



Hydro and Agro Informatics Institute

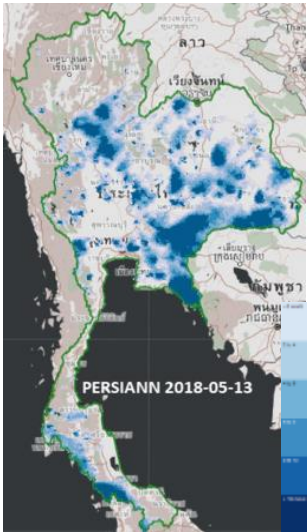
Ministry of Science and Technology
Thailand



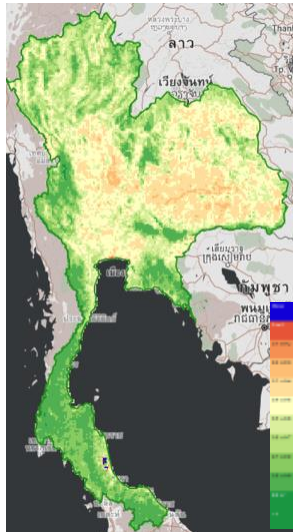
Using the Flood and Drought Management Tools in Thailand

Ticha Lolupiman
Model Developer

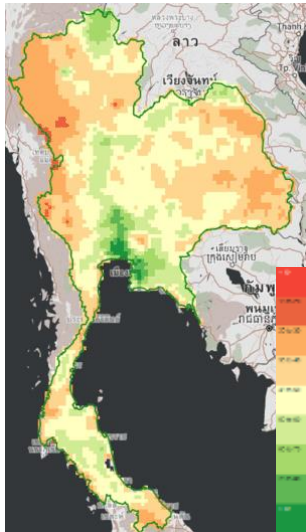
Hydro and Agro Informatics Institute, Thailand



Rainfall data



Vegetation index



Soil Water index

Access near real-time data

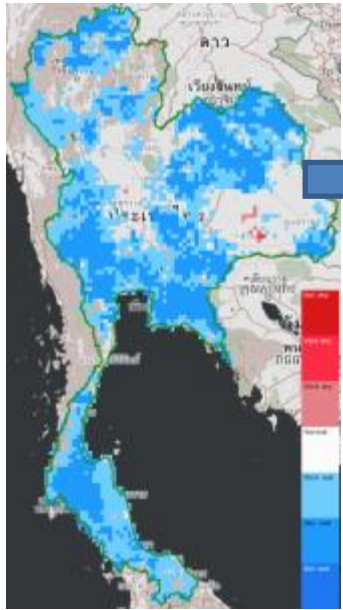
Flood and Drought Indices

Climate forecast and climate change data

Satellite	Data	Spatial Resolution	Temporal Resolution	Period
CHIRPS	Rainfall	0.05 deg	daily	1981-present
GPM		0.1 deg	daily	2015-present
CRU		0.5 deg	monthly	1901-2013
PERSIAN		0.04 deg	daily	2000-present
TRMM		0.25 deg	daily	2000-present
MODIS	Temperature	5600 m (resampling from 250m)	8 daily	2000-present
	NDVI	5600 m (resampling from 250m)	16 days composite	2000-present
	Evapotranspiration	5000 m (resampling from 1000m)	8 day	2000-2014
MeTOP-ASCAT	SWI	0.1 deg	10 daily	2007-present

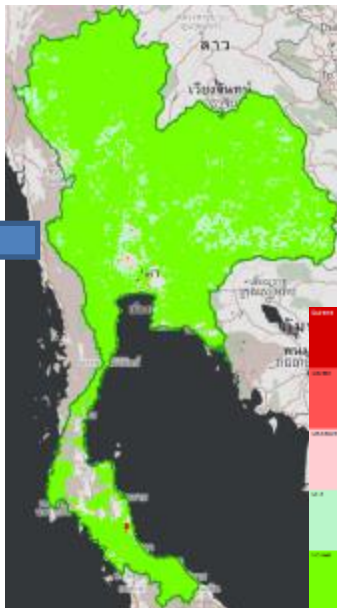
- rainfall, temperature, vegetation index (NDVI), Evapotranspiration, and soil water index (SWI) are provided in the portal.

Flood and Drought web portal



Indicate drought status from precipitation

SPI Index



VHI Index

Indicate dry status from vegetation health and ground condition

Access near real-time data

Flood and Drought Indices

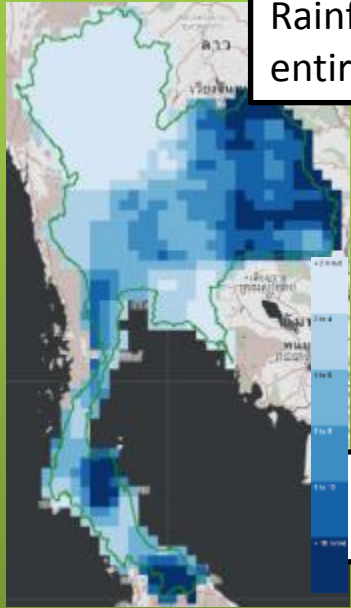
Climate forecast and climate change data

Index	Input	Strengths	Weaknesses
SPI	Rainfall (TRMM)	<ul style="list-style-type: none"> ➤ Calculate from long term mean precipitation ➤ Standard index ➤ Simplify and easy to understand ➤ Indicate status both of dry and wet in the same way 	<ul style="list-style-type: none"> ➤ Can not indicate ground condition ➤ Unstable with low precipitation region
EDI	Rainfall (TRMM)	<ul style="list-style-type: none"> ➤ Calculate from daily precipitation ➤ Current status of drought 	<ul style="list-style-type: none"> ➤ Daily rainfall is unstable data
VHI	NDVI & Temperature	<ul style="list-style-type: none"> ➤ Indicate ground condition status ➤ Monitor dry status and vegetation health 	<ul style="list-style-type: none"> ➤ Precipitation is not include

- Drought Indices are calculated from satellite data and can be used for **drought monitoring and planning** in Thailand.
- Many indices are suitable to difference drought types. For example
 - **SPI and EDI** indicate drought from **precipitation**.
 - **VHI** relate to drought in **agricultural** and crop area.
- **Total number** of index is **8** index both flood and drought

Flood and Drought web portal

Rainfall data cover
entire Thailand



Is this hit
a real
situation?

Rainfall forecast at
06 June 2018

Seasonal drought
outlook for Thailand

Will this
hit a real
situation?

SPI forecast
28 Feb 2019



Access near real-time data
Flood and Drought Indices

Climate forecast & Climate change data

Challenges in using Seasonal Forecast

- **For better planning and management** weather forecast provides location and intensity of future rainfall. it tells the tendency of **possible flood or drought**.
- **Accurate flood & drought risk assessment and mapping** with appropriate indicators and climate related data risk area can be identified and monitored in order to prepare **better measures or responses**.
- **Long-term prediction** under changing climate vs adaptation technology.
- The Climate Forecast System (CFS) is used for seasonal forecast and provides ensemble forecast with 9 months lead time.

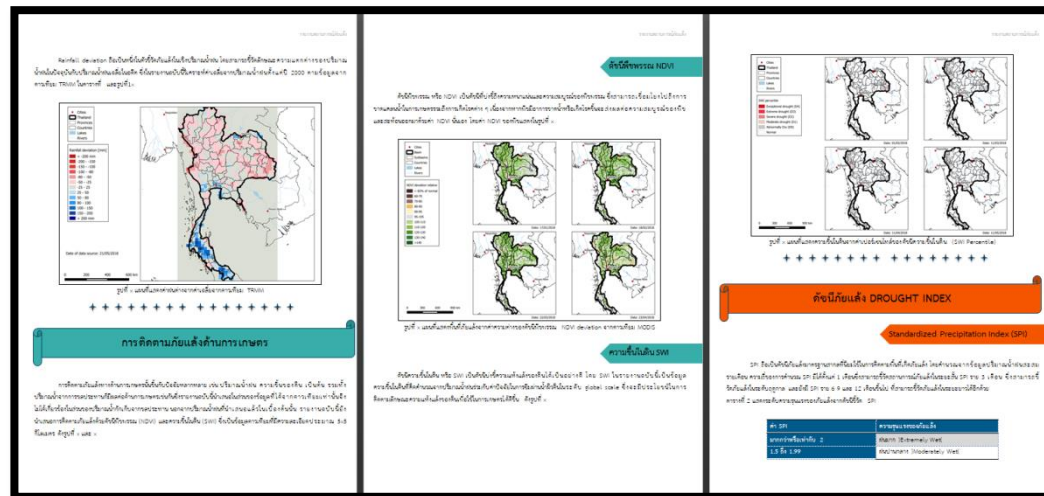
Thailand's Drought Reports



รายงานสถานการณ์ภัยแล้ง
ประจำวันที่: 10/09/2018



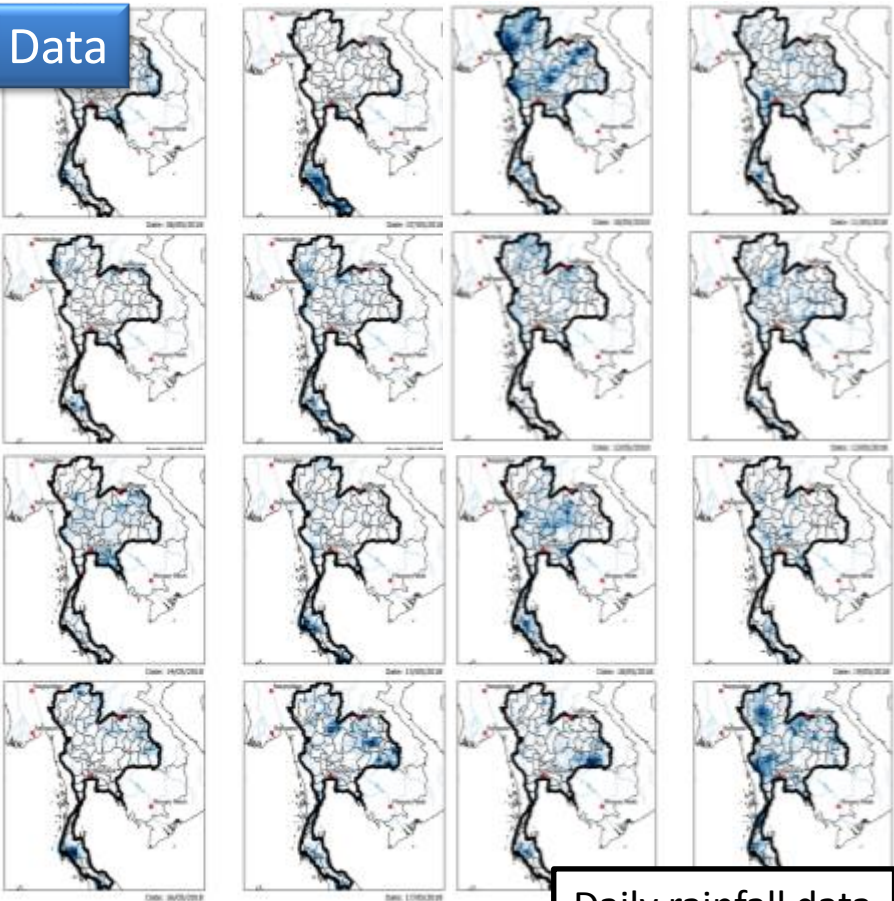
- **Advantages of the report**
 - ✓ Present **drought current status** of Thailand
 - ✓ Various water related satellite data are readily available such as **Precipitation, Vegetation, Soil Moisture, and combined indicators to generate drought indices**
 - ✓ **Easy to use, semi-automatic report generation tool**



Drought report will automatically send to water management organizations to indicate primary drought area.

Flood and Drought web portal: Selected data in Drought report

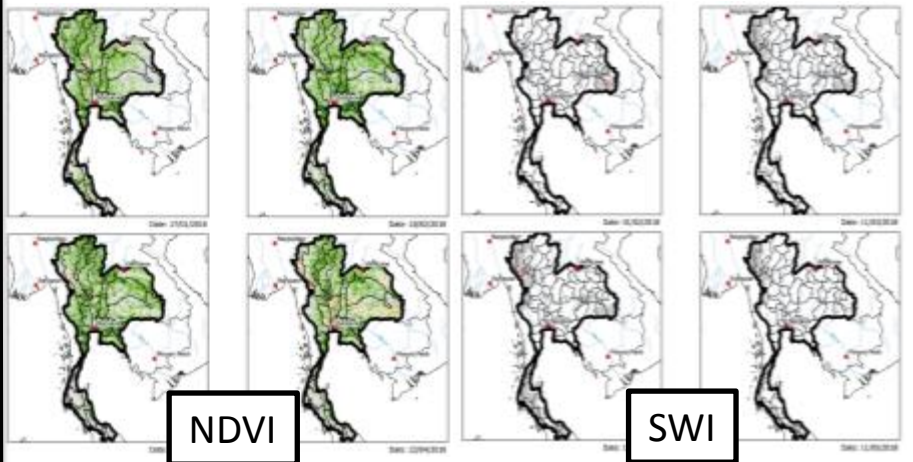
Data



Daily rainfall data

Daily Rainfall

- Monitoring of **spatial rainfall distribution**



NDVI

SWI

Computed Data

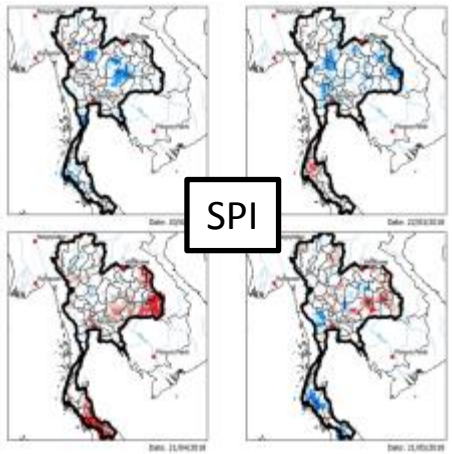
NDVI

- Monitor **health and density** status of agricultural area.

SWI

- Monitor **moisture and dry** status of soil.

Drought Index



SPI

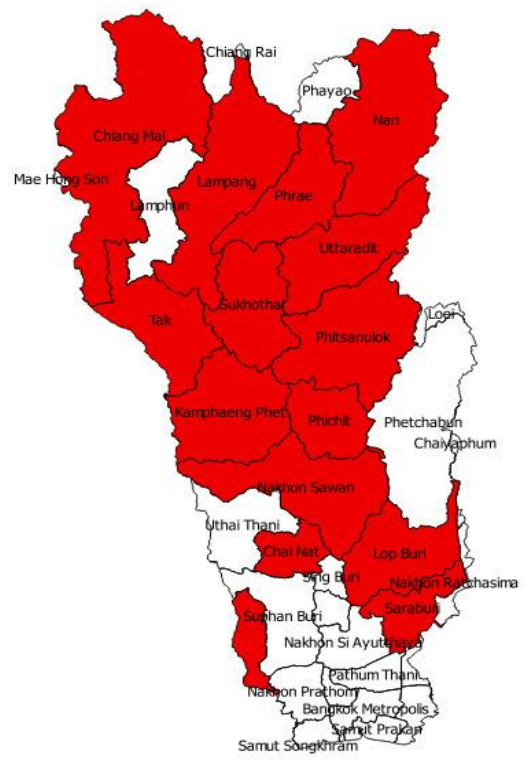
SPI

- Monitor and indicate **risk area** of drought.

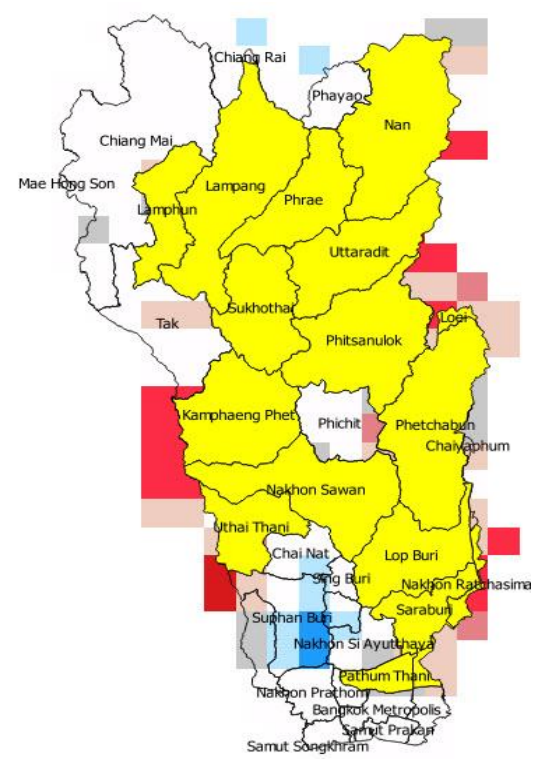
WHAT HAS WORKED AND WHAT DID NOT WORK?

Drought Indices Validation in 2015

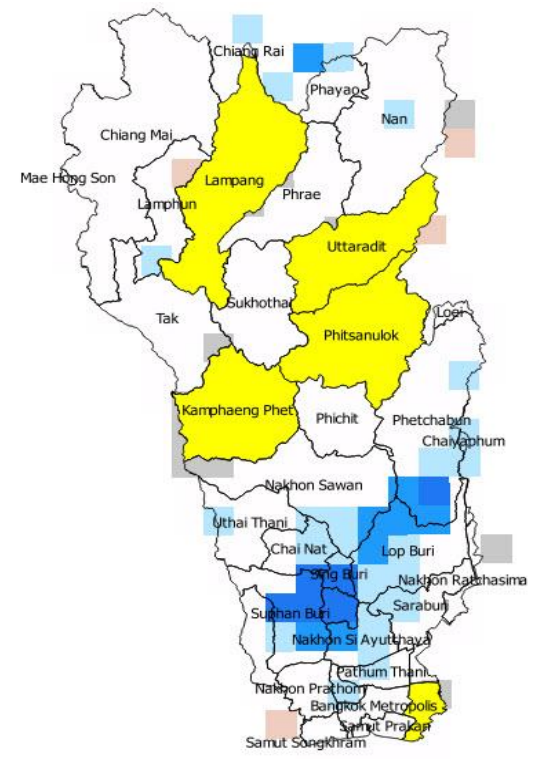
Drought area in 2015



SPI Validation



EDI Validation



Drought Area in 2015

Chiang Mai
Phrae
Kanchanaburi
Kamphaeng Phet
Chainat
Tak
Nakhon Sawan
Nan
Phichit
Phitsanulok
Ratchaburi
Lopburi
Lampang
Saraburi
Sukhothai
Uttaradit

Drought Area from SPI

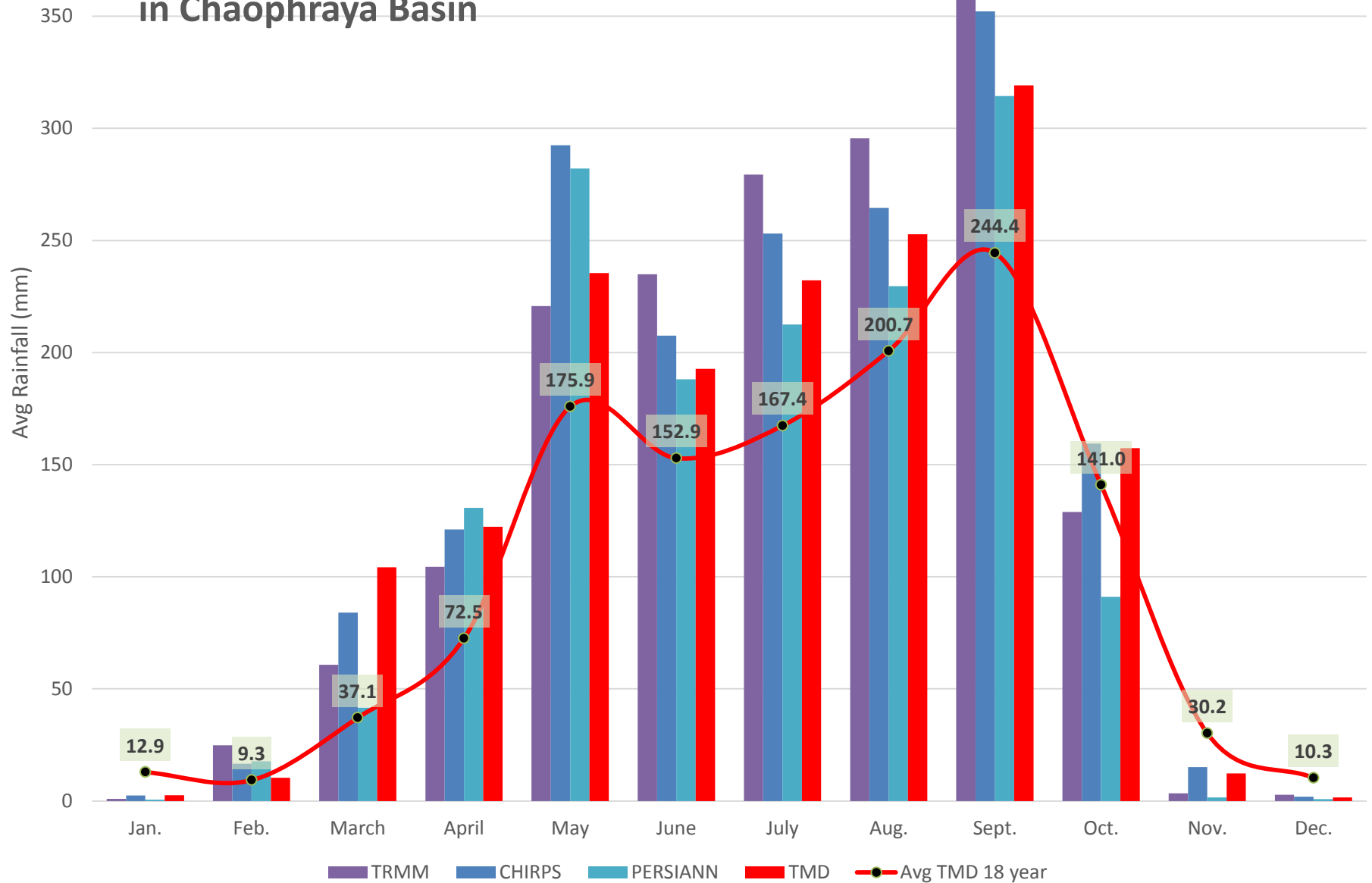
Phrae
Kamphaeng Phet
Nakhon Sawan
Nan
Phitsanulok
Lopburi
Lampang
Saraburi
Sukhothai
Uttaradit

Drought Area from EDI

Kamphaeng Phet
Phitsanulok
Lampang
Uttaradit

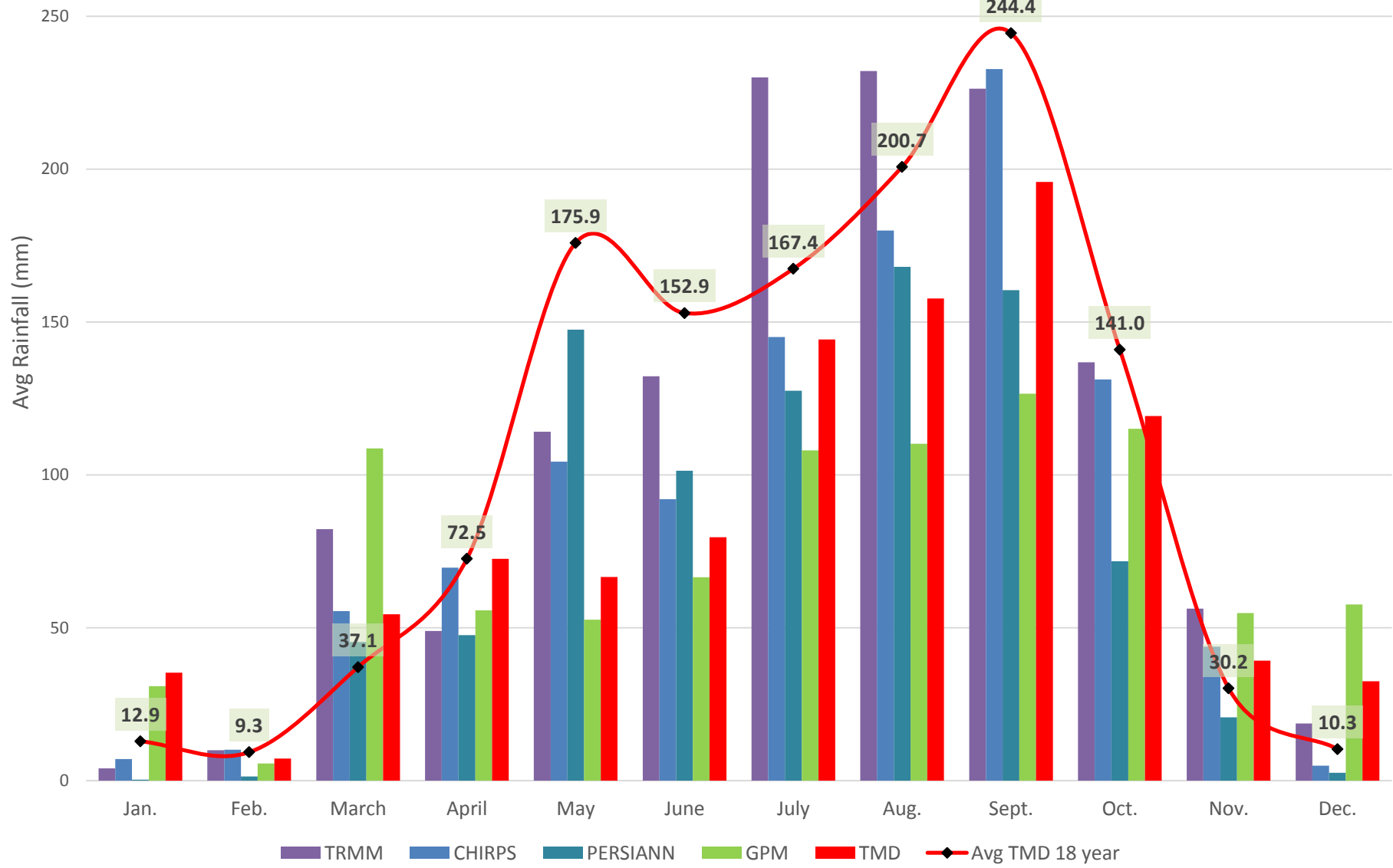
Rainfall Validation (Wet Year 2011)

Rainfall observation from satellite (FDMT web portal) vs rain gauge in Chaophraya Basin

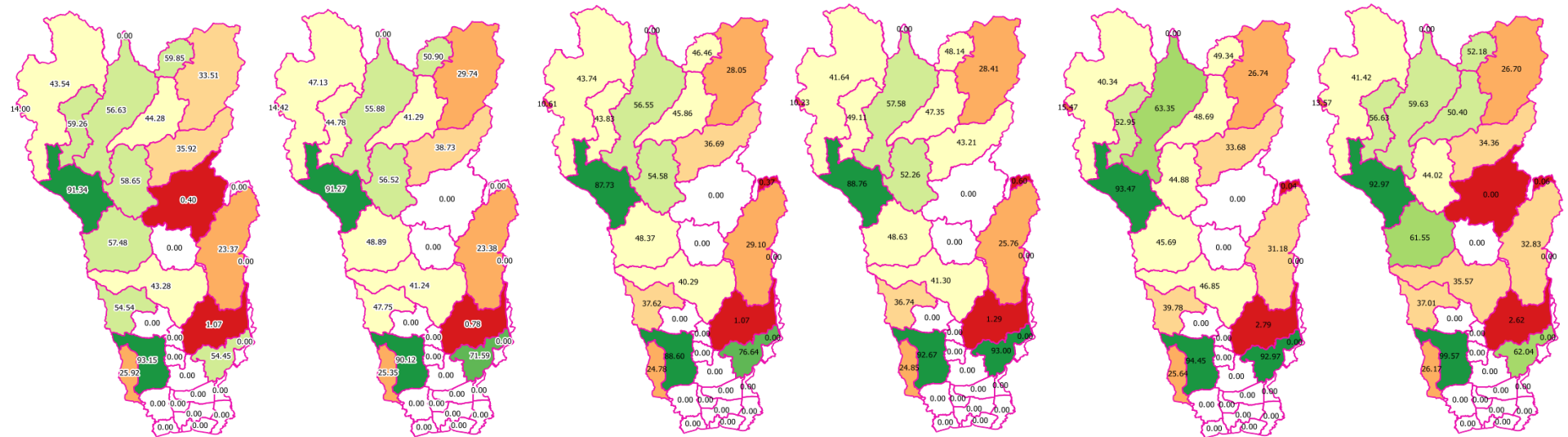


Rainfall Validation (Dry Year 2015)

Rainfall observation from satellite (FDMT web portal) vs rain gauge in Chaophraya Basin



SWI Validation (Soil moisture content from ground stations)



Jan

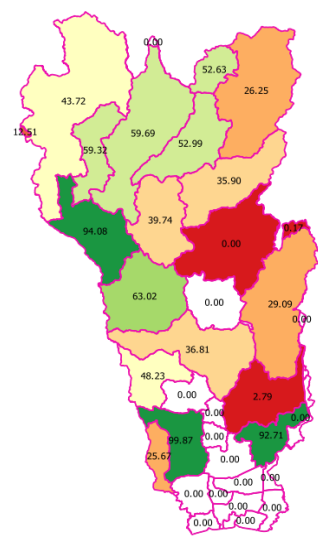
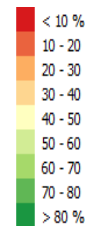
Feb

Mar

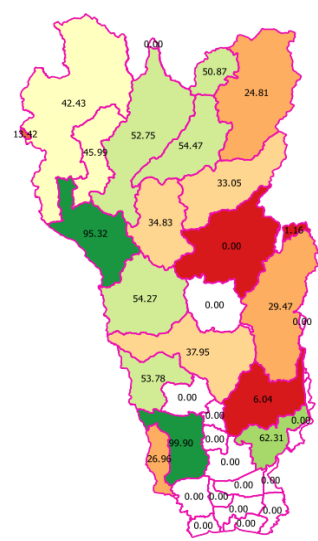
Apr

May

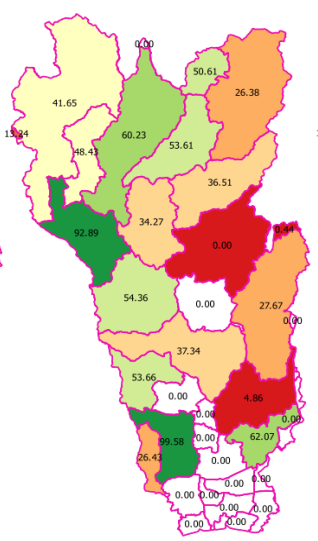
Jun



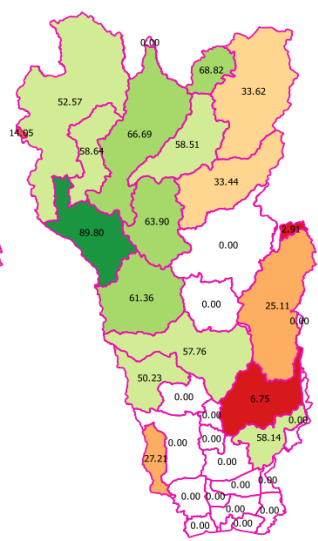
July



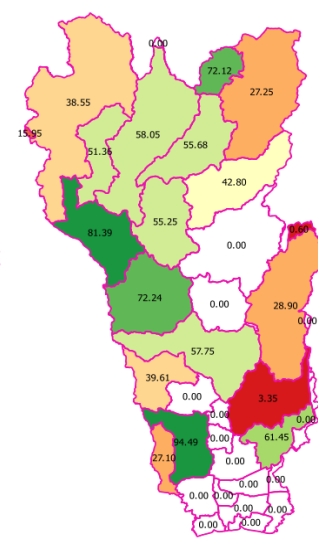
Aug



Sep

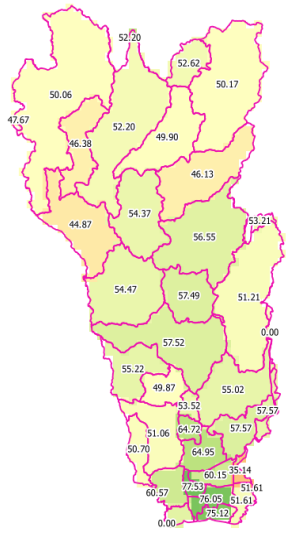


Oct

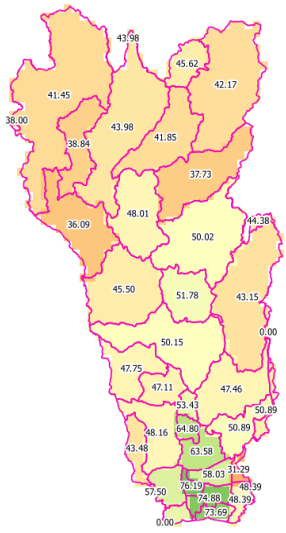


Nov

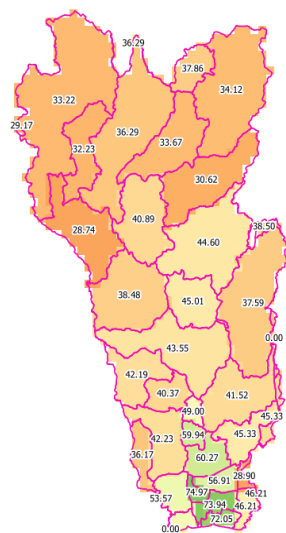
SWI Validation (SWI from FDMT web portal)



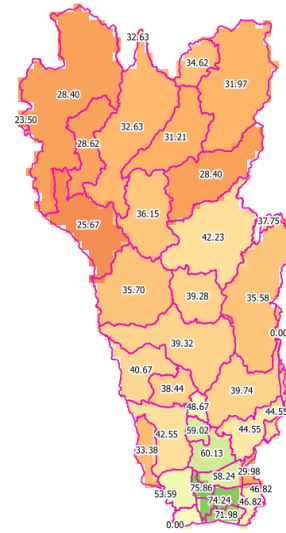
Jan



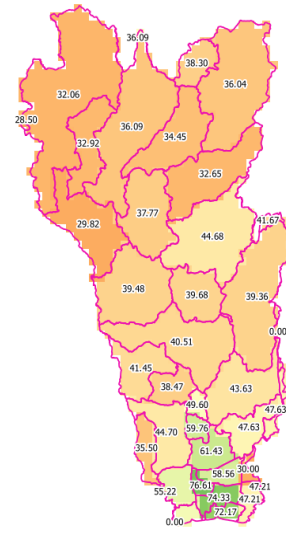
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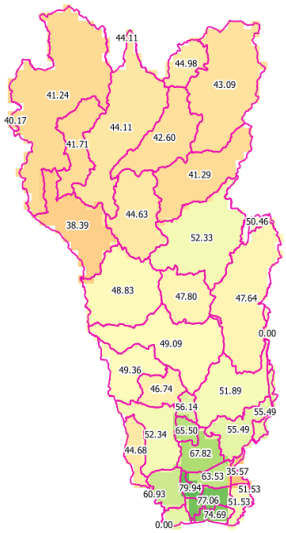
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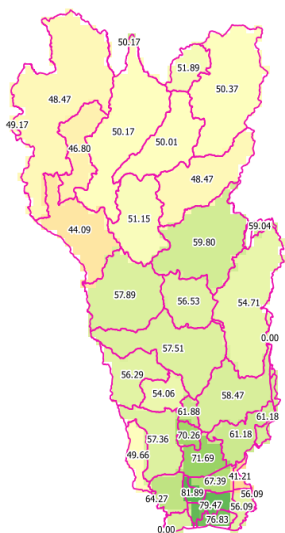
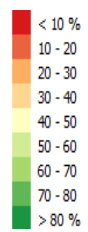
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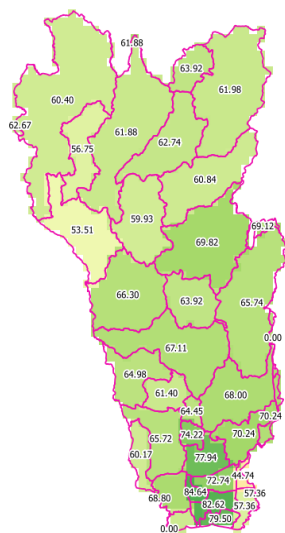
May



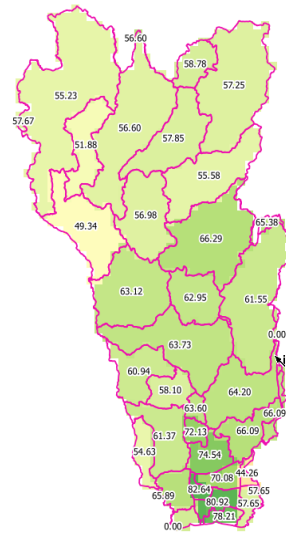
Jun



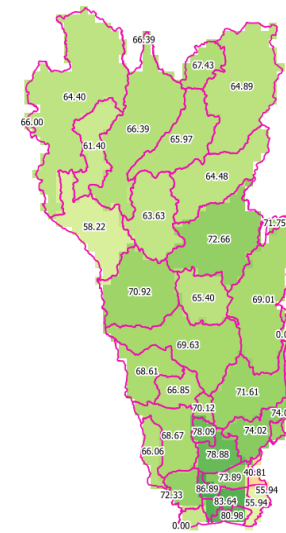
July



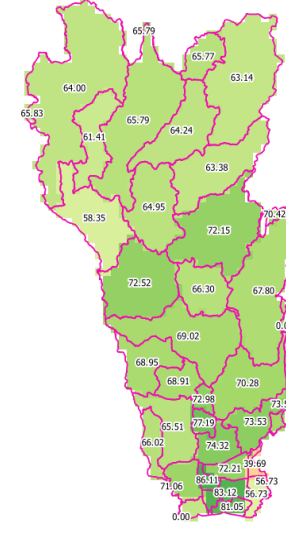
Aug



Sep



Oct



Nov

The screenshot shows the 'Flood and Drought Portal' website. At the top, there are logos for gef, UN environment, IWA (the International Water Association), DHI, and MIKE (Powered by DHI). The main navigation bar includes 'HOME', 'User: Ticha', 'Workgroup: Private', and 'Area: Thailand'. The page content is organized into a sidebar on the left and a main grid of application tiles on the right. The sidebar contains 'About the DataPortal' information, including a description of the portal's purpose, a user guide link, and contact information for Oluf Jessen and Bertrand Richaud. The main grid features ten application tiles, each with an icon, a title, and a brief description. The 'DROUGHT ASSESSMENT' tile is highlighted with a red dashed border. The tiles are: ISSUE ANALYSIS, WATER INDICATOR, DATA AND INFORMATION, DROUGHT ASSESSMENT, CROP APPLICATION, FLOOD ASSESSMENT, BASIN PLANNING, WATER SAFETY PLANNING, RDM TOOL, and REPORTING.

1. Follow up and monitor drought index in dry season (both index and forecasting data)
2. Using more applications for upcoming project, e.g.
 - Flood/Drought Assessment Application to estimate risk area and warning to local authorities

1. Correct satellite data with ground stations (bias correction) to improve data quality.
2. Users could add/upload data to web portal.



THANK YOU

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