MANAGE AQUIFER RECHAGE : THE EXPLORATION OF POTENTIAL AREAS, NAM KAM BASIN, SAKON NAKHON AND NAKHON PHANOM PROVINCES, THAILAND

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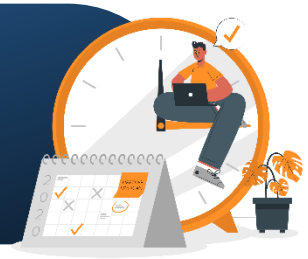
Outline



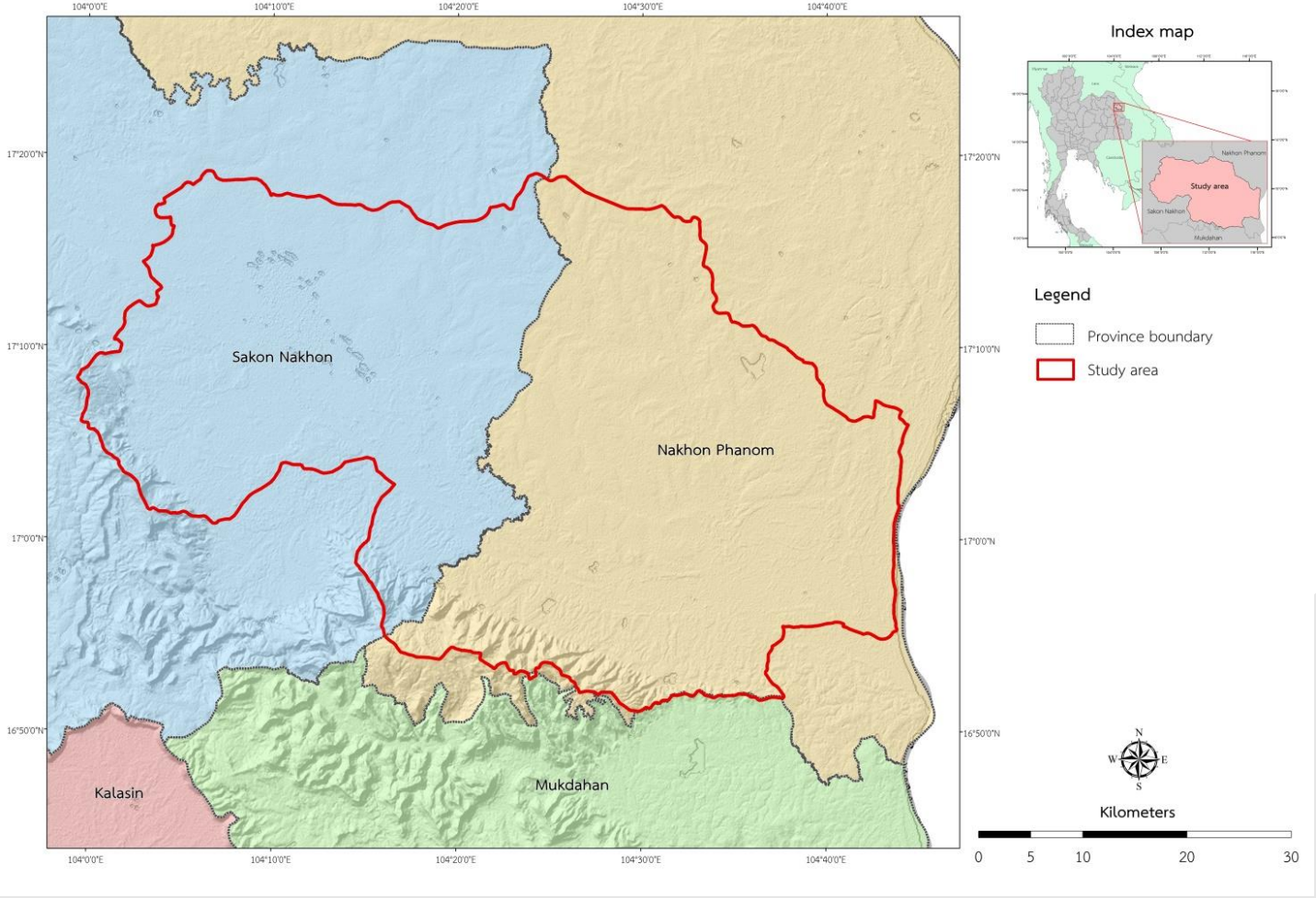
1. Background

2. Methods

3. Results

4. Conclusions

1. Background



Study area

- Nam Kam River Basin

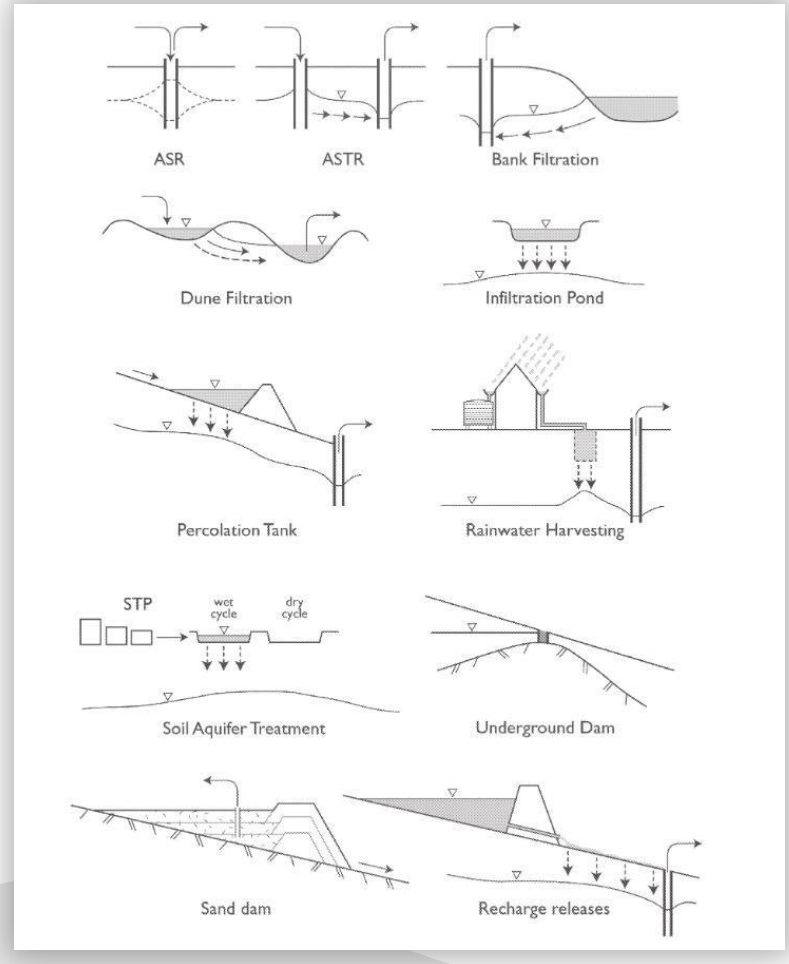
Problem

- Flooding due to tropical cyclones

Solution

- Conducting managed aquifer recharge (MAR)

1. Background



Dillon (2005)

What is managed aquifer recharge?

- Recharge of water to aquifer
- MAR methods mainly depend on hydrogeology

Benefits

- Store surplus surface water to increase infiltration into the groundwater system
- Increase water availability for consumption
- Restore groundwater levels

2. Methods

2.1 Literature reviews

No.	Secondary data	Short conclusion
1	Managed aquifer recharge in Thailand	15 projects from 1972 to 2019, different techniques and areas but mostly occur in the central part of Thailand
2	Topology	Flat area with an elevation of approximately180-200 meters above mean sea level
3	Soil permeability	Saturated hydraulic conductivity 0.5-2.0 cm/hr
4	Geology	Siltstone and sandstone of the Korat Group, unconsolidated sediments
5	Hydrogeology	Hard rock aquifer
6	Other report	DMR (1998) studied the distribution of rock salt Khon Kaen University (2001) evaluated the impact of irrigation on salt water distribution Kasetsart University (2017) studied the possibility of Nong Han Lake development DGR (2020) proposed the guidelines of MAR in Thailand

2. Methods

2.2 Field studies

Groundwater well inventory

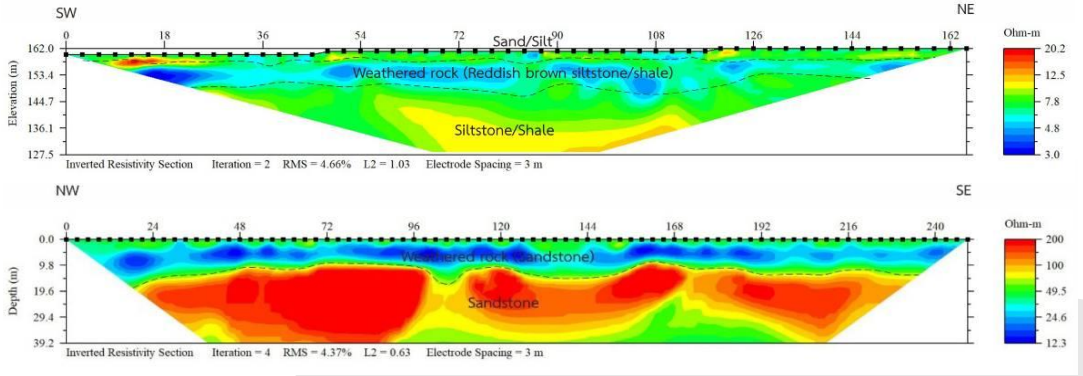
Total 480 wells

- Depth ⩽ 10 m 65 wells, water table 0.5-8.0 m below the surface

- Depth > 10 m 343 wells, water table 1.2-33.0 m below the surface

- Water quality

- Flow direction



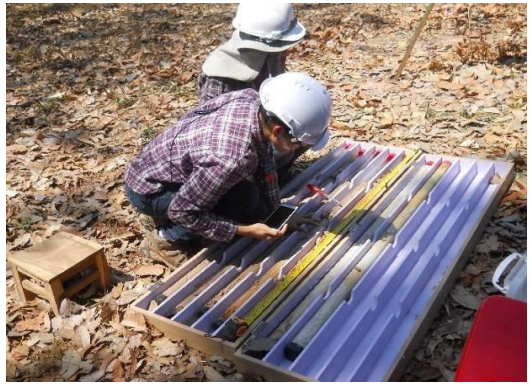
2-dimensional resistivity survey

Total 37 lines

- 3 layers : top soil, siltstone, and sandstone

2. Methods

2.2 Field studies



Drilling small-diameter wells

Falling head test

Total 11 wells

- 3 wells in sediments
- 8 wells in hard rocks

Total 29 wells

- 10 wells drilled in sediments, 1.01-23.96 m/day
- 19 wells penetrated in hard rocks, 0.72-15.37 m/day

2. Methods

2.3 Social study

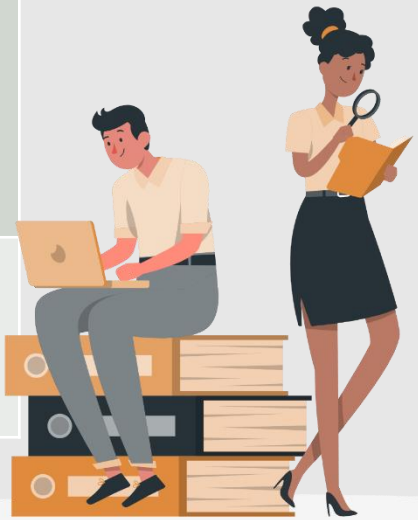
Questionnaire

- Flood situation
- The lack of water consumption
- Understanding of MAR

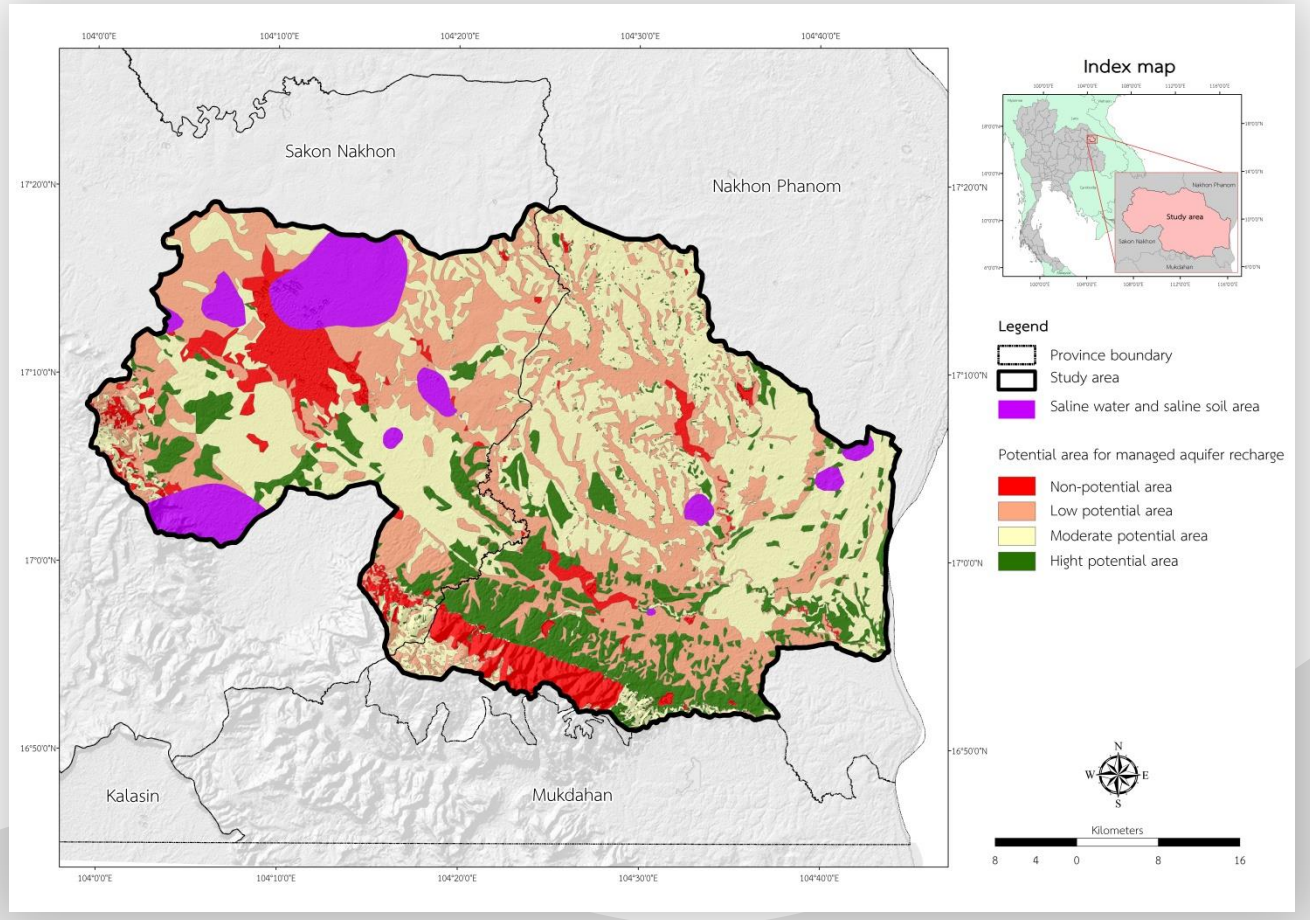
2. Methods

2.4 Delineation of the potential are as

Data	Description	Weight	Factor Rate
Geology	siltstone and shale	1	1
	silstone, sandstone, and conglomerate	2	
	eolian sandstone	3	
	weathered rock	4	
	terrace deposits	5	
	fluvial deposits	5	
Geomorphology	mountain	1	1
	floodplain	3	
	terrace	5	
Permeability (m/day)	<0.03	1	3
	0.03-0.12	1	
	0.12-0.48	2	
	0.48-1.50	3	
	1.50-3.00	4	
	>3.00	5	
Gradient	0-2	4	2
	2-5	5	
	5-10	3	
	10-20	2	
	>20	1	



3. Results



- Moderate potential area, 1,000 square kilometers (44%)
- Low potential area, 800 square kilometers (33%)
- High potential area, 350 square kilometers (14%)
- Non-potential area, 200 square kilometers (9%)

4. Conclusions

High and moderate potential areas must be the first two priority zones for conducting the MAR

The next step would focus on the study of the appropriate methods and testing the selected technique in the actual sites

MAR could lead Thailand to be on track to achieve the United Nations' Sustainable Development Goal 6

Reference

Dillon, P. (2005). Future management of aquifer recharge. Hydrogeology Journal, 13(1), 313–316. https://doi.org/10.1007/s10040-004-0413-6

Thank you