



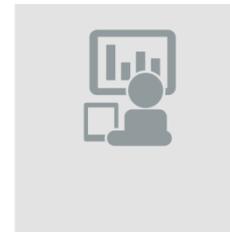
# Science and Technology in Action: Thailand Case Study

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19 March 2019

- **Climate Change Effect in Thailand**
- **S&T for Community Adaptation**
- **Example: Tropical Storm PABUK**
- **AHC: ASEAN Hydroinformatics Data Centre**





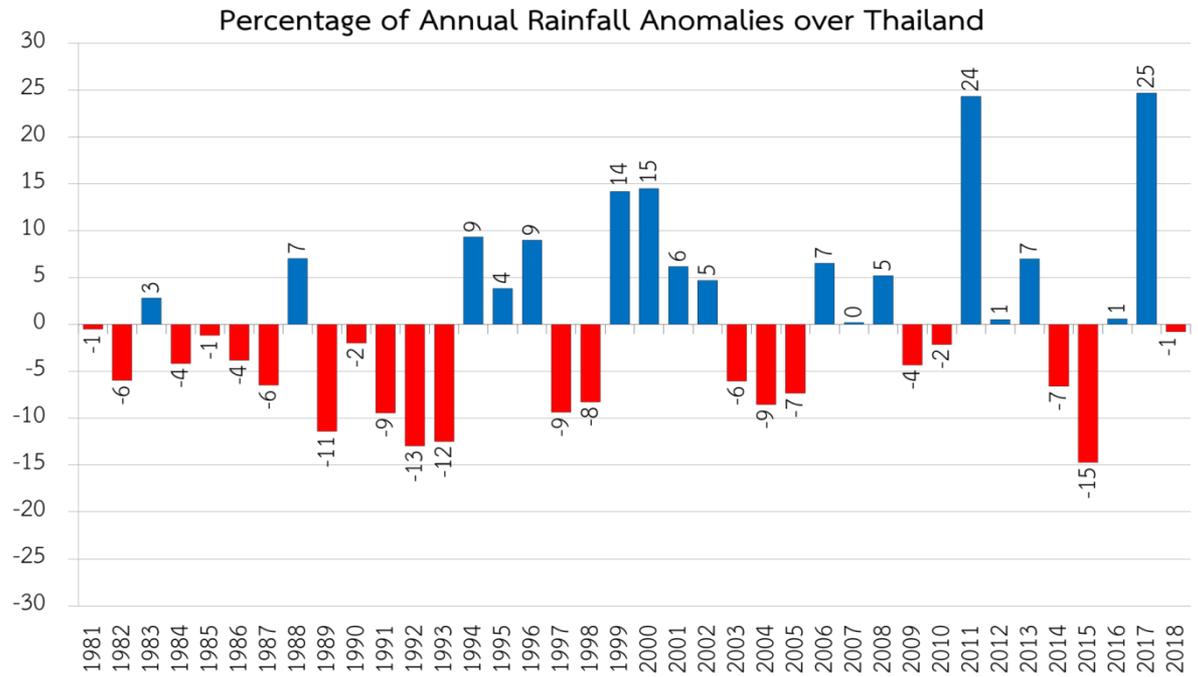
# Climate Change Effect in Thailand



# Percentage of Annual Rainfall Anomalies over Thailand

Thailand has experienced extreme climate from global climate change more frequently, which leads to flood and drought events.

30 Years  
AVG. Rainfall  
1981-2010  
**1,467 mm.**

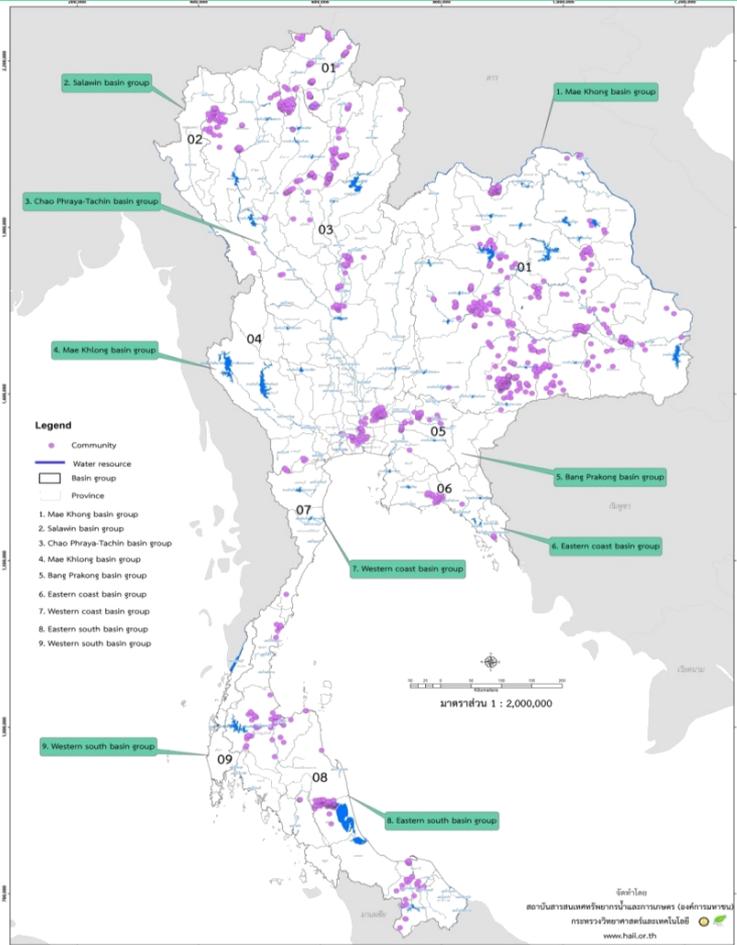




A weighted score from changing of extreme indices which included **R10mm**, **R20mm**, **R95PT**, **Rx1D**, **Rx3D**, and **Rx5D**.

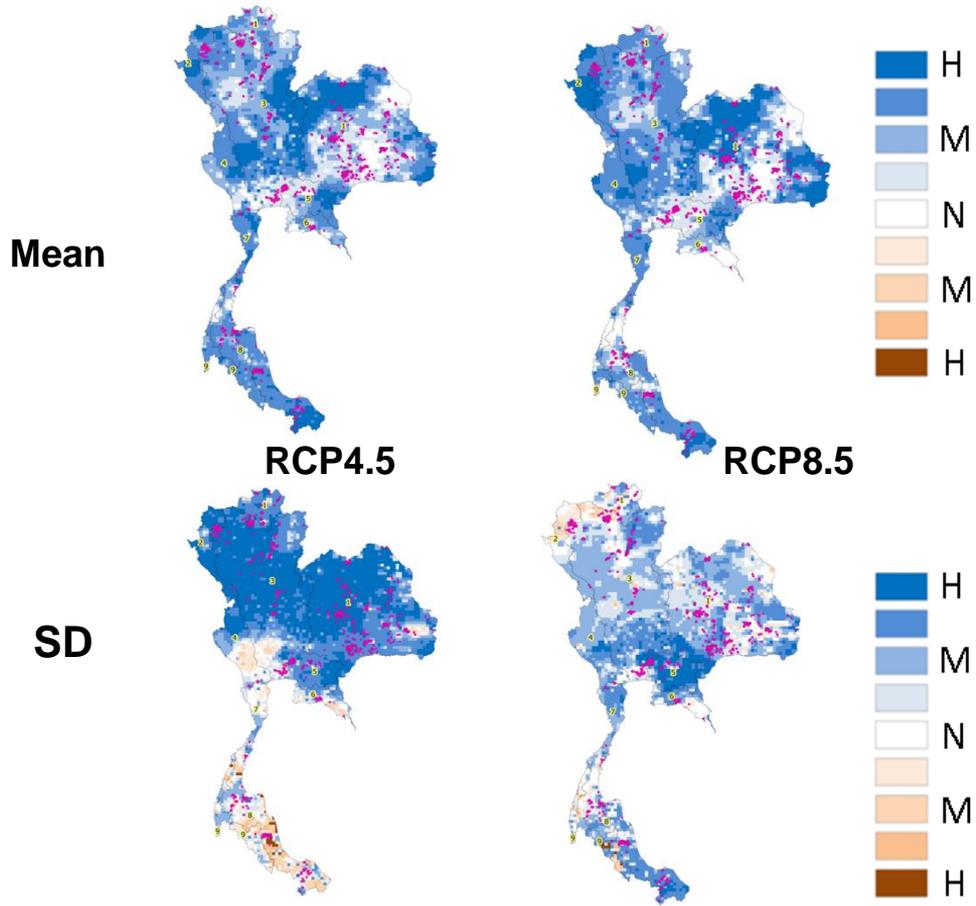


A weighted score from changing of extreme indices which included **CDD**, **SDII<sup>-1</sup>** and **PRCPTOT<sup>-1</sup>**.



Group	Basin Group	Total communities
G1	Mekong	641
G2	Salween	1
G3	Chao Phraya – Tha Chin	317
G4	Mae Khlong	4
G5	Bangpakong	37
G6	Eastern coast	29
G7	Western coast	4
G8	Eastern south	214
G9	Western south	11
	<b>Total</b>	<b>1,258</b>

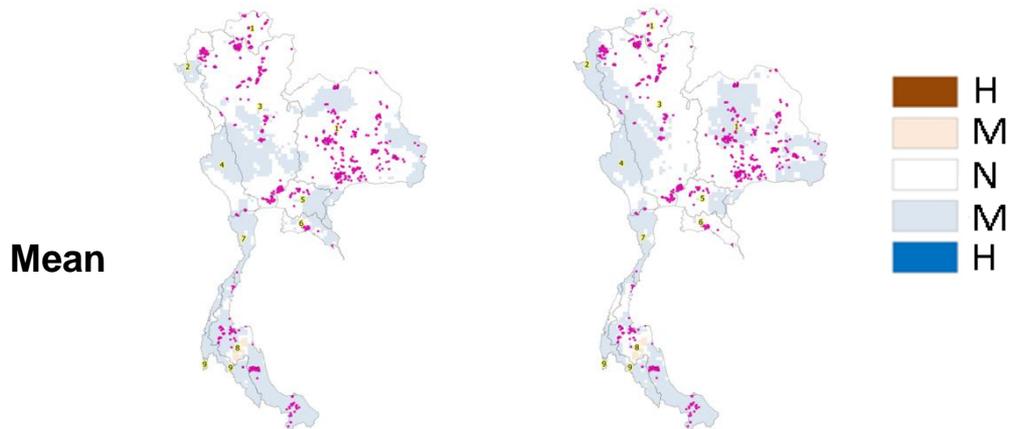
# Flood Possibility Index (FPI)



890 communities are at high risk of flooding

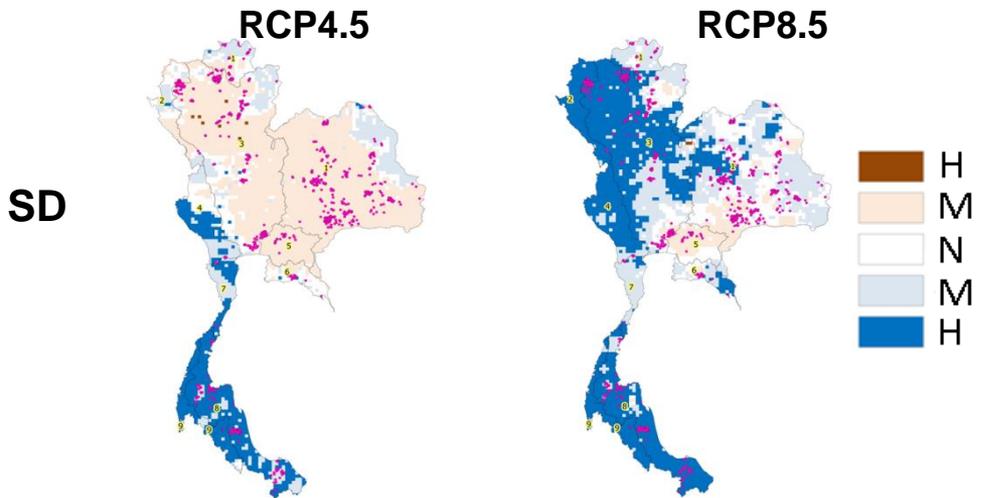
(based on mean FPI >50%)

# Drought Possibility Index (DPI)



950 communities are at medium risk of drought

(based on SD DPI >50%)





Thailand have **increased number of wet days** (higher CWD) and **shorter dry days** (lower CDD)



Frequency extreme indices reveal Thailand have **more heavy and very heavy rainfalls** (Rx5D)



Intensity extreme indices reveal Thailand have **higher intensity rainfall and more fluctuation.**



**890 communities** are at **high risk of flooding** in near future



**950 communities** are at **medium risk of drought** in near future



**607 communities** are at **risk of flood and drought** in near future



## S&T for Community Adaptation

- **S&T Adaptation for capacity building at community level**



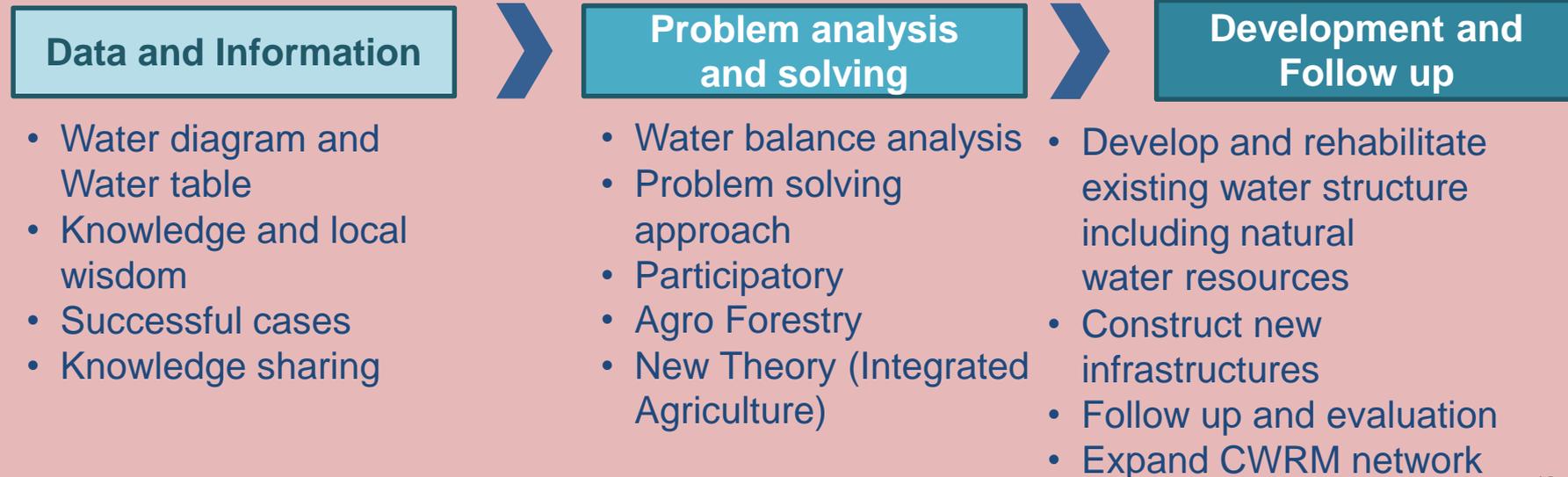
Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Upland rice												
Cabbage												
Broccoli												
Spinach												
Garlic												
Custard												
Celery												
Chayote												



## Mechanism



## Operation



## Virtue Collaboration: Driven by Trust and Faith

Goals -> Community's Livelihood and Sustainability Development

### Community's Roles

- Volunteer for community's benefit
- Understand and utilize information and data for management and planning
- Operate and take action the development plans

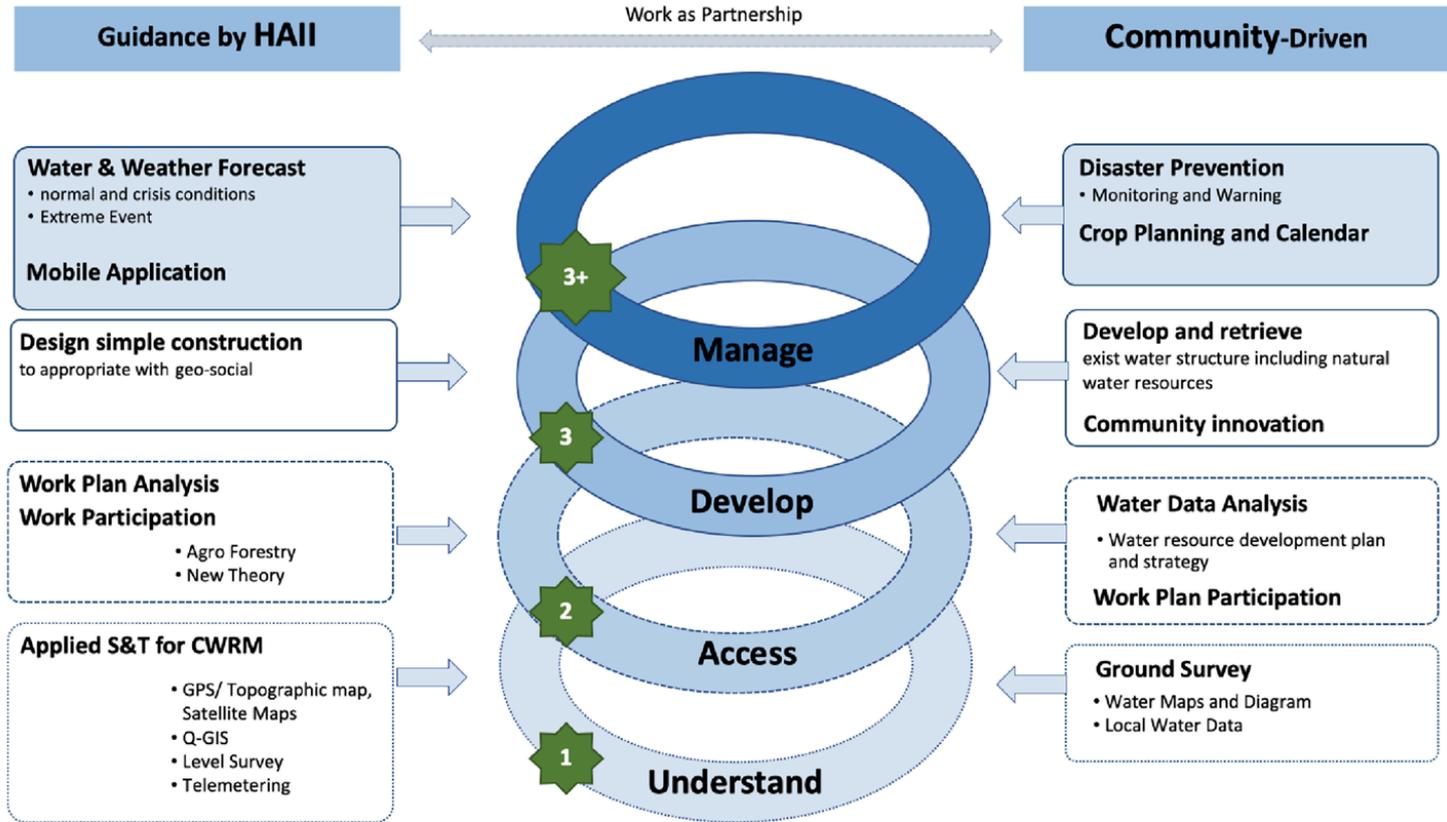
### Partner and Friend

Learn  
Do  
Win

Together  
Together  
Together

### HAI's Roles

- Non-profit operation
- 2 ways communication
- Involve and participate with communities
- Provide information, data, tools, etc. for co-critical thinking and planning





# S&T into Actions: Community Water Resource Management (CWRM)

Thailand

Hydro and Agro Informatics Institute

**S&T**

**Technology**

- Telemetering Station
- GPS/ Topographic map, Satellite Maps
- Q-GIS
- Level Survey
- Echo Sounder

**Data**

- Water Maps and Diagram
- Water resource development plan and strategy
- Community data base
- Water resource database
- Water Balance Analysis

**Innovations**

**Engineering/Innovation**

- Design simple construction to appropriate with geosocial
- Implementation planning and management including maintenance systematically

**Community innovation**

- Stone or concrete check dams
- Cement check dams
- Concrete Floodgates
- Flood canal
- Canal street
- mire suction boat
- Ground water recharge
- Reinforced concrete creek through Brooks
- Household grease trap
- Solar cell water pump system
- Solar cell electric floating system

**Water Structure System**

- Reforestation System
- Small Reservoir Management System
- Sugarcane Water System
- Flood and Drought Management System
- Waste Treatment Management
- Large Reservoir Management

**Outcomes**

**Water Security**

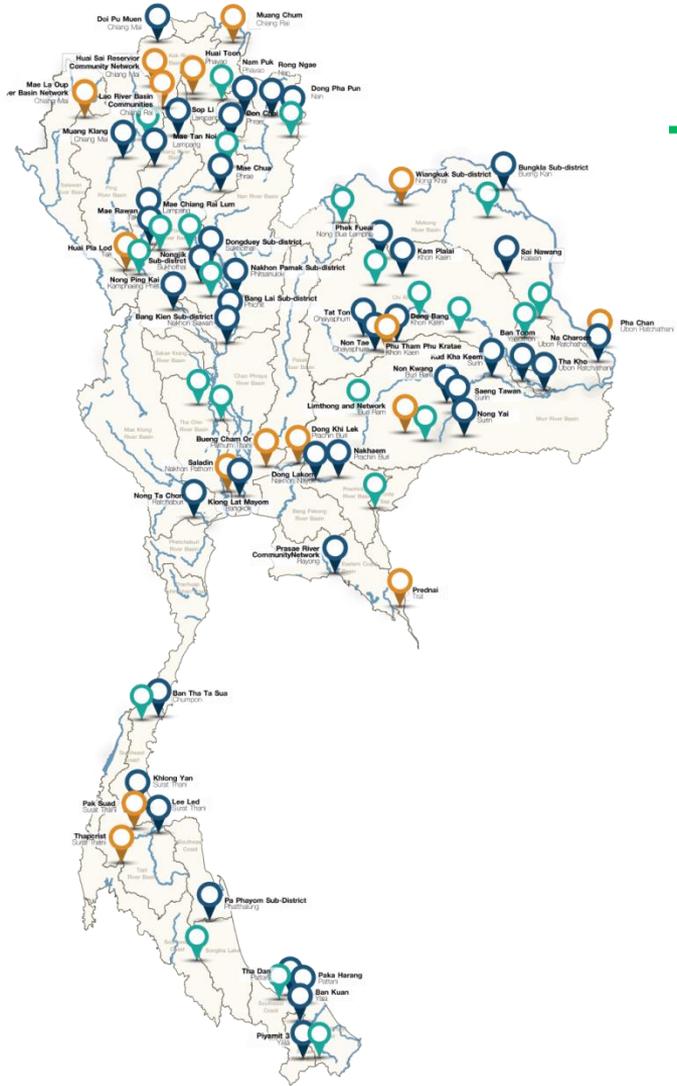
- Water resource management plan in Sub-district level
- Community Water Resource Development Plan
- Sub-district and Provincial Water Resource Management Center

**Food & Income Security**

- Agroforestry (3 Forest, 4 Benefits)
- Integrated Agriculture (New Theory Agriculture)

**Energy Security**

- Clean Energy
- Renewable energy



# Community Network



**24** Provincial Water Resource Management Center



**60** Core Communities (1,573 villages)



**18** Live Museums



## Tropical Storm “PABUK”

Preparation – Monitoring –  
Analysis – Response

- 1 National and Local Response
- 2 Community Response
- 3 Technology and Monitoring System



# 1 Disaster Preparedness at National and Provincial Level

Thailand  
Hydro and Agro Informatics Institute

## Crisis Operation Center at DPPM local office, Surat Thani province



**Report of the Crisis Operation Center for "Tropical Storm Pabuk" At DDPM Local Office, Surat Thani Province**

24-hr monitoring (4 – 5 Jan 2019)

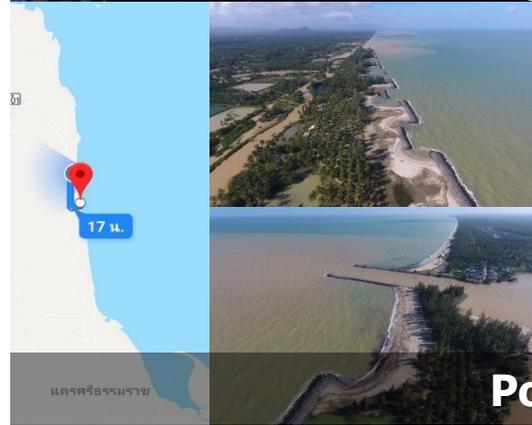
**24-hour monitoring and warning to network**

# 1 Disaster Preparedness at National and Provincial Level

**Crisis Operation Center at DPPM local office, Surat Thani province (cont.)**

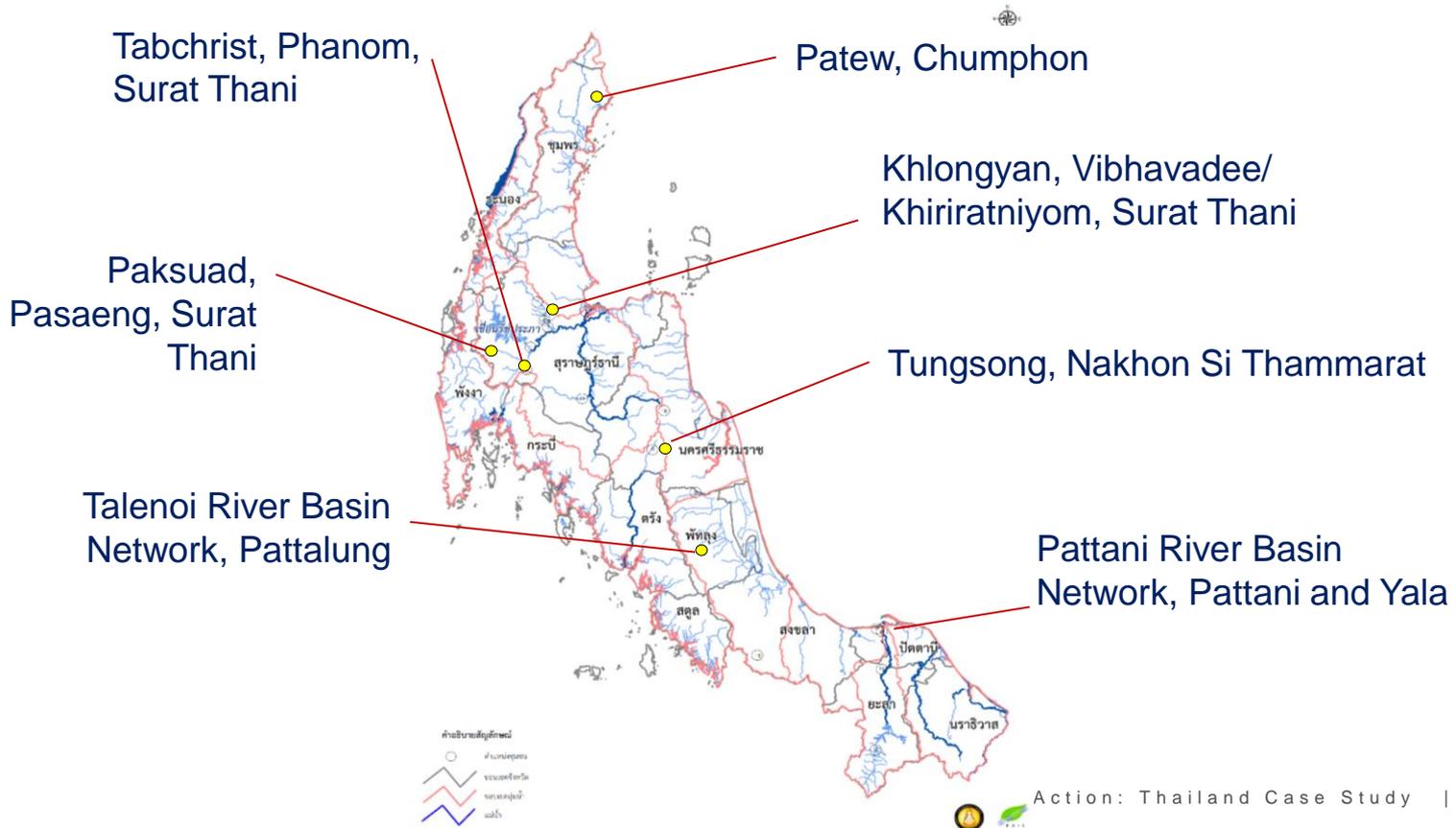


**Meeting for Monitoring report**



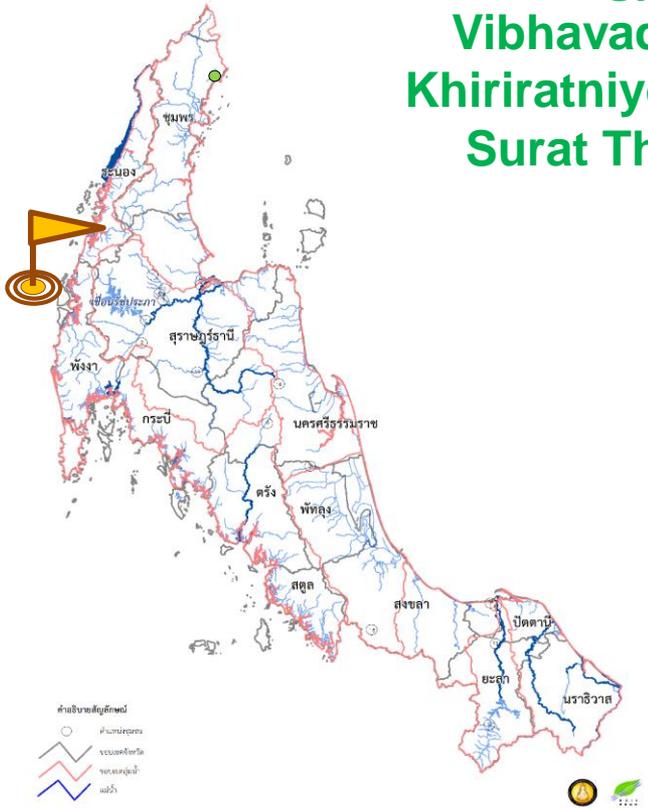
**Post-disaster survey**

## 7 Communities prepare for Tropical Storm Pabuk



# 2 Disaster Preparedness at Community Level

## Khlongyan, Vibhavadee/ Khiriratniyom, Surat Thani



2 Jan 2019 – Community monitored water situation via 1) radio communication 2) Khlongyan LINE network 3) telephone



Prepared radio communication network

Inform of preparation and emergency contact number

# 2 Disaster Preparedness at Community Level

## Tabchrist, Klong Chaun, Phanom, Surat Thani



2 Jan 2019 – Community monitor water level in Klong Bangsainuan Reservoir and found water level is 100% reserved. Therefore, the community drain water off to prepare for heavy rainfall from Tropical Storm Pabuk.



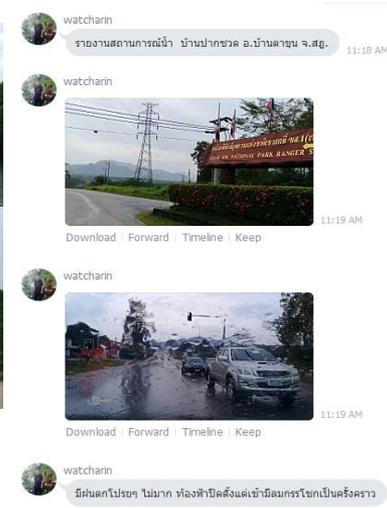
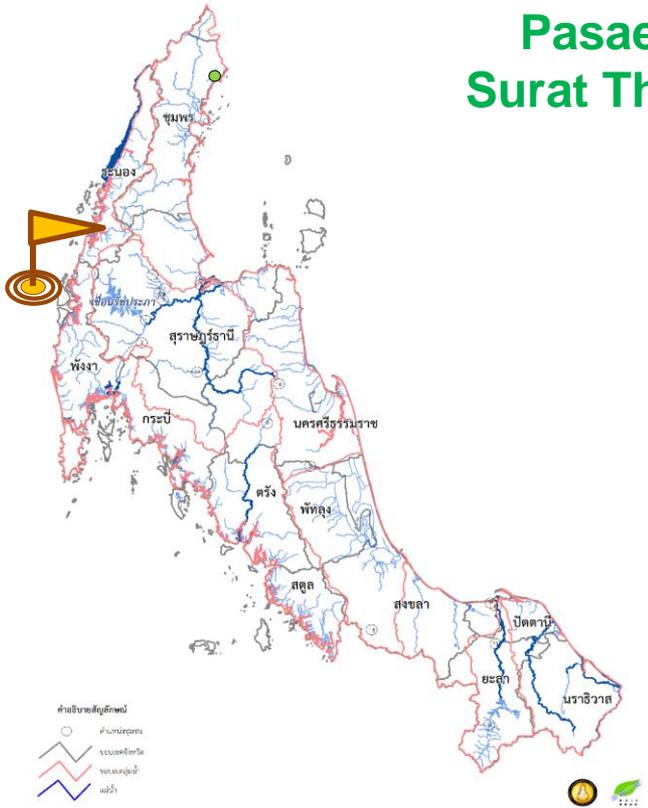
Drain water for heavy rainfall

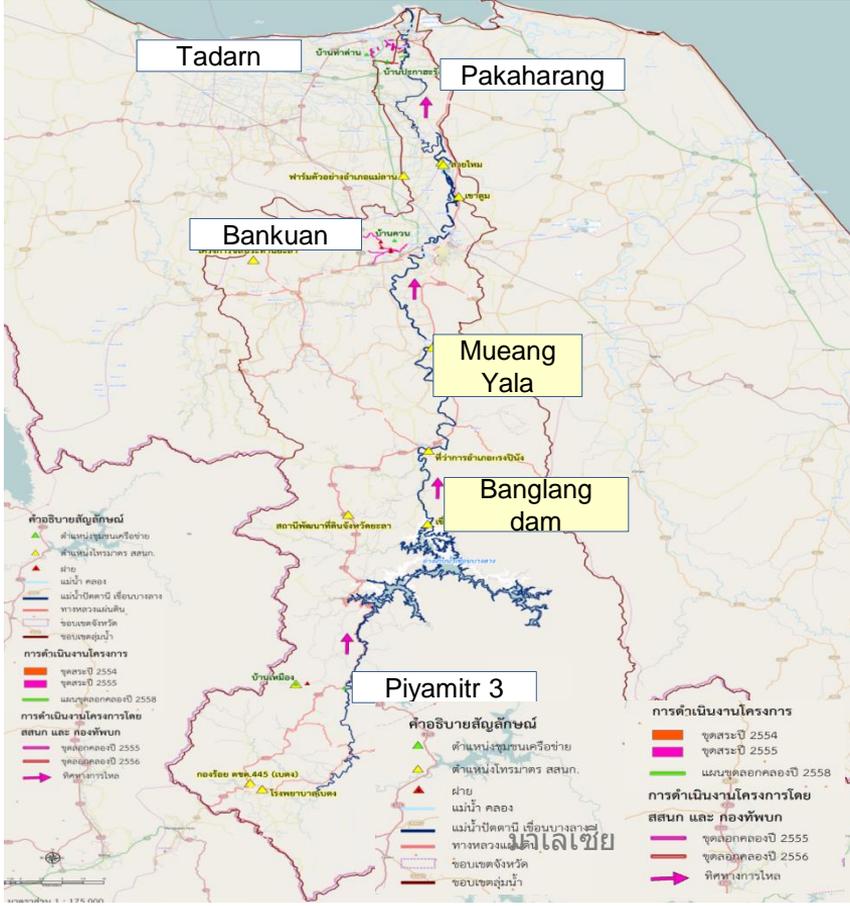


# 2 Disaster Preparedness at Community Level

## Paksuad, Pasaeng, Surat Thani

3 Jan 2019 – Community monitor by surveying local weirs and monitor water level in canals and report situation via community LINE network





## Pattani River Basin Network, Pattani and Yala Province

The Pattani River Basin Network has more than 940,000 acres of area, cover 15 districts in 2 provinces (Yala and Pattani). Pattani river has two tributaries, namely Yaha river and Klong Nongjik. 715,000 population live in the basin and make a living by farming and livestock.

Pattani River Basin face the problem of flood in the mid- and downstream area (17,500 acres) for more than 30 years.

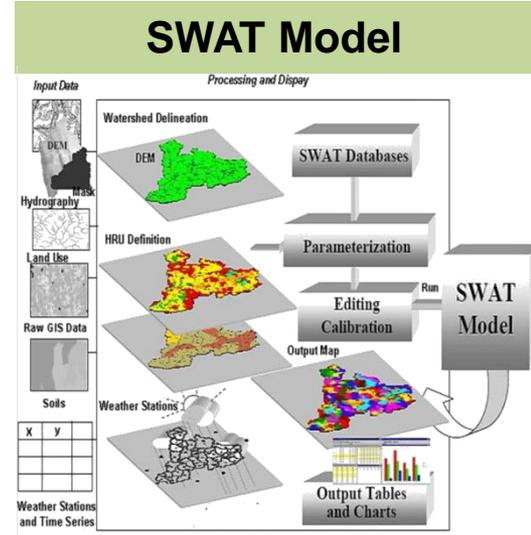
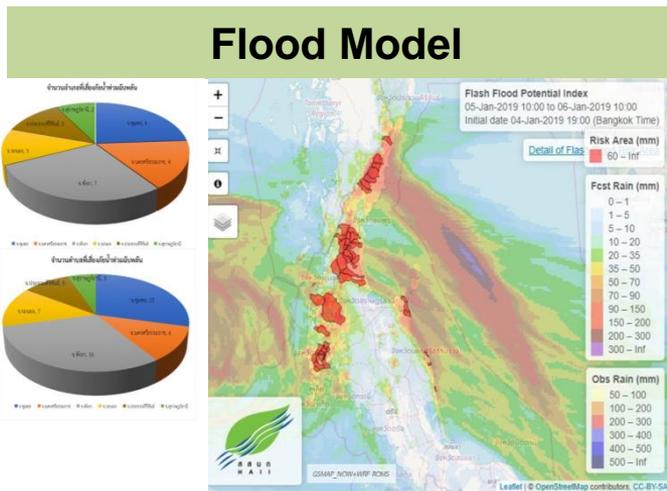
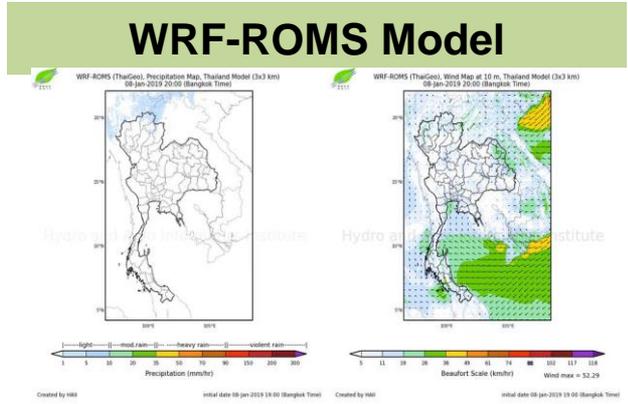
HAI collaborate with 4 local community networks on Community Water Resources Management (CWRM)

- Piyamitr 3, Betong, Yala
- Bankuan, Mueang, Yala
- Pakaharang, Mueang, Pattani
- Tadarn, Nongjik, Pattani

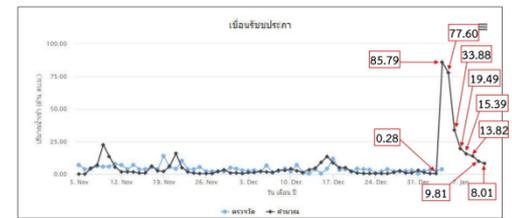
Map shows rehabilitated water structure by Pattani CWRM network, HAI, Military, and Utokapat Foundation

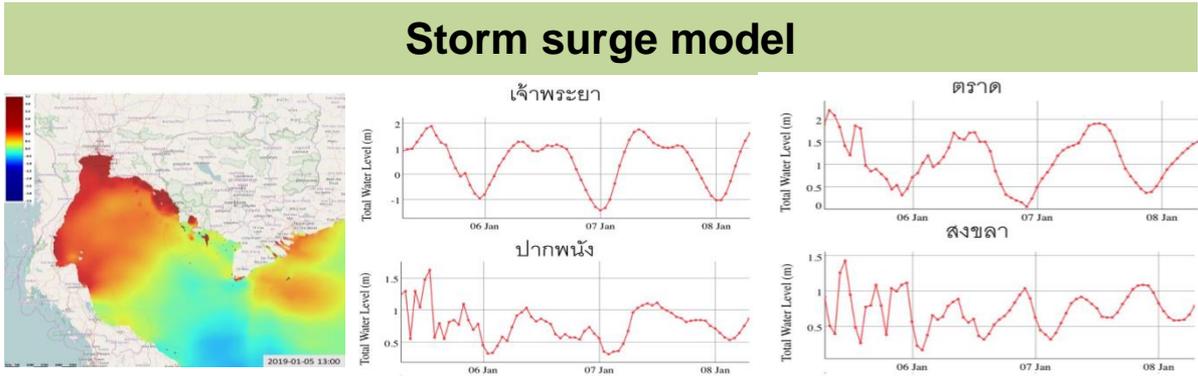
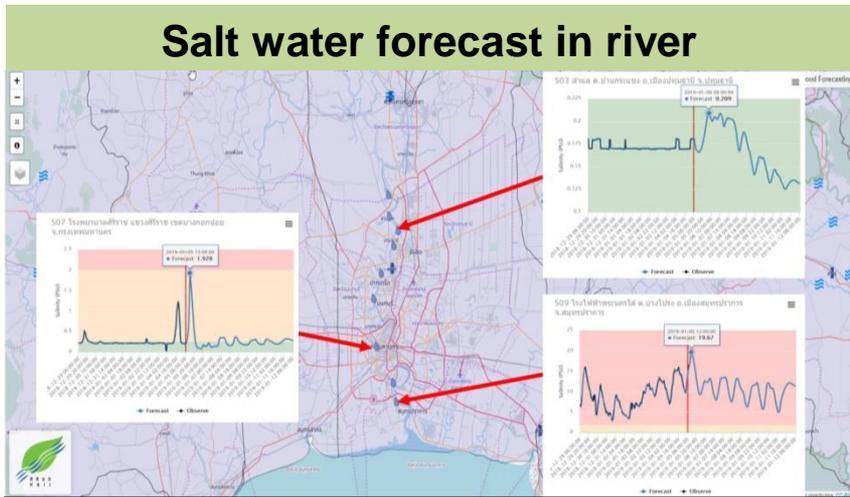
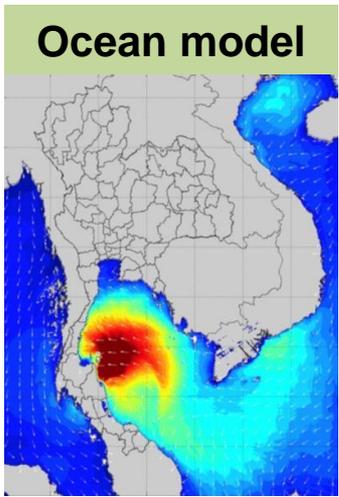


# 3 Technology and Monitoring System



คาดการณ์ปริมาณน้ำไหลเข้าเขื่อนรัชชประภา  
ระหว่างวันที่ 3 - 11 ม.ค. 2562







## Comparison of Tropical Storm PABUK (2019) vs HARRIET (1962)



### Losses in Fisheries (PABUK 2019)

- Nakhon Si Thammarat
- Fish pond 1,340 acres
  - Marine animals 3,303 acres
  - Cement tanks 8,427 sq.m.

- Surat Thani
- Fish pond 48 acres
  - Marine animals 23 acres
  - Cement tanks 140 sq.m.

- Wind speed 95 km/hr
- Landfall at Talumpuk, Pakpanang, Nakhon Si Thammarat
- **LOSSES: 911 people**  
**22,296 houses destroyed**  
**50,775 houses damage**

- Wind speed 85 km/hr
- Landfall at Pakpanang, Nakhon Si Thammarat
- **LOSSES: 5 people**  
**405 houses destroyed**  
**53,008 houses damage**



**Precise Weather Forecast** allow early preparation and evacuation of 31,665 people – **decrease losses of life**



**Storm Surge Warning** to prepare for salt water intrusion



**Data support** to governors and Disaster Preparedness and Mitigation Center Bureau 11 for **immediate response**



**New working methodology:**  
1) Area-based  
2) Horizontal collaboration  
3) Integrated work



**Communication with Media**

- Fast
- Precise
- Raise awareness
- No panic



# From Country to Regional ASEAN Hydroinformatics Data Centre



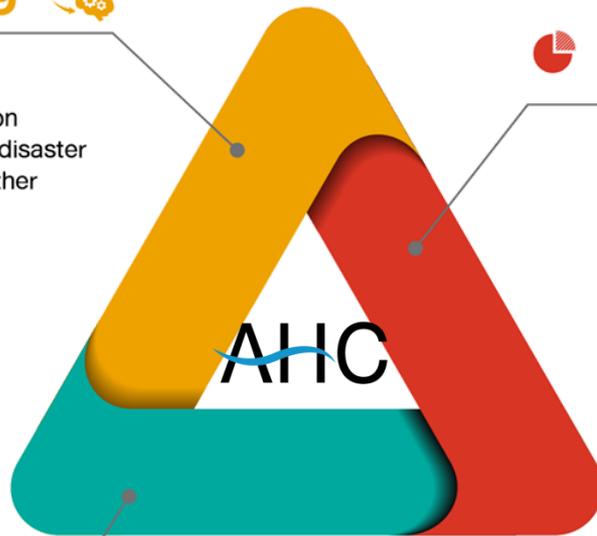
## Knowledge Sharing

To create a platform for knowledge and information sharing on the role of science and technology for disaster risk reduction and learning from experiences of other countries for climate change adaptation



## Technology Matching

To match and exchange technology that is applicable to other countries



## Capacity Building

To build the capacity of the young water expert and young researcher in ASEAN countries





Regional collaboration on the data sharing and integration as learning-based platform



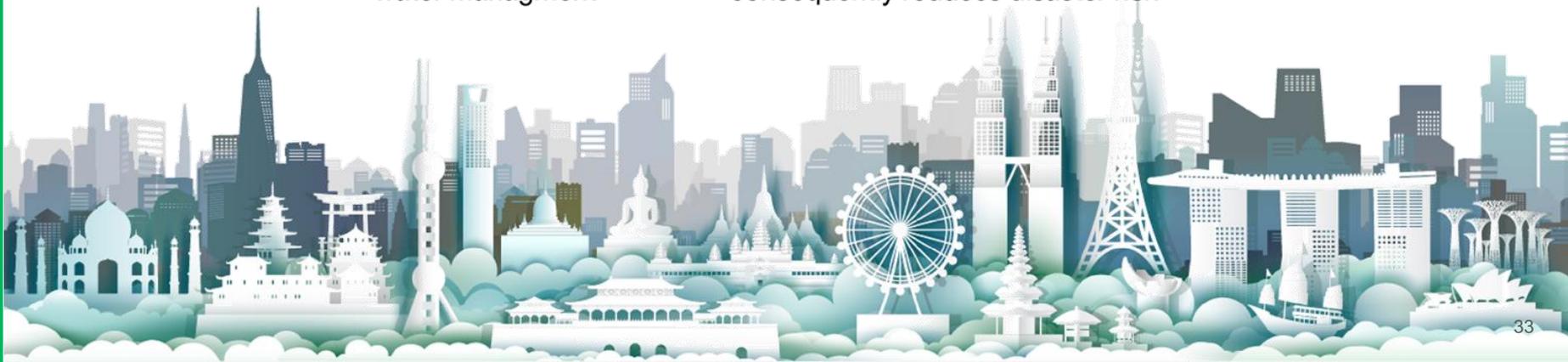
ASEAN connectivity by S&T for equitable use of water and weather information and efficient water management



Centralized database for both policy makers and practitioners to promptly respond to normal and crisis situations and consequently reduces disaster risk



Partnership for new knowledge and regional contribution to capacity building



An aerial photograph of a city at sunset. The sky is a mix of orange, yellow, and grey. A wide river flows through the city, with several boats visible. On the left bank, there are industrial buildings and a large white ship. On the right bank, there are several tall skyscrapers and a long bridge. The city is densely packed with buildings.

# Thank You

**Dr. Sutat Weesakul**

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