related resources

Recommended references

Shafiqul Islam, Lawrence E. Susskind『Water Diplomacy: A Negotiated Approach to Managing Complex Water Networks』 (RFF Press) ISBN:978-1617261039
Ben Boer, Philip Hirsch, Fleur Johns, Ben Saul, Natalia Scurrah
『The Mekong: A Socio-legal Approach to River Basin Development』(Routledge) ISBN: 978-1138788459
Mekong River Commission website, www.mrcmekong.org

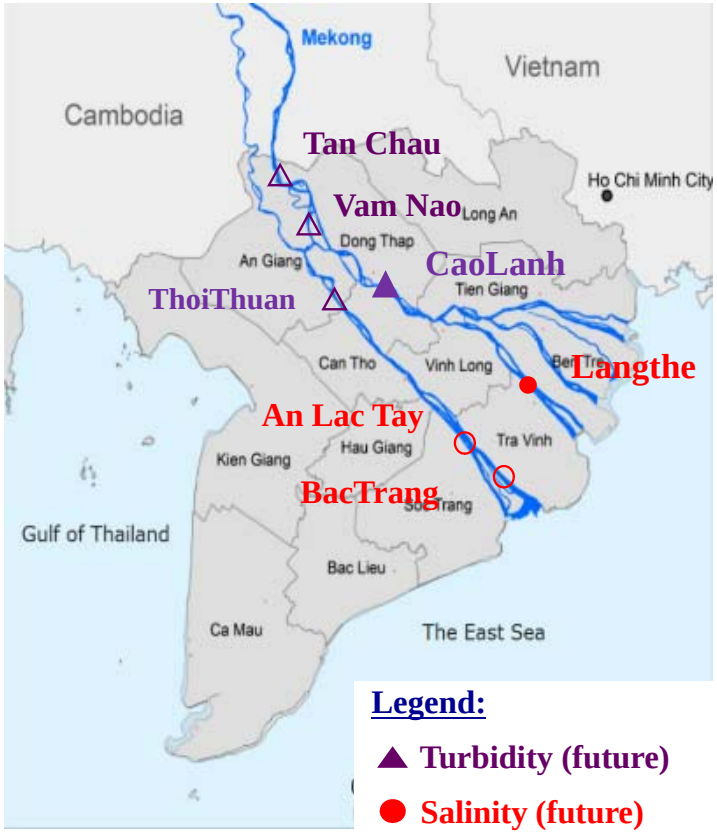
Outcome and On-going Works

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.

On-going steps

1. • Installing two more instrument: 1 turbidity meter and 1 salinity meter in Vietnamese Mekong Delta
2. • Analyzing collected and monitored data as well as establish 2D numerical simulation for the whole Vietnamese Mekong Delta
3. • Preparing manuscripts submitting to some international journals
4. • Preparing documents to submit to some conferences: (i) River flow 2018 in Lyon, France; (ii) 3rd International symposium on Flash Flood in Oman…
5. • Having International exchange course “Conflict Management (Global Water Issues)” in 09/2017



DPRI Annual Meeting, 2017

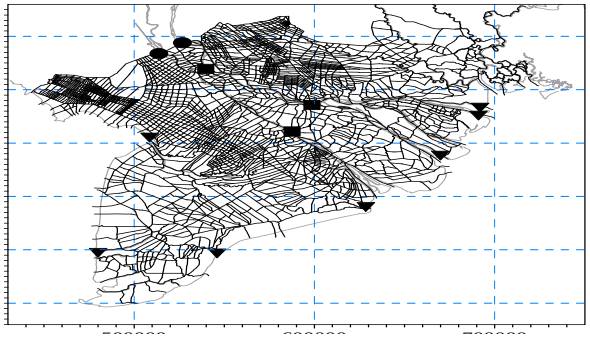
STUDY ON THE IMPACTS OF RIVER-DAMMING AND CLIMATE CHANGE ON THE MEKONG DELTA OF VIETNAM

Presenter: Doan Van Binh

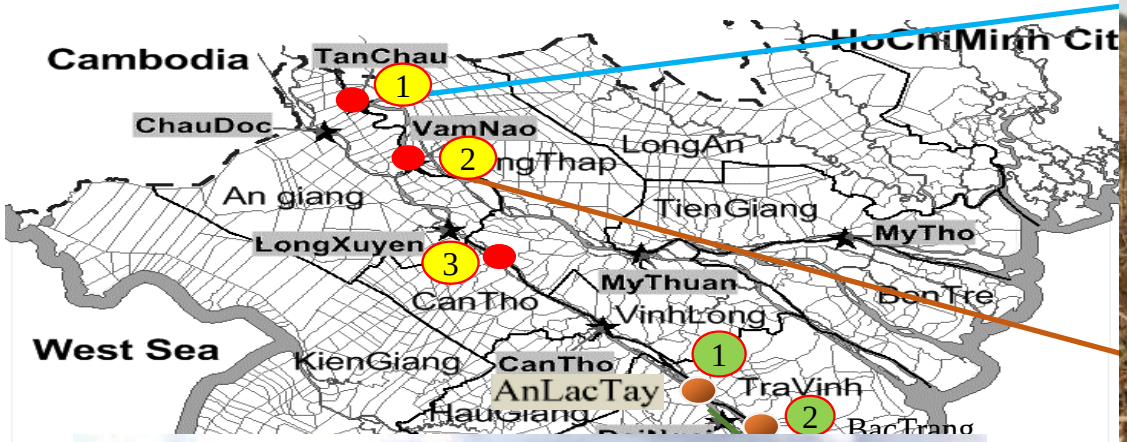
Supervisors: Prof. Sumi, Prof. Sameh

Date: Feb. 2017

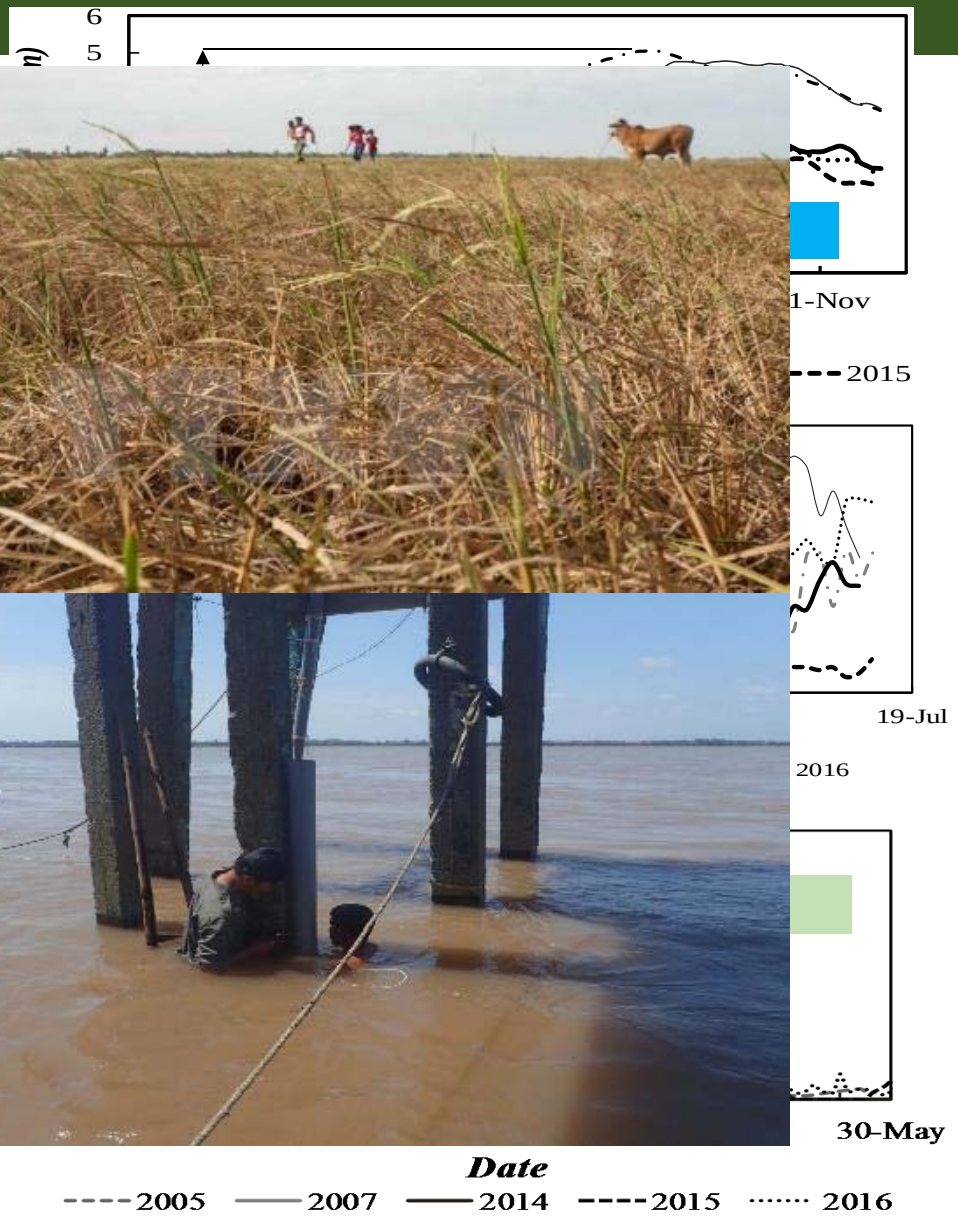
Place: Kyoto University – Uji Campus



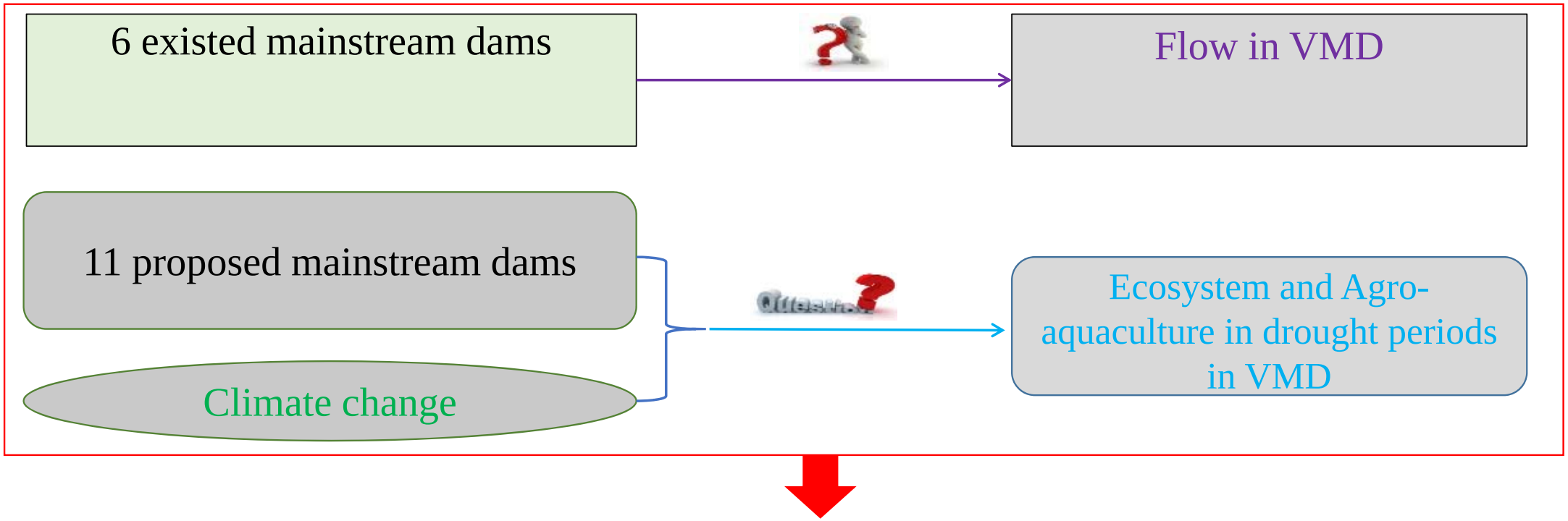
STUDY AREA – VIETNAMESE MEKONG DELTA



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



OBJECTIVES



Objective 1

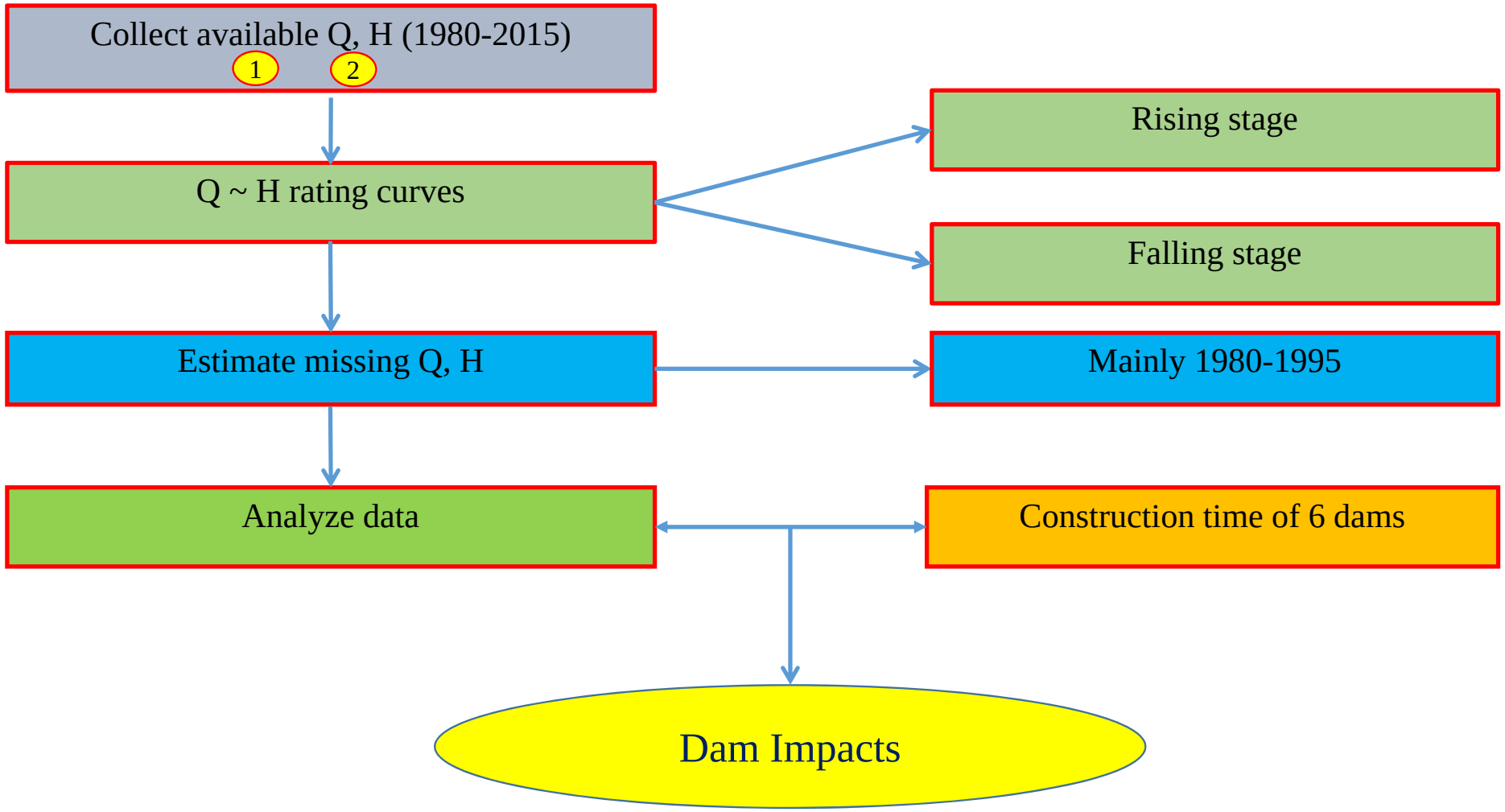
Impacts of 6 existed mainstream dams on hydrology of VMD

Objective 2

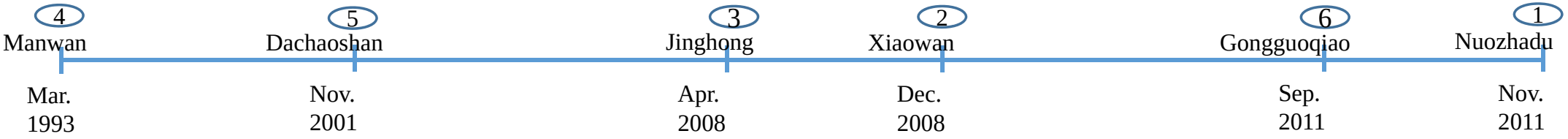
Impacts of 11 proposed mainstream dams in Thailand, Laos and Cambodia on hydrology of VMD under climate change

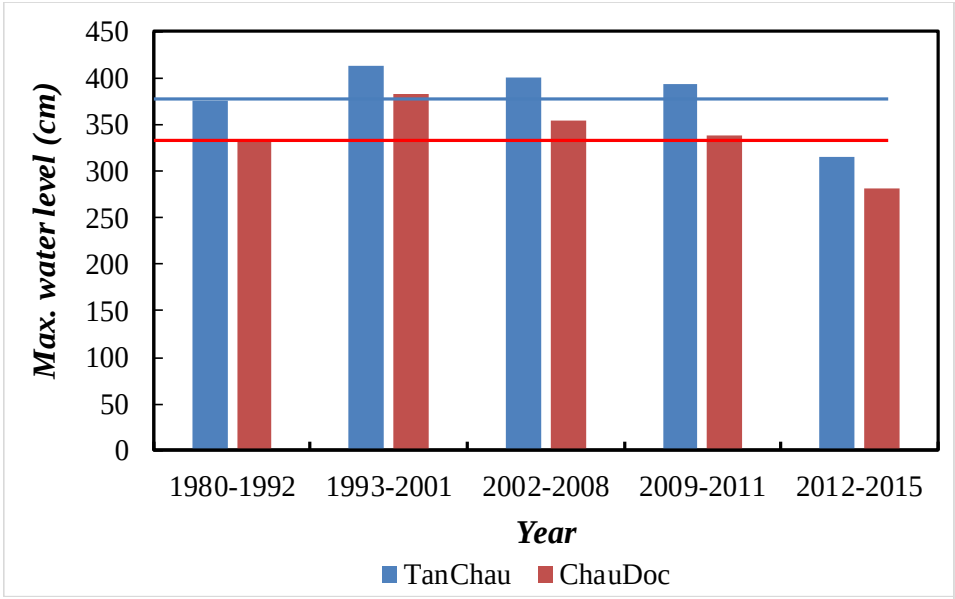
First Objective: Impacts of the 6 existing mainstream dams on VMD

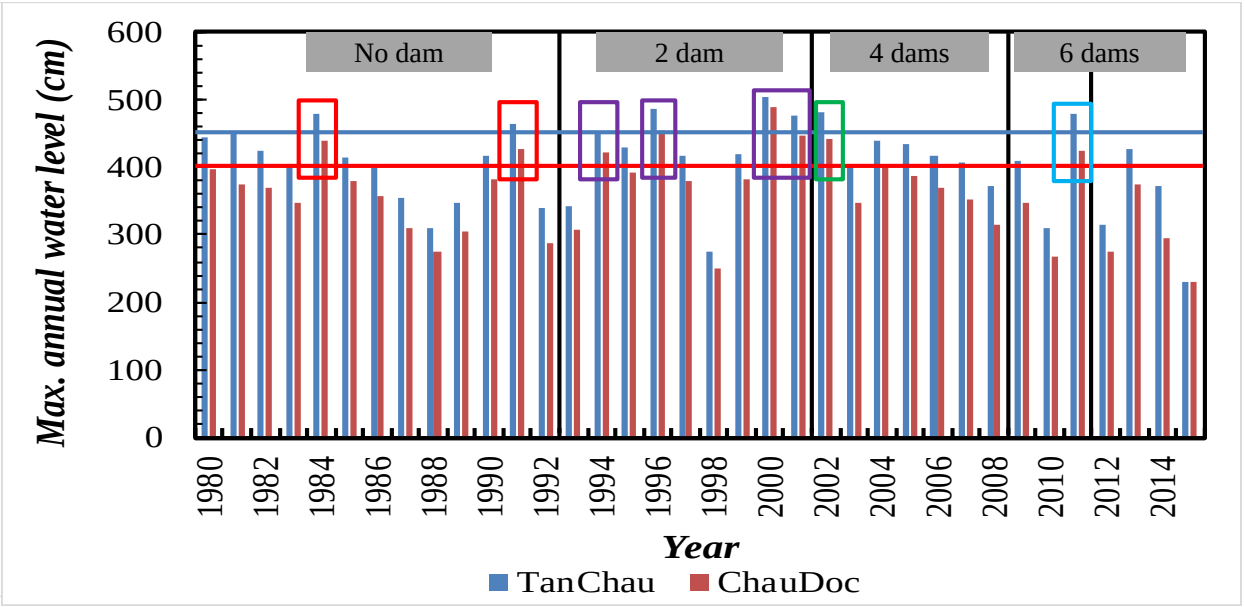
Methodology



Results: Chinese dam impact on flood peaks of VMD







Dams: reduce normal flood → while → VMD needs normal flood

Dams: cannot cut high flood → while → VMD needs high flood decreased

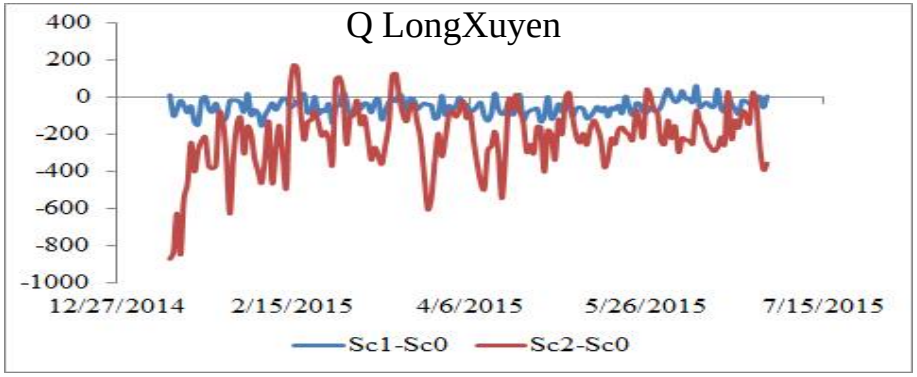
→ Six existed dams have negative impacts on VMD

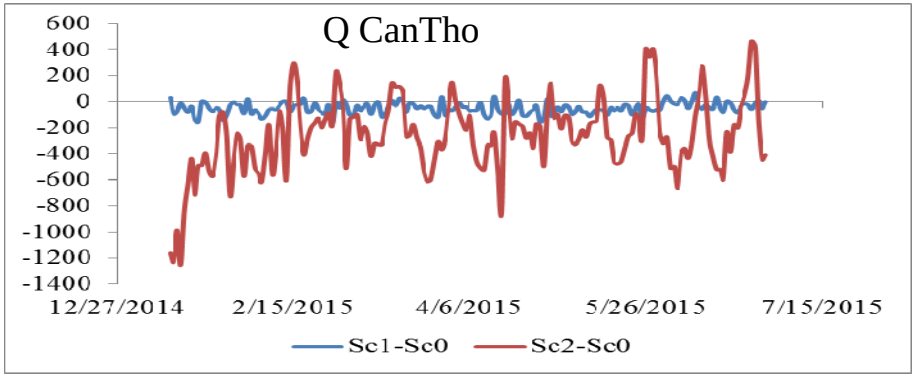
Second Objective: IMPACTS OF 11 PROPOSED DAMS ON VMD

Methodology Numerical model simulation under the following scenarios

Scenario	Description of boundary condition	Remark
Scenario 0 (Baseline)	- **Upstream**: Discharge hydrograph of 2015 - **Downstream:** Water level stage of 2015	*Without dam and without sea level rise*
Scenario 1	- **Upstream**: Discharge hydrograph of 2015, considering 11 dams in Laos - **Downstream**: Water level stage of 2015	*With dam and without sea level rise* -Jan. – May: -1.9% at TanChau, -2.5% at ChauDoc - Jun. : -0.5% at both TanChau and ChauDoc
Scenario 2	- **Upstream**: Discharge hydrograph of 2015, considering 11 dams in Laos - **Downstream**: Water level stage of 2015, considering sea level rise 47 cm	*With dam and with sea level rise* -Jan. – May: -1.9% at TanChau, -2.5% at ChauDoc - Jun. : -0.5% at both TanChau and ChauDoc - Water level of 2015 + 47cm (high emission scenario - A1FI – increasing 5.5mm/y) (Doyle et al. 2010)

Results: Impacts of 11 proposed dams on Q of VMD



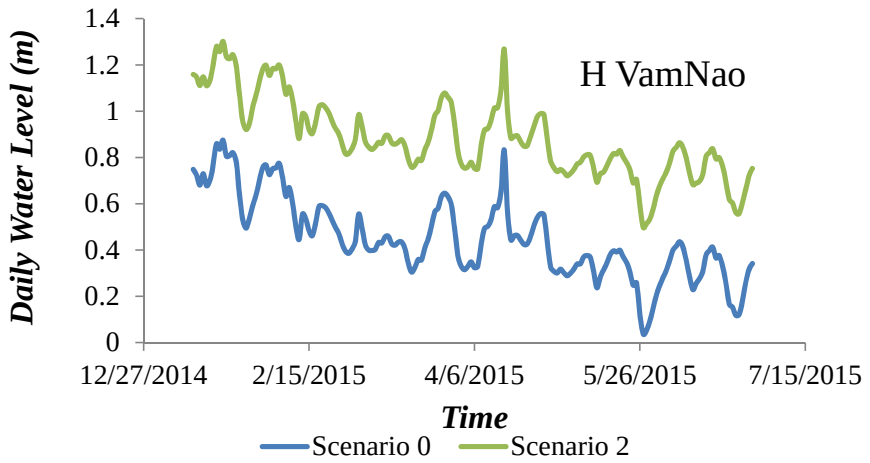


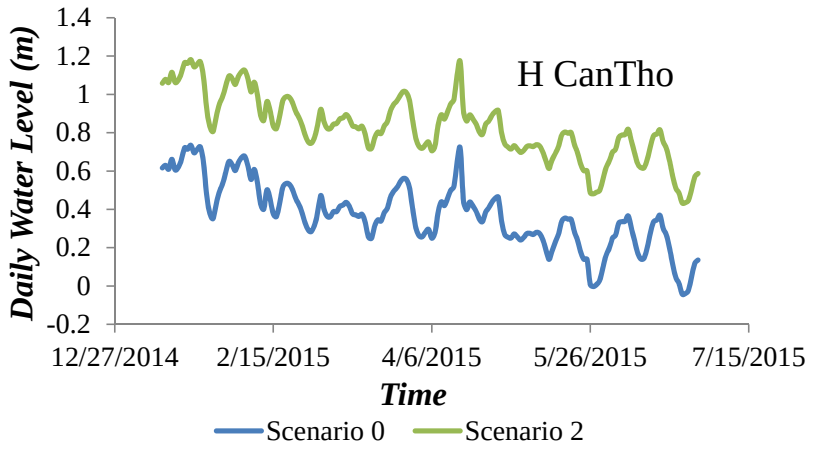
Scenario	Discharges in VMD
11 dams built	↘
11 dams built + Sear Level Rise	↘

Station	TanChau	VamNao	MyThuan	MyTho	ChauDoc	LongXuyen	CanTho	DaiNgai
(Sc1-Sc0)	-63.8	-31.6	-27.0	-9.6	-13.8	-50.6	-50.0	-17.1
%	-1.9	-2.2	-1.2	-0.5	-2.5	-2.8	-2.9	-3.6
(Sc2-Sc0)	-63.8	-24.1	-34.8	-16.3	-13.8	-213.8	-260.2	-22.2
%	-1.9	-1.0	-2.8	-2.7	-2.5	-11.6	-14.9	-4.6

Discharges in Hau River decrease more than Tien River

Results: Impacts of 11 proposed dams on H of VMD





Station	TanChau	VamNao	MyThuan	MyTho	ChauDoc	LongXuyen	CanTho	DaiNgai
(Sc2-Sc0)	0.423	0.436	0.456	0.467	0.436	0.452	0.458	0.467
% increase	94.6	127.1	75.5	221.2	139.2	172.6	162	25.7

Water levels in Hau River increase more than Tien River

DISCUSSION

Based on field measurements and numerical simulation for various scenarios

6 dams in China

SLR + 11 dams

Sedimentation in main Rivers

Significant reduce Q

Increase H

Irrigation

Fishery

Livelihood of mil

Conclusions

- 6 Chinese dams caused more tidal influence upstream and diminished normal flood but high flood, where normal flood is extremely important to VMD
- 11 proposed dams will cause severe problems to livelihood of local people in VMD by increasing salinity intrusion and flooding in coastal areas.

Solutions

Chinese dams' owners should inform dam operation schedules to downstream countries in the beginning of a year.

11 dams in Thailand, Laos and Cambodia should have solutions to release as much water downstream as possible

In impacted areas by saltwater: shifting land use: changing from freshwater agriculture to saltwater aquaculture

Future Work

- Investigate sediment load change
- Study on salinity intrusion

Install more turbidity and salinity stations

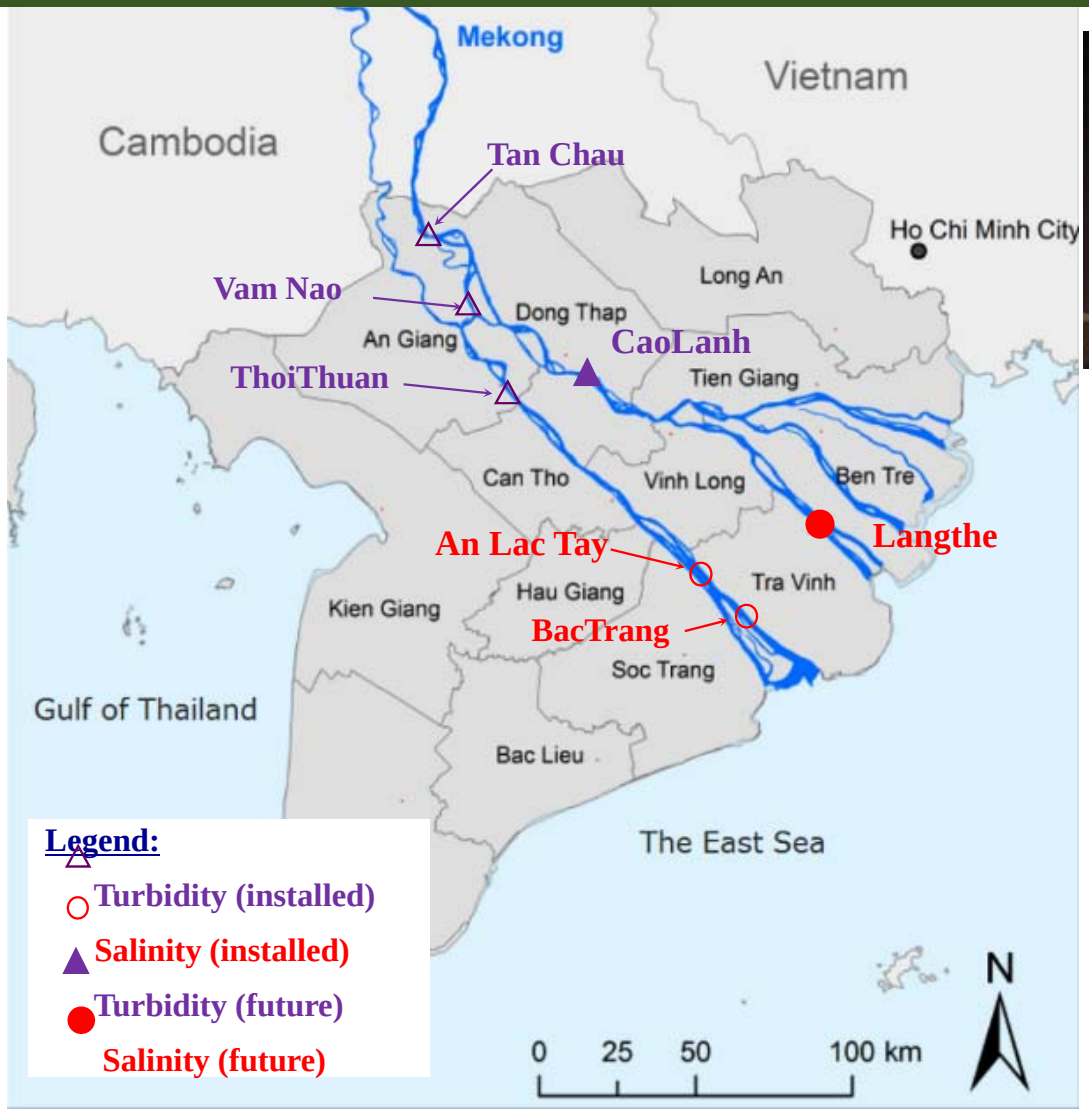
Conduct field investigations & measurements

2 dimensional numerical simulations

On going works : Equipment installation and monitoring

Turbidity and salinity should be the most basic measures for monitoring changes in water resources situation in the Mekong Delta.

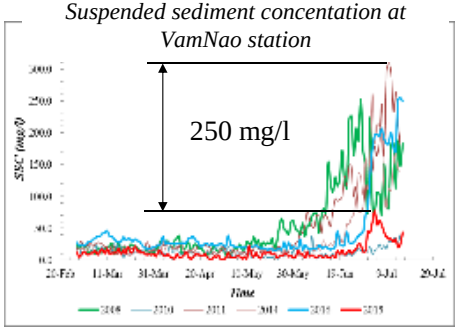
Installation of the turbidity meter



Salinity collection at AnLacTay station

Turbidity collection at VamNao station

Suspended sediment concentation at VamNao station



One of the most important out come

Good collaboration through intimate communication!

Thank you for your attention!

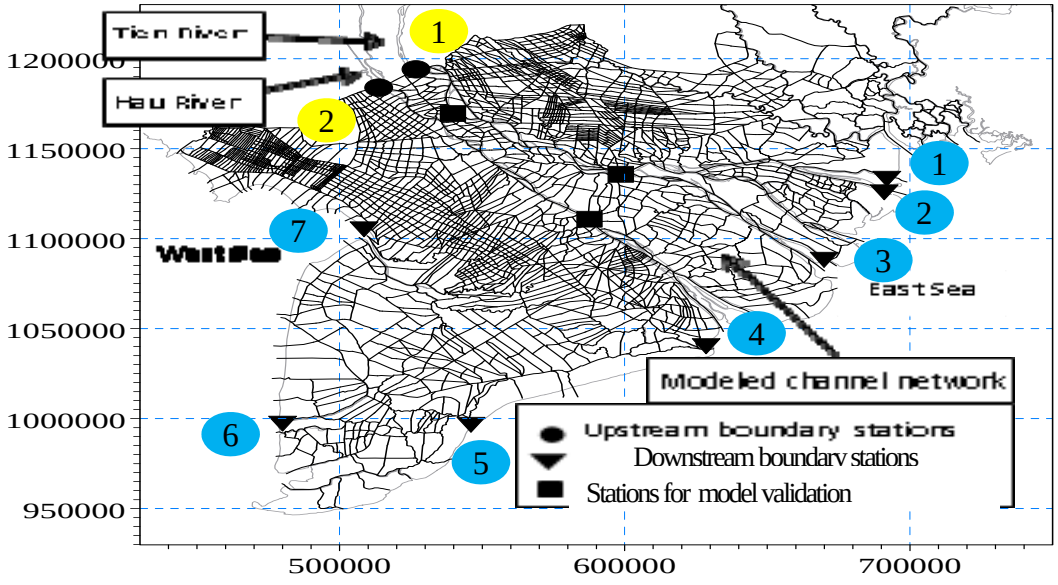
Members of Sumi Lab

Second Objective: Impacts of the 11 proposed dams on VMD

Methodology

Setup of numerical model

- 2,551 branches
- 13,429 points
- Cross section: 2010 and 2014



Station	VamNao	MyThuan	CanTho
For Calibration of year 2015			
R^2	0.913	0.936	0.978
Nash	0.807	0.862	0.913
For Validation of year 1998			
R^2	0.877	0.970	0.950
Nash	0.727	0.912	0.890