GEOSS AP

Task Group 5
Asian Rice Crop Estimation and Monitoring

Kyoto, 25 Oct, 2018

Vorawit MEESUK, PhD.
THAILAND

Hydro and Agro Informatics Institute : HAII

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HAII

1998

Integrate & improve Thailand Water Resources Management Network Was initiated by H.M. The King Rama IX

2000

Awarded for the Paten of The Process of Data Display and Map for Geography Resources Management

2002

- Developed Terabyte Server for large scale data repository and data backup
- Started the Agro Informatics Network Project

2003

Collaborated with NARO (the National Agriculture Research Organization) Japan on " Field Server"

NARO

2004

16 January 2004
Hydro and Agro Informatics Institute (HAII) was established under NSTDA , Ministry of Sciences and Technology

2006

CWRM (Collaboration on Community Water Resource Management)

With private sectors such as Coca-Cola, SCG, PTT

2008

27 December 2008
The Royal Decree on the establishment of Hydro and Agro Informatics Institute (Public Organization) 2008 was promulgated.

2009

1 January 2009
The Royal Decree on the establishment of Hydro and Agro Informatics Institute (Public Organization)

NARO

Field Server Workshop

BANGKOK 10-14 Mar, 2003

Prof. Seishi NINOMIYA

Cyber farming?

Thanks to FieldServers farmers will be able to find out exactly what crop they should sow for the best results at the click of a mouse.

■ *Suchalee Pongprasert*
THE NATION

It's a hot day. The sun is shining brightly in a cloudless sky. To find out if there will be a drought, a farmer logs on to the Internet to check out the latest weather reports.

With the advancing technology and the near-to-completion development of an agricultural data warehouse, which covers such issues as the amount of rainfall by area, humidity, wind, fertility of soil in given locations and so on, farmers and agriculturists nationwide will soon be able check if their land is likely to experience flooding, as well as which plants are most likely to flourish.

To access the data, all the farmers will have to do is go to the nearest Internet cafe or access point, select the data relevant to their area and wait for the information requested to pop up on the screen.

For example, instead of growing corn, agriculturists may learn that their land is actually more suited to crops like sugar cane, tapioca, pineapple or other fruit and vegetables. Since the quality of soil as well as the weather in each area is different, the correct information will protect them against planting inappropriate crops.

Thanks to the National Electronics and Computer Technology Centre (Nectec), this vision will soon become a reality. The Nectec team is currently working on a concept called tele-metering with the aim of building an Internet-based data bank that covers rainfall, irrigation, local natural resources and other issues that affect crops in all of rural Thailand.

Under the tele-metering plan, a number of wireless Internet-based devices known as FieldServers will be installed to collect agriculture-related data. This will then be processed at the centre. The final information will not only be used by government agencies to formulate planning and policies that effectively support planting in each zone, but will also be simplified to make it understandable to farmers.

Designed as an automatic monitoring system, the FieldServer, which is a lamp-like device, made of a CPU with a Web browser, and sensors that collect infrared data as well as air temperature, relative humidity, solar radiation, soil and leaf moisture and amount of rainfall and more.

The system also includes Wi-Fi (wireless fidelity) using 802.11b. This provides wireless transmission at 11 megabits per second and transfers information through the network to the server at the centre.

Digital and web cameras can be attached and remotely controlled via the web browser.

By installing the FieldServers in fields, yards or even streets, real-time data such as weather conditions and images at any given place can be automatically monitored.

"This will help us get an enormous amount of data from all areas nationwide without the need to send people out to the field. More importantly, it allows us to call up data from a certain date and time and process it along with other information," Nectec's director Thaweesak Koanantakool says.

In addition to checking information relevant to their area, farmers can also seek data on neighbouring communities or nearby provinces, to check if weather conditions such as heavy rainfall will affect their community or province as a whole.

At the same time, the move will also allow the government agencies to more effectively manage the development of agricultural, forestry, environmental and ecological projects.

Tele-metering is part of Nectec's Agricultural Information Network (AIN) joint project with the Agriculture and Agricultural Cooperatives Ministry and the Bank of Agriculture. The aim is to integrate agricultural information from a variety of sources into a single database thus enabling farmers to check weather reports, crop prices and other vital information.

"Even having just one device in a tambon is sufficient to make a comprehensive data bank," says Thaweesak.

To encourage people in all farming communities to access the information provided on the network, the Net Tambon project that delivers Internet access to people in more than 70,000 *tambon* nationwide will become the access point. The portal – www.siamvillage.net – will also make the information easy to understand.

And since the device can be turned into a hotspot when connected to the Internet, Nectec says it will allow people to get access to the online information with even more ease. It hopes that the devices will potentially help reduce the "digital divide".

In order to make the number of FieldServer devices available in all rural areas, Nectec plans to develop and produce the device locally rather than rely on imports.

The centre will, however, link up with the National Agricultural Research Organisation (Naro) in Japan, which has considerable expertise in producing the device to transfer technology and know-how to researchers and developers in the country.

As a first step, Nectec aims to develop the FieldServer prototype before distributing the relevant information to potential local manufacturers who in turn will produce the devices and sell them to users at a relatively cheap price. In Japan, the device costs about US$200 (B8,550)

"We will work on the design and develop about five to six prototypes before handing the research to the private sector," says Thaweesak.

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HAII's Telemetry System

INSPIRED BY NARO's Field Server

TELEcommunication

Land line phone * Cellular Fiber *
Radio * 3/4G * Satellite * WiFi *
LoRa * NB-IoT

METERING

Rain, Temperature, Humidity,
Pressure, Solar intensity,
Wind speed & direction,
Water level, Salinity

HAII's Telemetry System

2004, HAII's Telemetry System adopted the ideas of " Field Server II" from NARO (National Agriculture and Food Research Organization), Japan. Since then, we further developed our 1st Telemetry System and deployed in remote areas.

YRS	CONTROLER	TELECOM	SENSOR
2004 - 2005	• TCP/IP data transfer • Web service data monitoring		•Precipitation, Temp , RH •Solar radiation
2006 - 2008	• 10 – 60 mins data recording • GPRS compatible	WAVECOM M1206 & Fago Maestro 100 (2G modem) •FTP data transfer •Modem configure by SMS	•Precipitation, Temp , RH •Solar radiation, Wind
2009 - 2012	• USB data recording • Solar cell ECU	Cinterion TC65 •FTP data transfer •Modem & RTU configure by SMS, OTA firmware upgrade •2 ways communication	•Precipitation, Temp , RH •Solar radiation, Wind •Water level (Radar)
2013 - 2015	•Circuit Unit for GPRS Modem •Circuit Unit for A2D	•Gemalto (3G Modem) •FTP data transfer •Modem & RTU configure by SMS, OTA firmware upgrade •2 ways communication •SkyWave (Satellite)	•Precipitation, Temp, RH •Solar radiation, Wind •Water level (Radar) •Salinity
2016-2018	New Model 2016 •GPS position receiver •GPS clock sync. •Compact design	Gemalto (3G Modem) •MQTT protocol data transfer •Internet of Things (IoT)	Digital sensors - High accuracy and stability Fan-aspirated radiation shield - Accurate air temperature and humidity measurement

HAII's Telemetry System

- HAII's Telemetry System is able to measure several HYDRO-MET parameters, e.g., water level, precipitation, temperature, humidity, and pressure.

2004

2005

2007

2010

2012

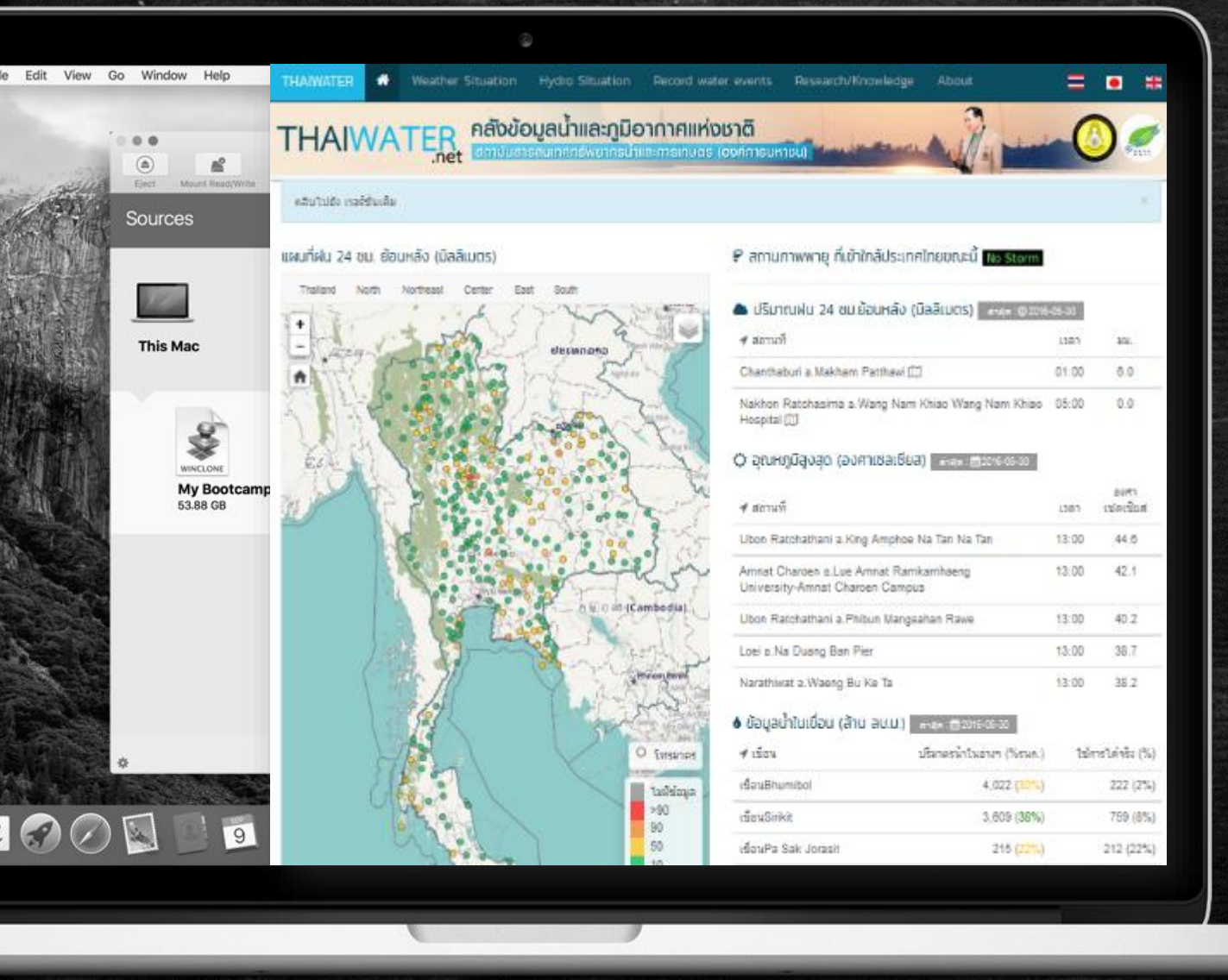
2017

2018

HAII's
Telemetry System
935 Stations
Nationwide
2018

WEATHER TELEMETRY STATION

WATER LEVEL
TELEMETRY STATION
T H P
3/4G
4Dw
EC
DO
SkyWave
RAIN GAUGE
WEATHER
SENSORS
SOLAR CELLS
RADAR
WATER LEVEL
MEASUREMENT
350



WEB APPs

ALL MONITORED, ANALYSED, FORSTED HYDRO-MET INFO & MORE ARE AVALIABLE AT

WWW. THAIWATER.NET

SELECTED MONITORING & FORECASTING

HYDRO-MET INFO IS READY FOR YOUR

ANDROID & iPHONE

MOBILE APPs

Available on the App Store

GET IT ON Google Play

Water data is of particular importance

BETTER MONITORING water resources

&

BETTER FARMING

Stories of

Pha Chan Community

UBON RATCHATHANI

HAII's Telemetry Stations & ThaiWater Mobile Apps

Rainfall monitoring & forecasting

>80% rainfed agriculture

>50% rice fields in NE

parachute rice transplanting

reduce water consumption

in one-sixth ratio

of traditional transplanting

Rice seedlings &

dry land cultivation

can be prepared in advance

Dried rice products is always
required by rice mill

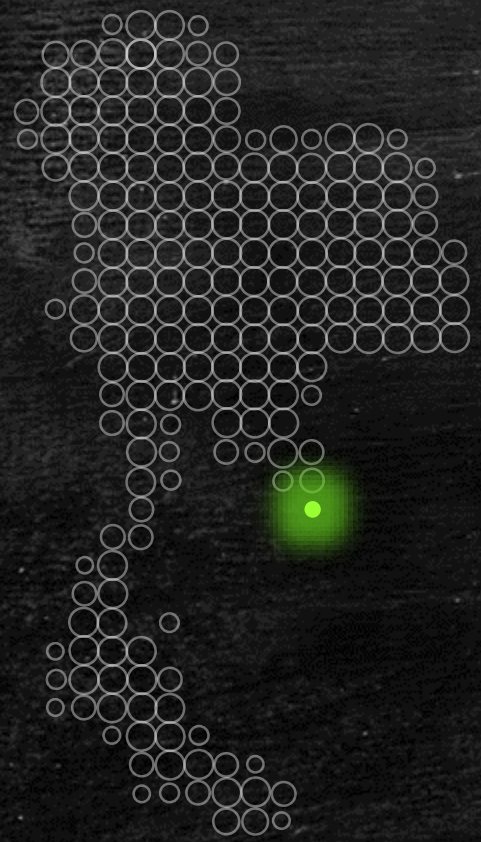
3 no rain days on are
good to dry their product

Farmers have better planning
& getting more benefits

Stories of

Pred Nai Community

TRAT



3 consecutive no rain days on ThaiWater Mobile Apps gives sufficient information for rubber planter

Tapping rubber products in rainy days can dilute rubber products & causing fungal disease

Giving fertilizer in rainy days is almost always wasting

avoid harvesting fruits
during rainy season

THAI delicacy fruit trees

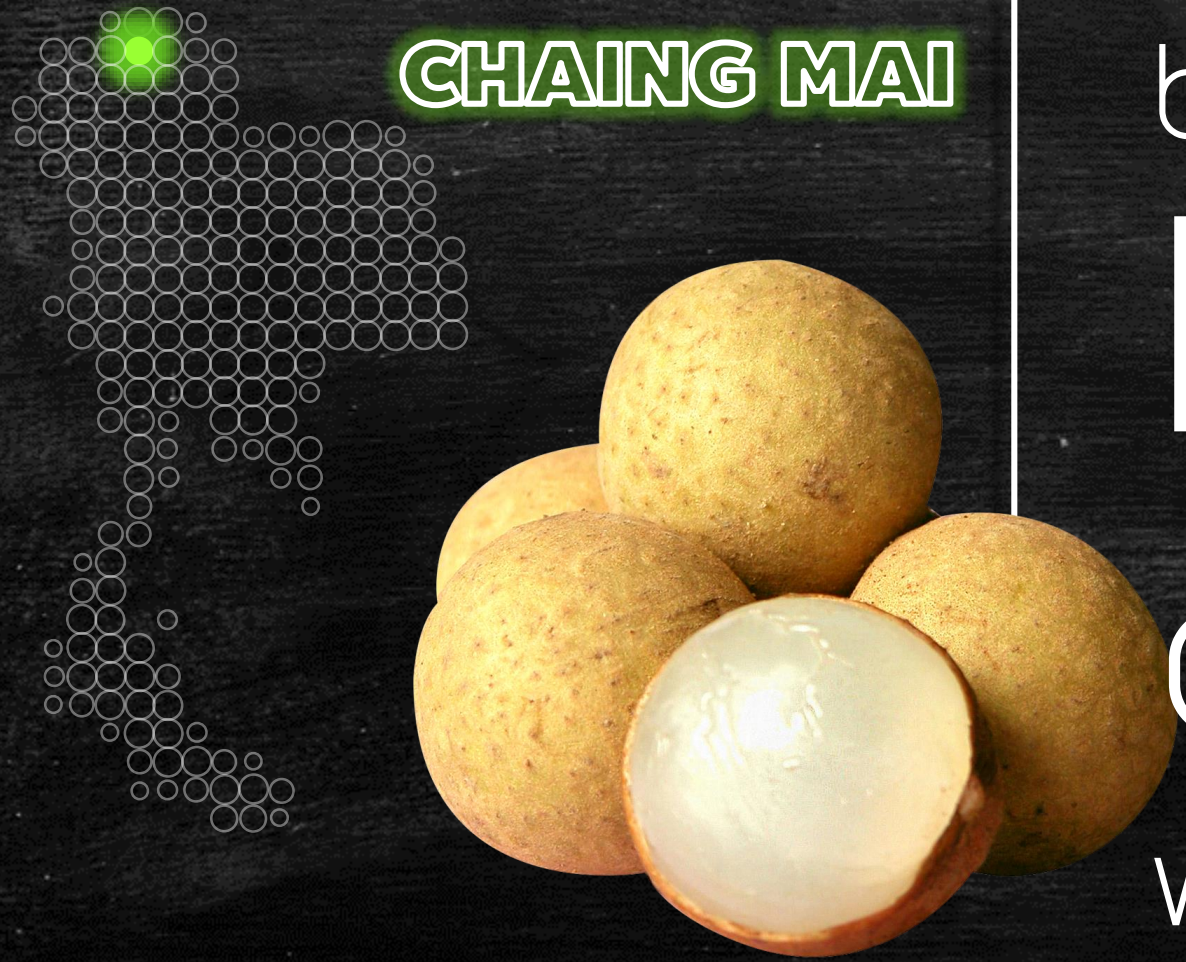
Watering too much
may causing fungal disease

Giving too little water
can cause yellow & fallen leaves

Stories of

Huai Sai Community

CHAING MAI



temperature below 15 c

increase

blooming rate of

LONGAN

decrease

wasting fertilizer

Stories of

Petch Lan Na Farm

LAMPANG

BETTER MONITORING

the temperature below 10 c

increase 10-20%

survival rate of

chick and piglet

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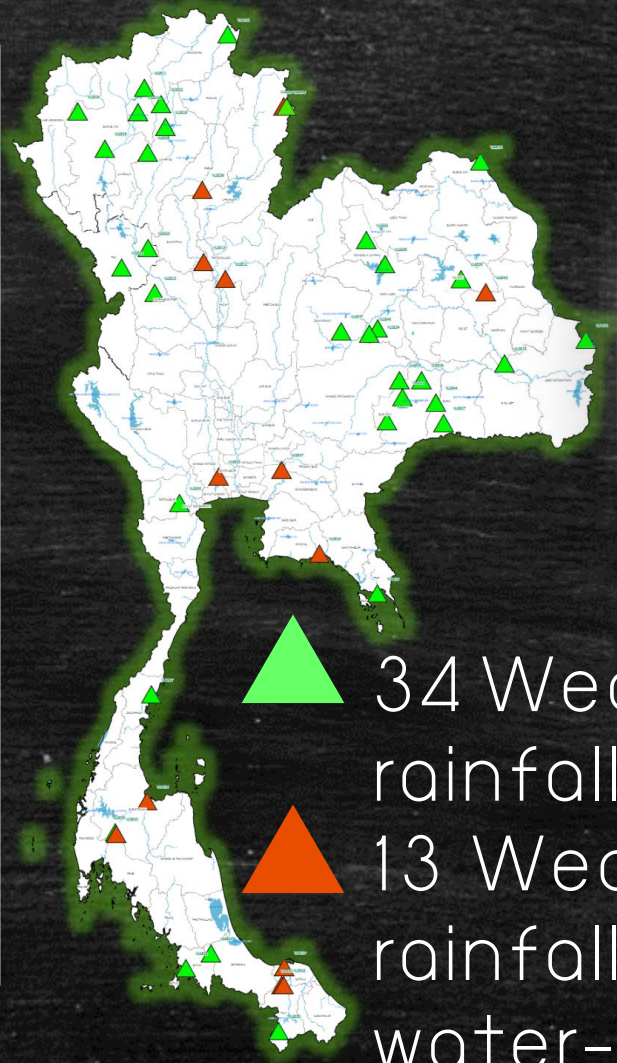
HAII

47 Telemetry Station for other Communities



34 Weather & rainfall stations

13 Weather, rainfall, & water-level stations

Data warehouse

High Performance Computers

35 GOVERNMENT AGENCIES

Distributed functions, Integrated use

Prime Minister Operation Center (PMOC)

National Water Resources Committee (NWRC)

Committee on The Integration of National Hydroinformatics and Climate Databases

Chairman: Minister of Science and Technology
Secretariat: HAII, EGA

Office of the National Water Resoures

by: National Water Command Center (NWCC) under ONWR

9 ASPECTS OF HYDROINFORMATICS

- Primary Data acquisition
- Analytical Reports

1 **Short-, Medium- and Long-Range Weather Prediction**
TMD DRRAA HAII HD

2 **Water Management in Irrigated Area**
RID EGAT

3 **Water Management in Rainfed Area**
DWR DGH RID MD LDD

4 **Water Management for Consumption and Industrial Use**
PWA MWA DLA DGR MOI EGAT RID DDPM

5 **Ecosystem and Water Quality Preservation**
PCD DWR RID DDS PWA MWA MOI HD DMCR

6 **Disaster Warning and Management**
DDPM NDWC DDS DMR

7 **Water for Electricity Generation**
RID EGAT

8 **Economic and Social Development Planning**
NSO BB NESDB DLA CDD OAE MOI

9 **Infrastructure for Data Systems**
HAII EGA DPT GISTDA NIMT RTSD GOL NSTDA MD

SINGLE INTEGRATED REPORT

- Public Announcement
- Management during Normal situation
- Management during Crisis situation

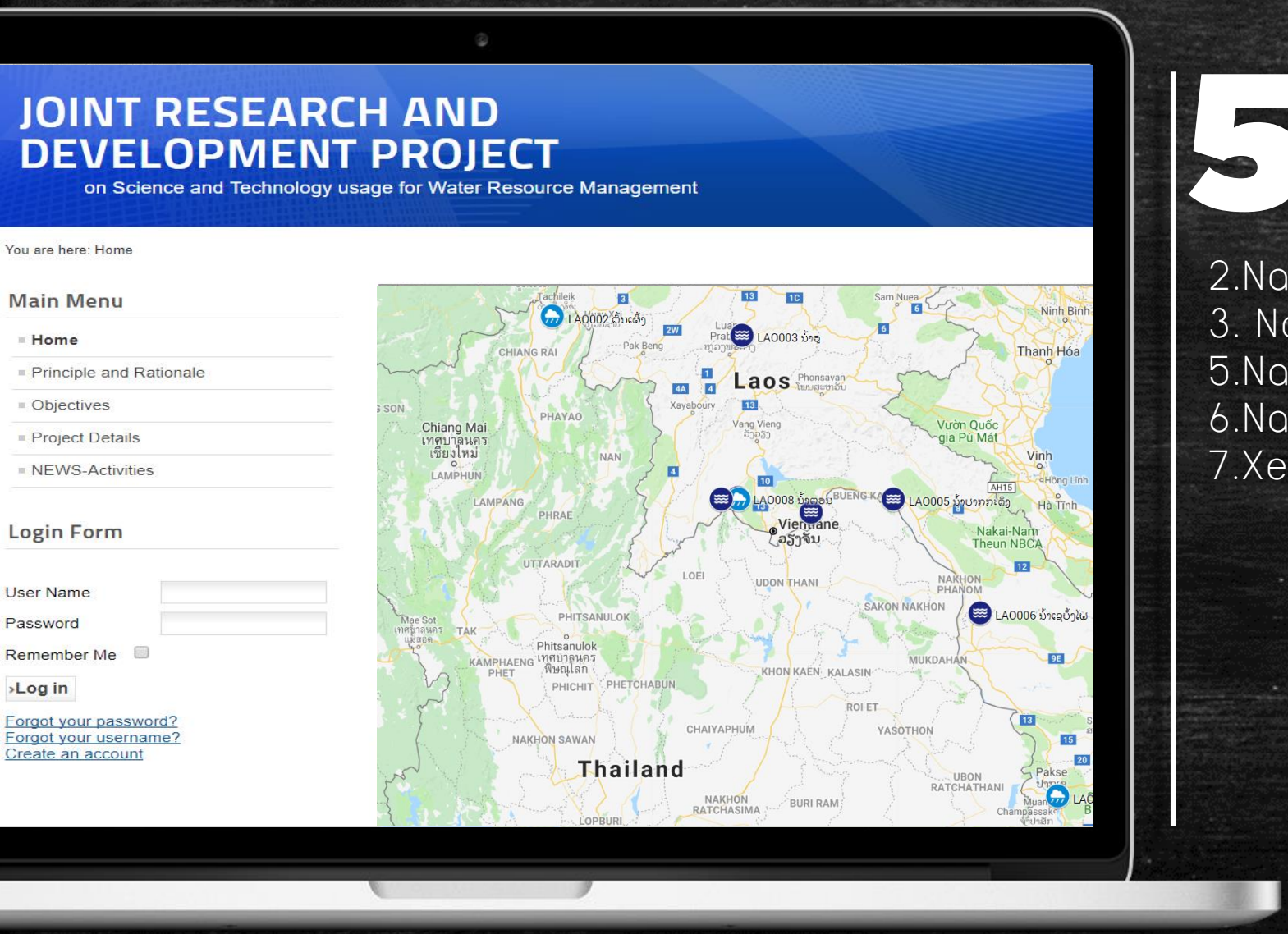
Government

Announcement

Public / Press

National
Hydroinformatics &
Climate Data Centre
http://nhc.in.th

8 Telemetry Stations
Collaboration with
HAII-THAI & DTI-LAO PDR

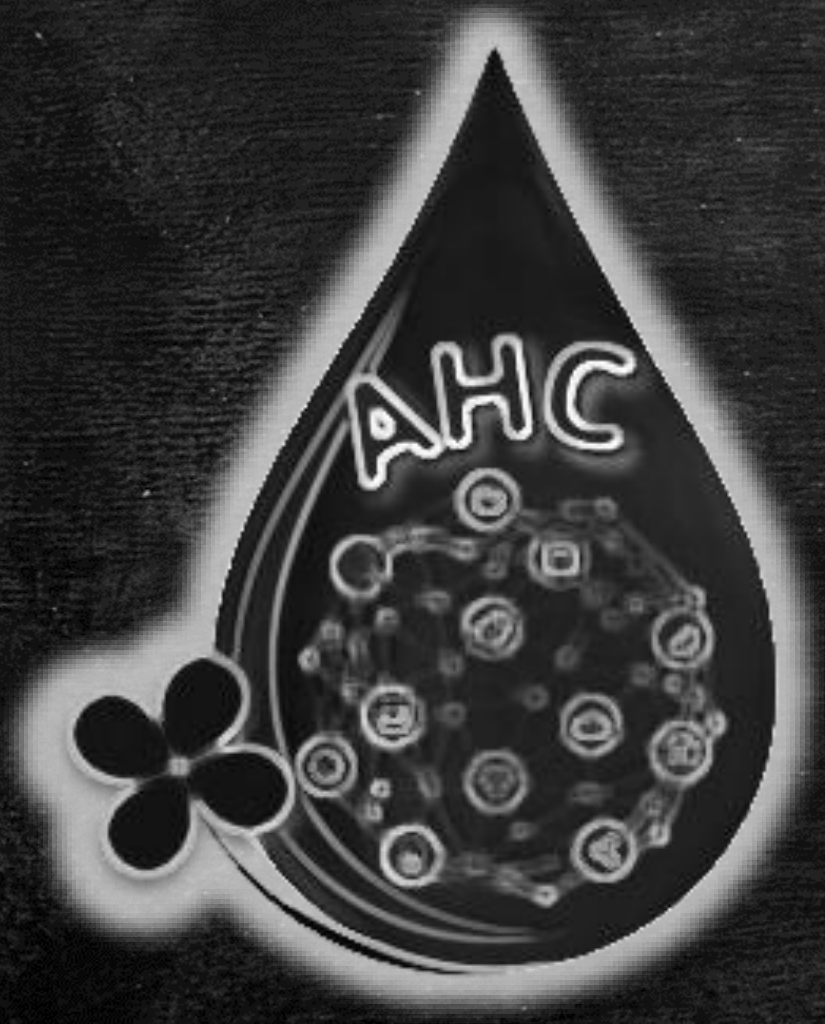


5 WATER LEVEL stations

2.Nam Ou
3. Nam Torn
5.Nam Ngum
6.Nam Kading
7.Xe Bang Fai

3 WEATHER stations

1. Ton Phueng
4. Rong Mor Noi
8. Pak Se



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