THE 1st THAILAND GROUNDWATER SYMPOSIUM: KEY TO WATER SECURITY AND SUSTAINABILITY

Bangkok & Kanchanaburi(22 - 26 August 2022)

Evaluating the Effectiveness of Managed Aquifer Recharge in Shallow Groundwater : A Case Study of Nontree Sub-district, Prachinburi Province, Thailand

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Aksornklang, Rattaweep, Pholkern, Kewaree, Saraphirom, Phayom, Prommarach, Thanyaporn, Kreetep, Jiraporn, Homsin, Napon, Foytong, Piyawat, and Luepradit, Arunya

location and geo physical features of Nontree Sub-district

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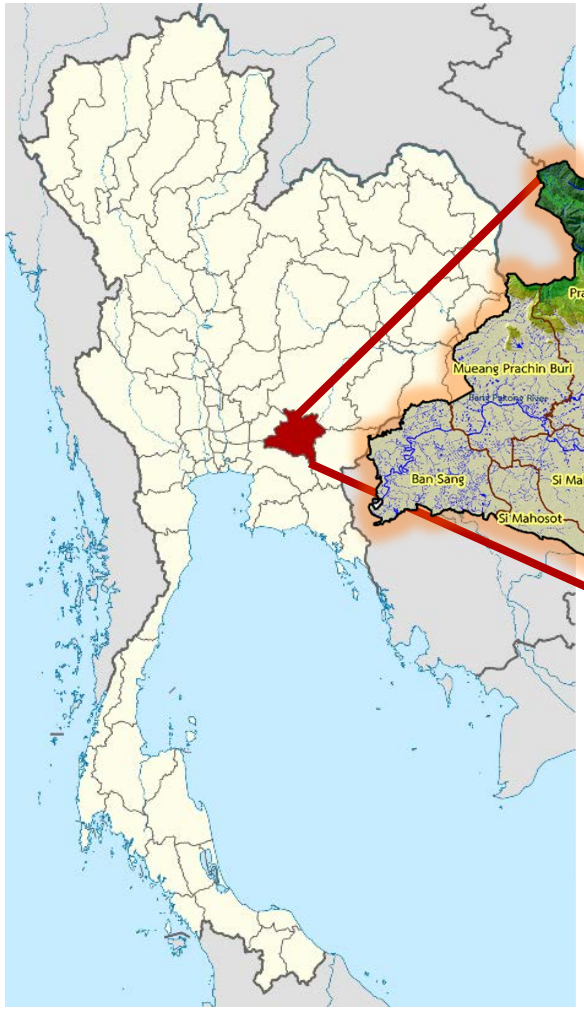

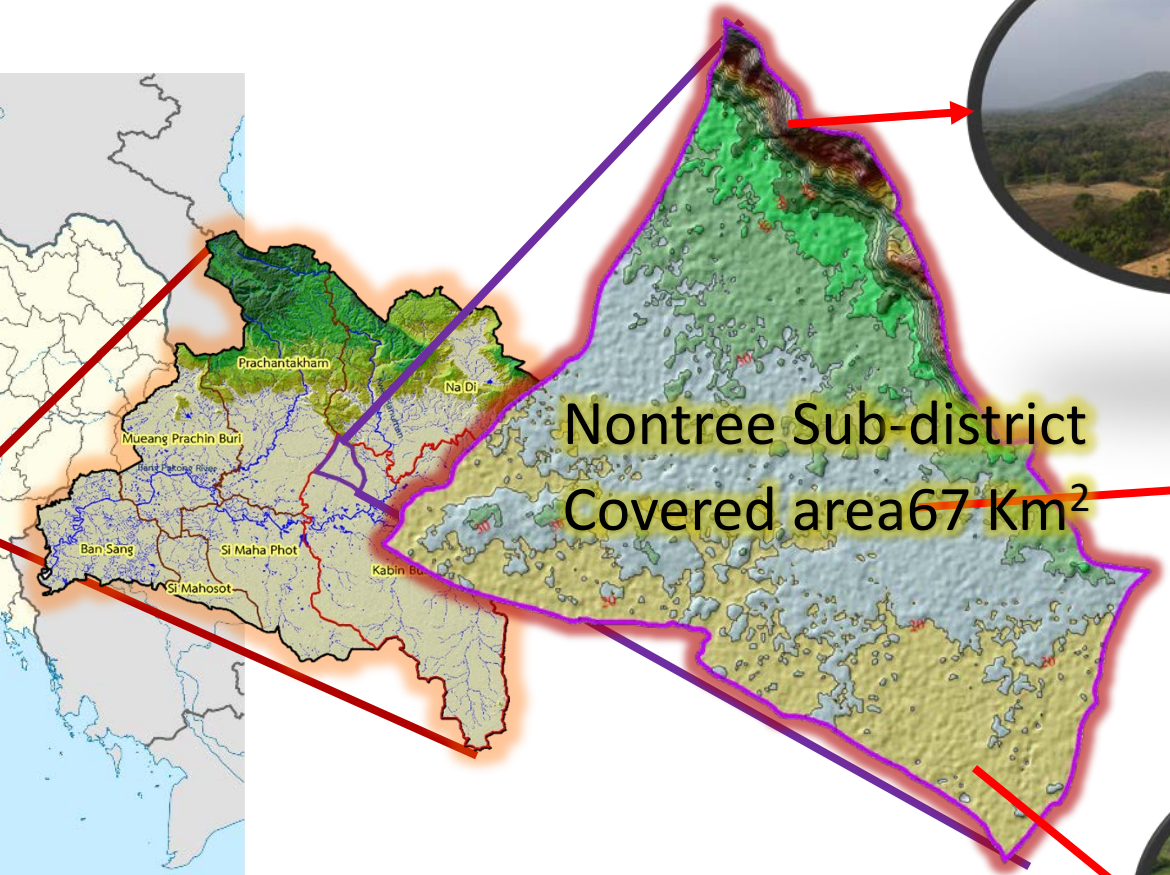

moutain

Plan area

floodplain

Nontree Sub-district

Main occupation and agricultural product

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Organic vegetebles

Organic fruits

Water problems in Nontree Sub-district

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Rainy season

Dry season

Water Balance in Nontree Sub-district

In rainy season

Surface water balance

Rainfall = 101 Mm^3/yr

SW storages = 10 Mm^3/yr

Natural recharge = 21.5 Mm^3/yr

Evaporation = 1.0 Mm^3/yr

Evapotranspiration (rainy season) = 44.5 Mm^3/yr

Flow out from the area = 23.5 Mm^3/yr

In dry season

The water needs of the crops

7.68 Mm^3/yr

→

SW storages

= 10 Mm^3/yr

→ **Evaporation 2.5 Mm^3/yr**

→ **Ecosystem 3.5 Mm^3/yr**

→ **Remaining 4.0 Mm^3/yr**

→ **Water shortage**

3.68 Mm^3/yr

The MAR in Nontree Sub-district (2019- now(2022)

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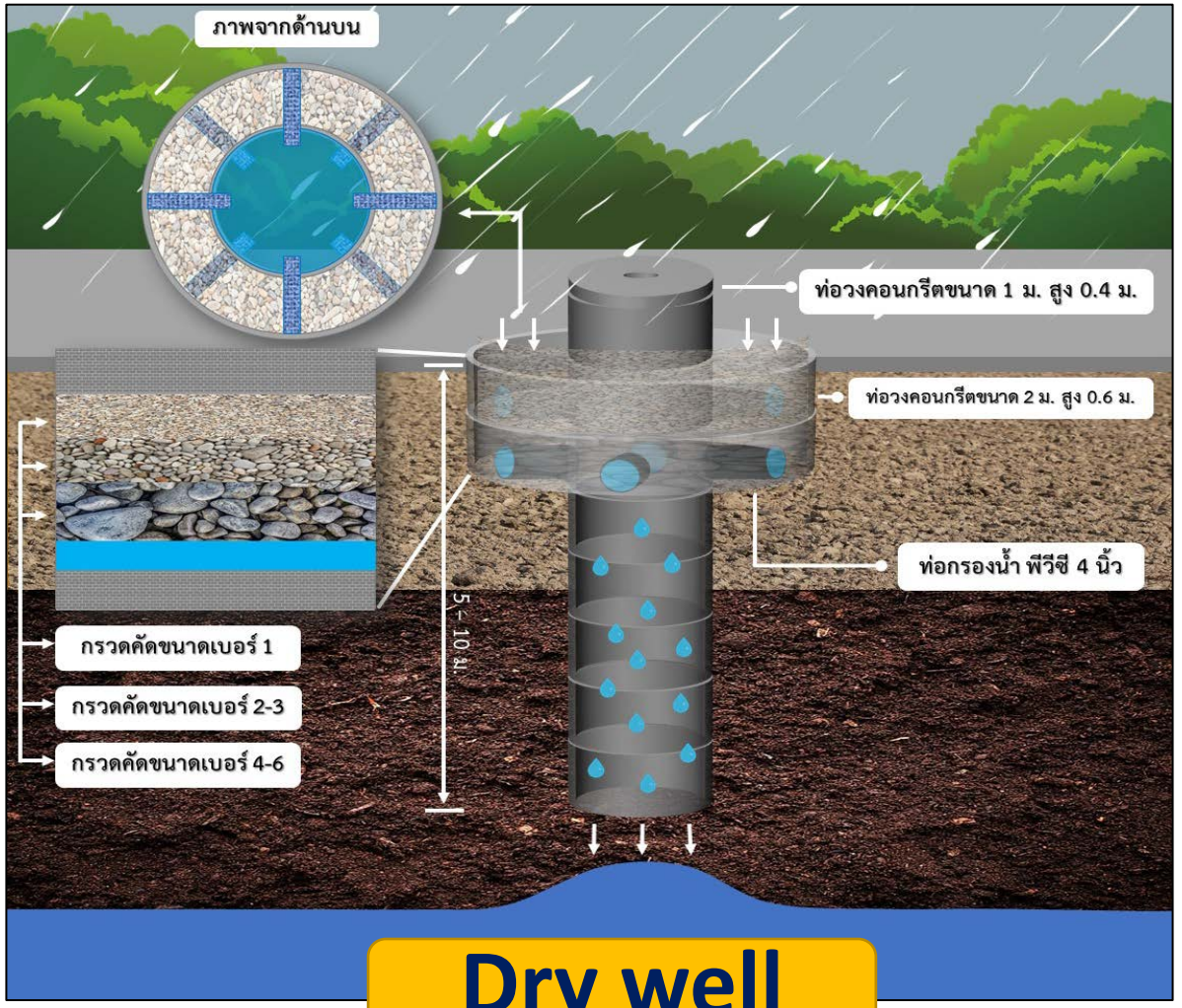
Rooftop harvesting



Dry well

The MAR in Nontree Sub-district (2019- now(2022)

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Recharge basin/ ponding

The MAR in Nontree Sub-district (2019- now(2022)

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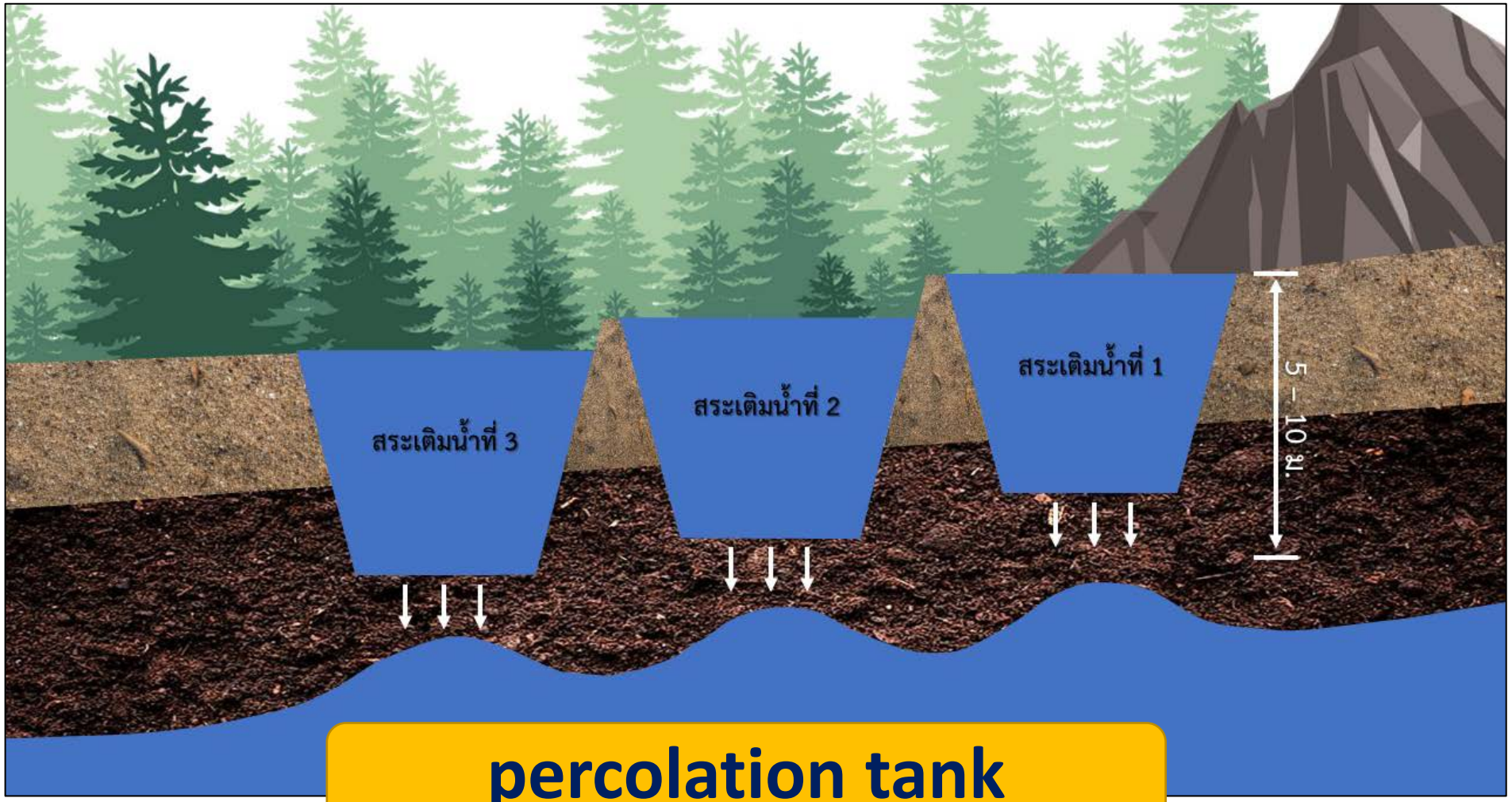

percolation tank

Field investigations

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GW investigation

Water usage

GW and SW leveling

MAR suitability and methods maps in Nontree Sub-district

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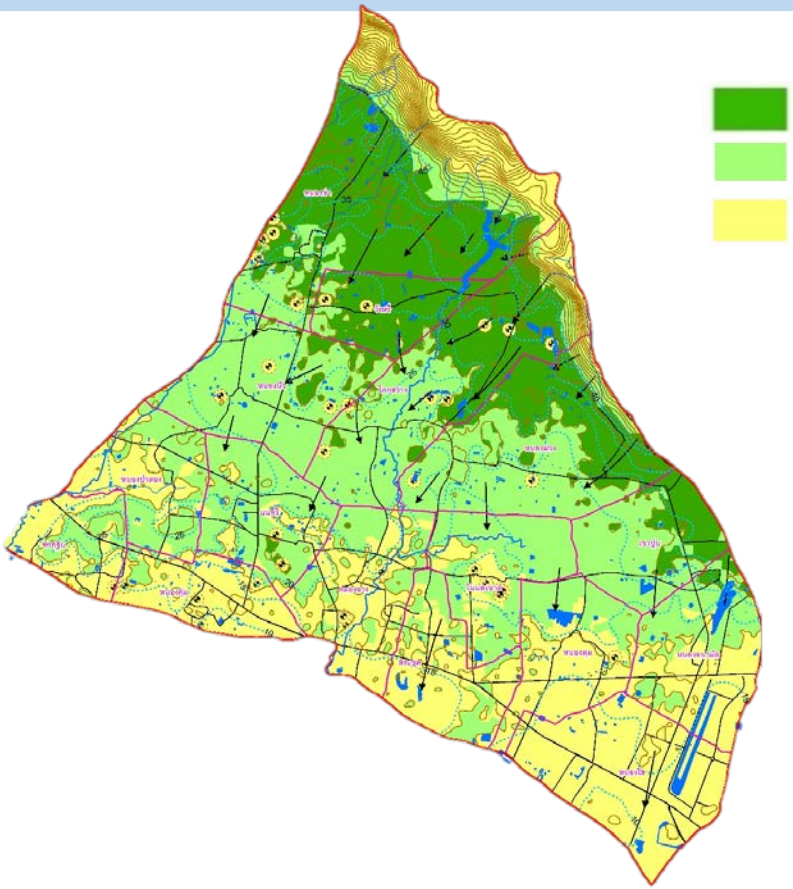
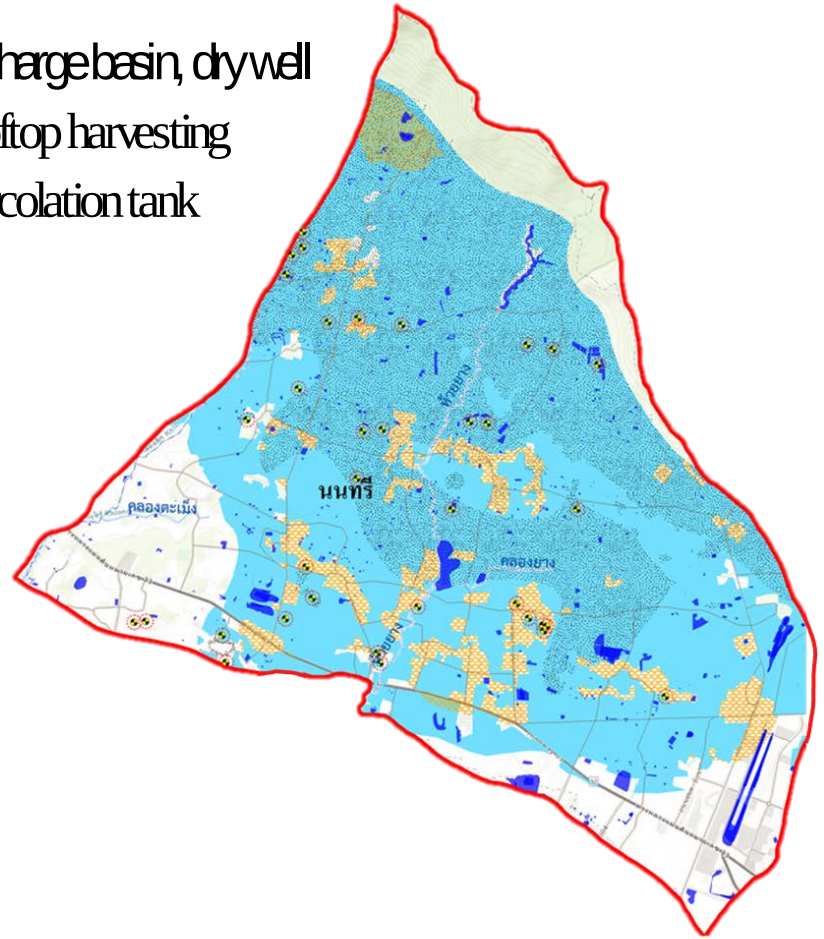


The most suitable (¶ĩš Žrai)
Highly suitable (17,325 rai)
Moderately suitable (14,766 rai)

Equipotential line
GW flow direction
Village
Street
Stream
Water body
livestock farms

recharge basin, dry well
rooftop harvesting
percolation tank



Monitoring system

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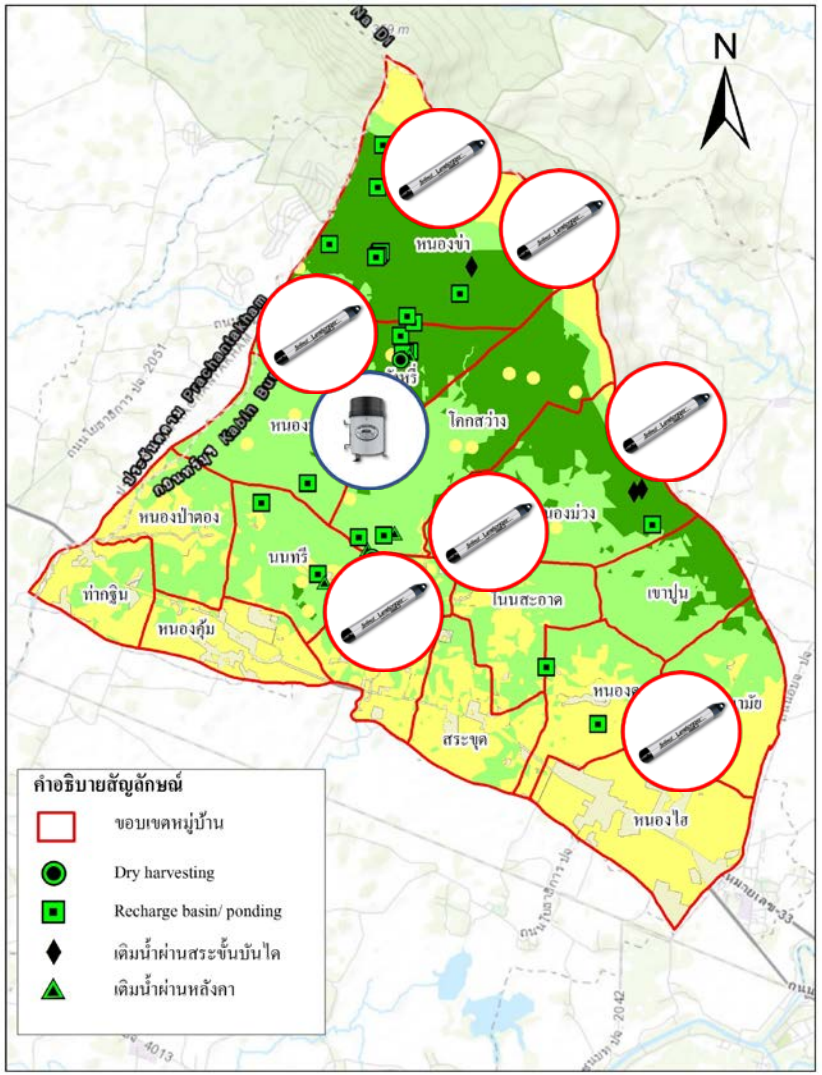

Village	Staff gauge	Water level logger	Rain station
Baan Kok sa-ad	1	0	0
Baan Non-sri	3	2	0
Baan Nongbua	1	0	0
Baan Wangree	7	1	1
Baan Nong-kha	8	2	0
Baan Nongmaung	3	2	0
Baan Nongdum	1	0	0
	24	**7**	**1**

The MAR in Nontree Sub-district (2019- now(2022))

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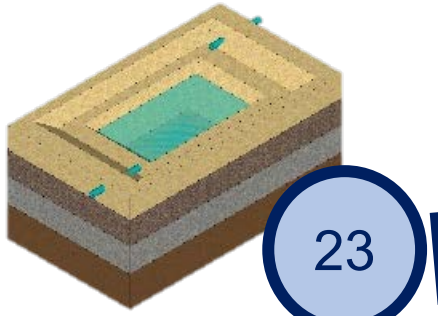

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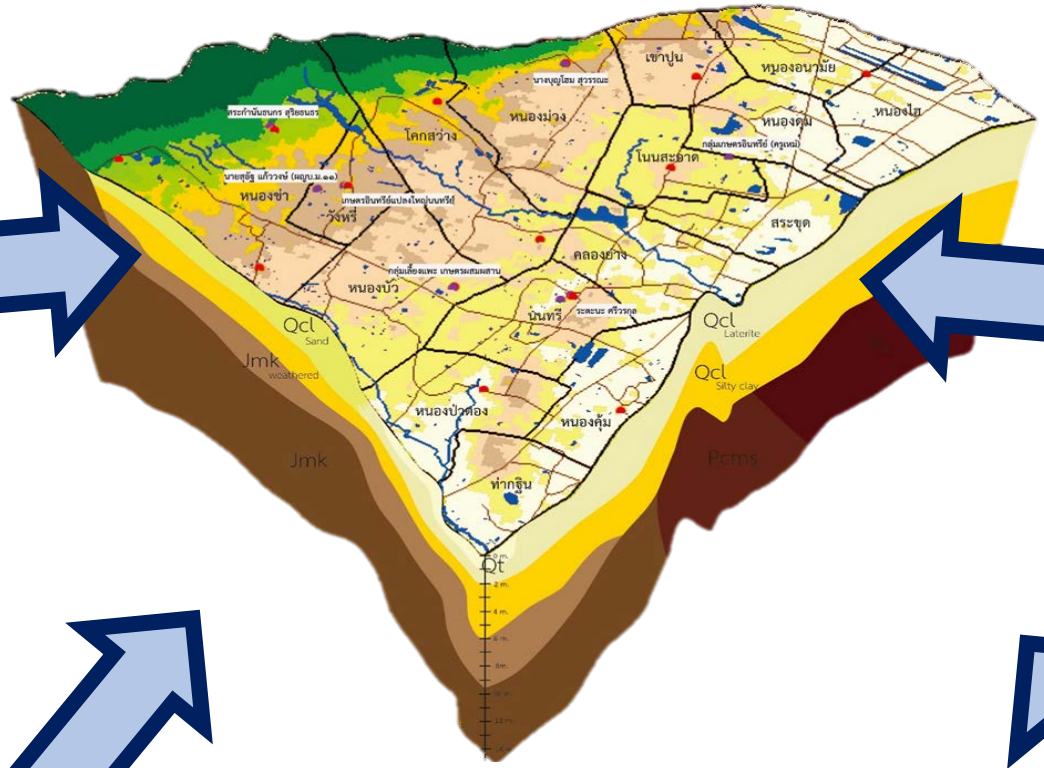
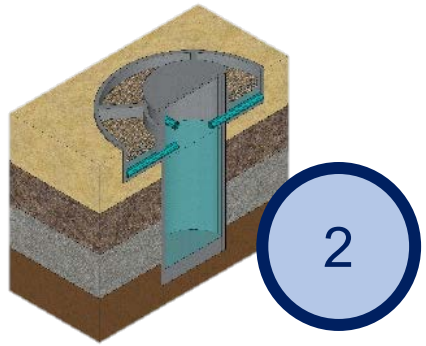
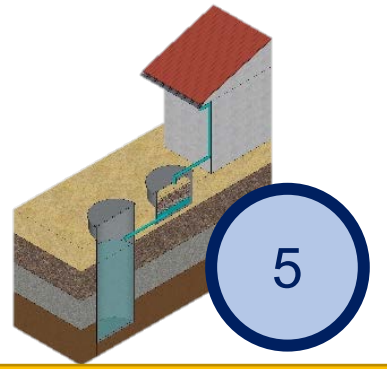
Recharge basin / ponding





2

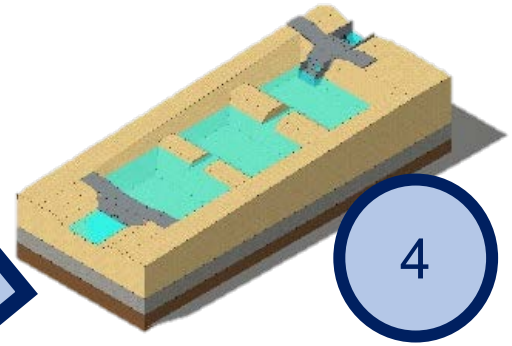
Dry harvesting



5

Rooftop harvesting

Total point of MAR system
34 point
and 189,782 cu.m



4

Percolation tank

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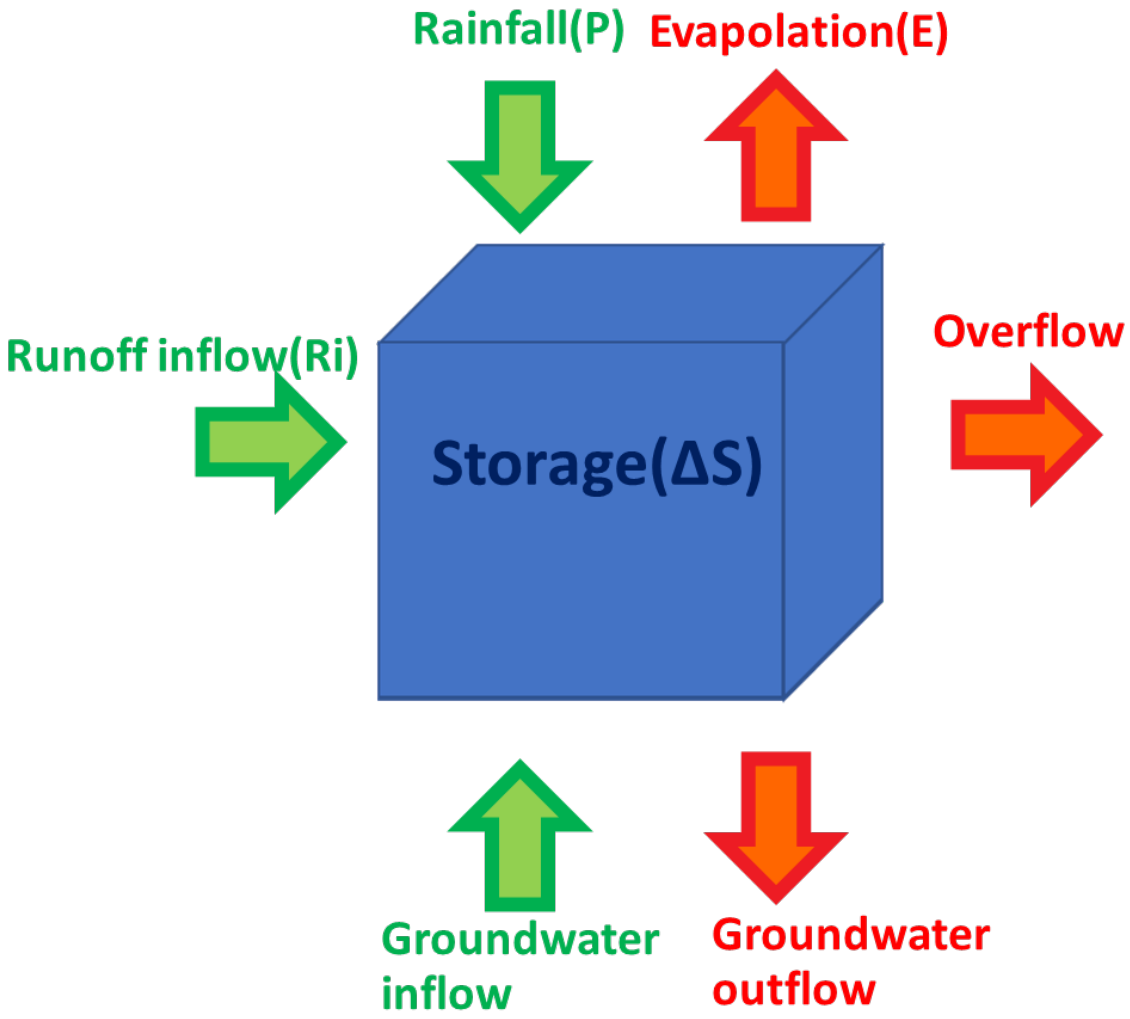

Recharge volume(in rainy season)

=

goundwater outflow –

(evapolation + overflow)

≤

Rainfall + runoffinflow

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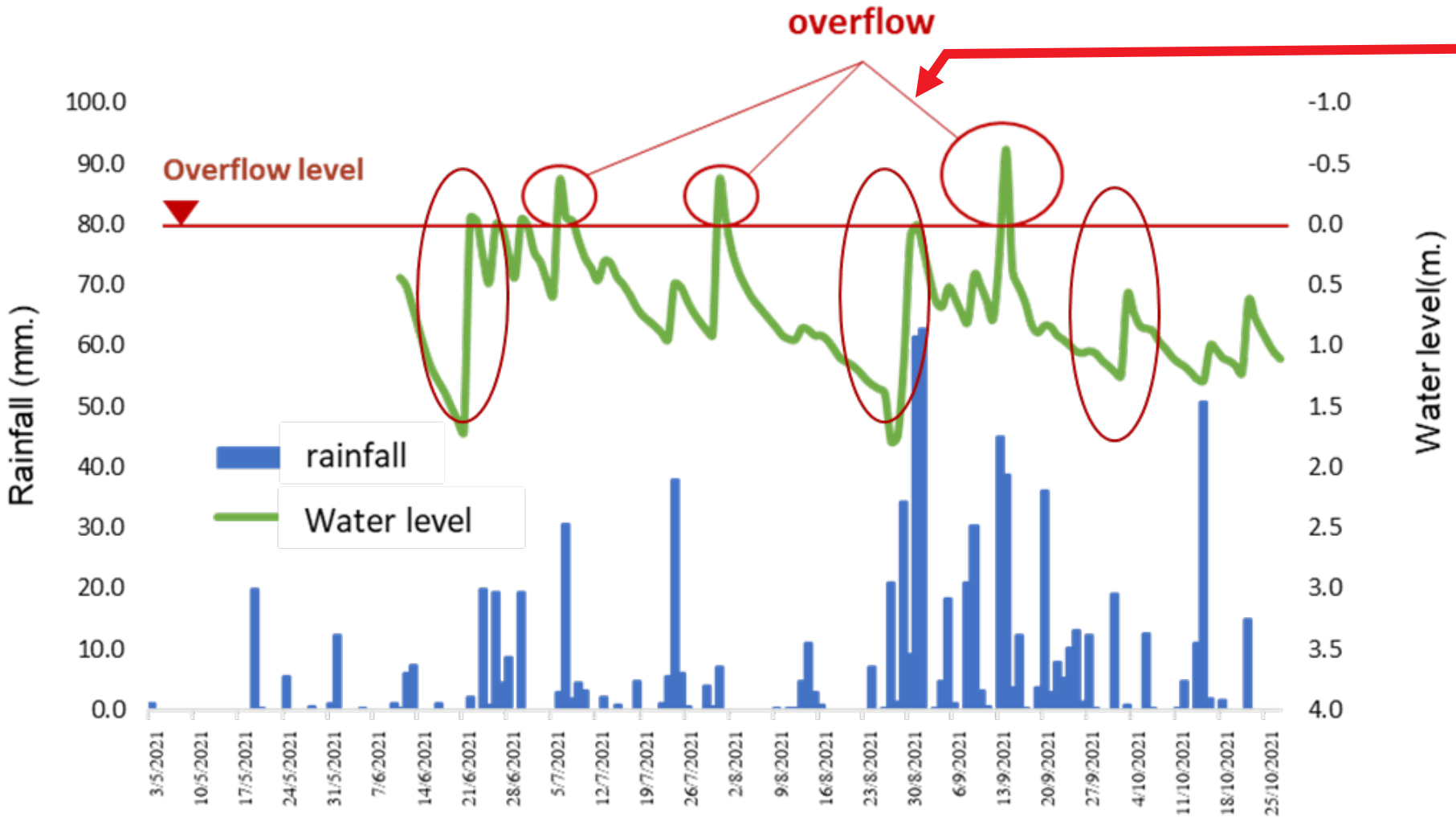

Sort out

- Overflow
- The water level rapidly changes

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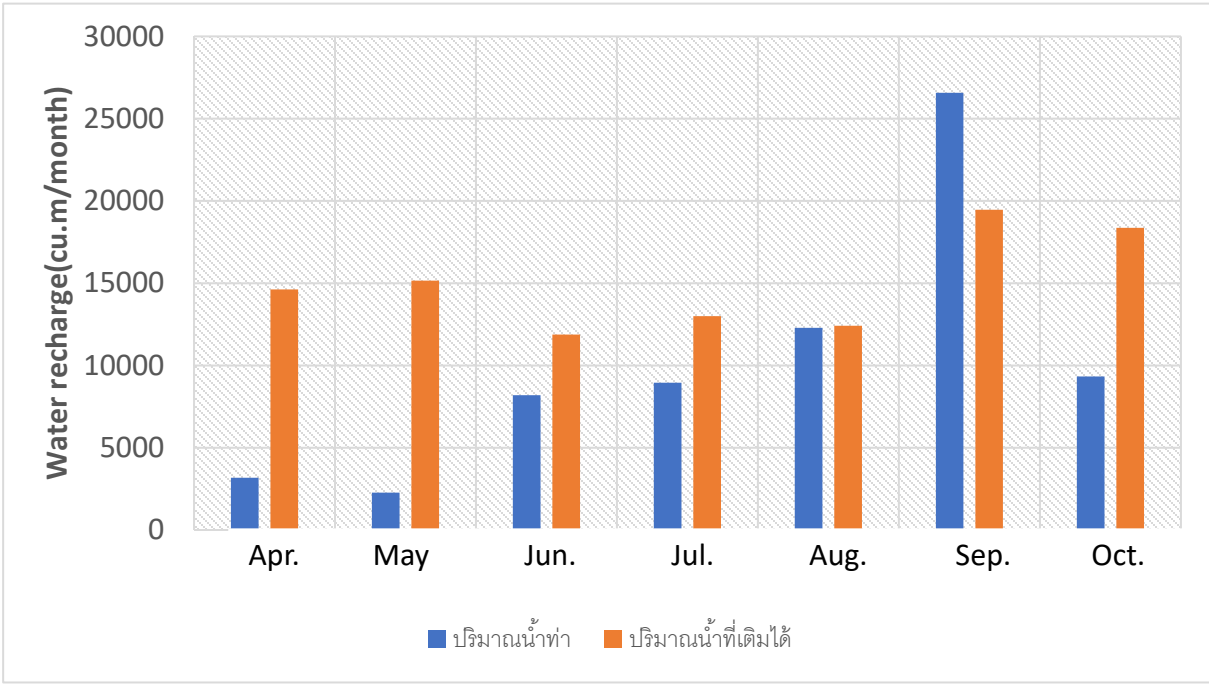
Water infiltration (m./hr.)

MAR system	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Percolation tank	0.033	0.027	0.036	0.015	0.015	0.015	0.015	0.015	0.015
Dry harvesting	0.021	0.018	0.018	0.015	0.015	0.015	0.015	0.015	0.015
Rooftop harvesting	0.021	0.018	0.018	0.015	0.015	0.015	0.015	0.015	0.015
Recharge basin (Foothills and hilly areas)	0.033	0.027	0.036	0.015	0.015	0.015	0.015	0.015	0.015
Recharge basin (Plain)	0.021	0.018	0.018	0.015	0.015	0.015	0.015	0.015	0.015
Recharge basin (lowland area)	0.018	0.021	0.018	0.018	0.015	0.015	0.015	0.015	0.015

Groundwater recharge (cu m./month)



Totals volume of MAR system

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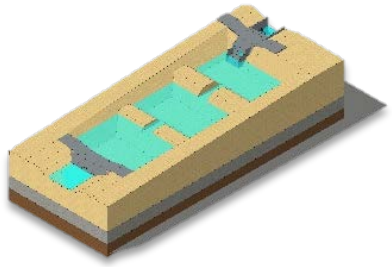

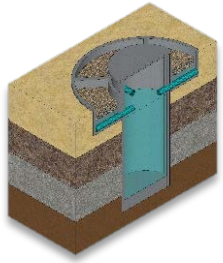

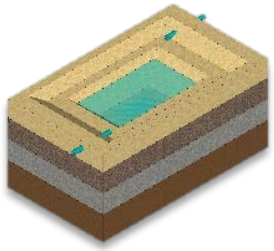

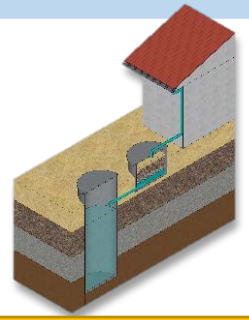

total

	Percolation tank	Dry harvesting	Recharge basin / ponding	Rooftop harvesting	
Total system	4	2	23	5	32
Total storage (cu m.)	100,109	14	89,624	34	189,782
Recharge (cu m./year)	693,000	3,800	1,131,000	980	1,828,780
Efficiency (times)	5-25	250-300	16-20	10-50	

Change in shallow groundwater level

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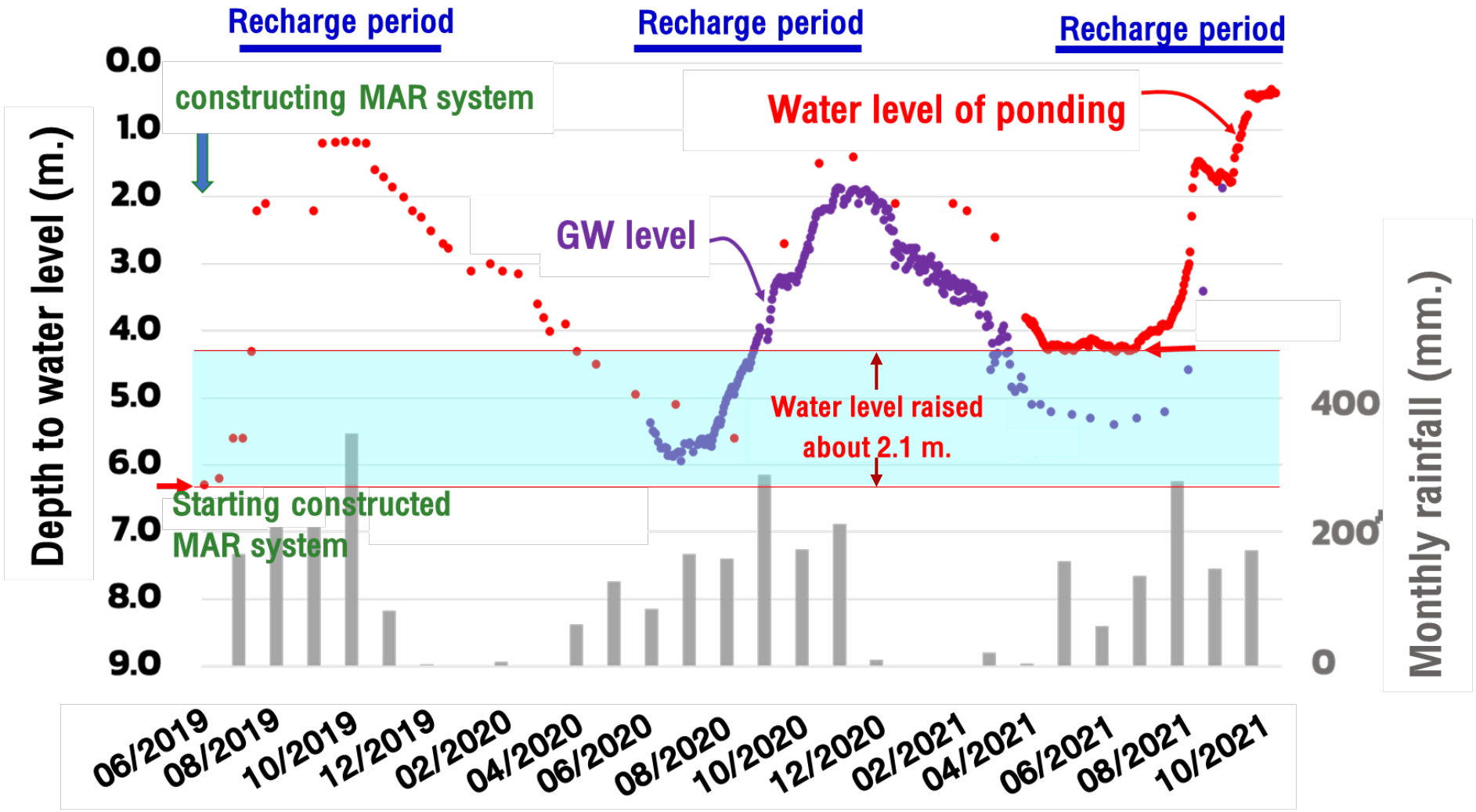

Conclusion and Recommendations

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1. From 2019-2021, the total volume of recharged water to shallow aquifer is around 2.9 Mm^3 in Prachinburi Province and 2.5 Mm^3 in Nontree from 34 systems.
2. The efficiency of MAR systems varies by 20% by the annual rainfall pattern.
3. The shallow groundwater is gradually increased when compared at the same time of the year, especially in the dry season.
4. The shallow groundwater level in this area was increased by around 1.7 m. and the spreading area of recharged water is about 4.5 km2 in 2021.

Thank you

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