Drilling and Development of Hot Spring Groundwater, Porn Rang Hot Spring, Bangrin Subdistrict, Mueang Ranong District, Ranong Province

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Topic

- Introduction
- Methodology
- Result
- Conclusion

Introduction

Porn Rang Hot Spring is located in Ngao Waterfall National Park, Bangrin Subdistrict, Mueang Ranong District, Ranong Province.

- Open for service as a health tourism destination.
There are a lot of tourists nowadays who come to the hot springs to take advantage of the service in the hot springs.

- During the drought in 2017, there was a problem caused by a water shortage for consumption.

Introduction

Fig. 1 Topographic map of Bangrin subdistric.

Ban Porn Rang Hot Spring Area

is exposed in a small valley near Khlong Porn Rang

- elevation about 60 m. above MSL.
- The surface manifestation covers an area of 30 x 80 m.

Discharges as natural hot pools and seepages.

➡ 3 artificial circle-shaped concrete pools.

➡ 1 artificial horseshoe shaped concrete pool.

objective

The objectives of this study were to explore and drill to develop hot spring groundwater of sufficient quality and quantity

- For Consumption
- To support tourism and services which promotes the Ranong tourism industry to expand and sustainably

Methodology

1. Desk study available data, geological and hydrogeological analyzed.
2. Collect water samples from natural hot pools and seepages.
3. Geological survey
4. Exploring Geophysics with Specific Electrical Resistivity.
5. Drilling for investigation and groundwater well development.
6. Collect water samples from wells that have been drilled and developed groundwater.

Geological setting

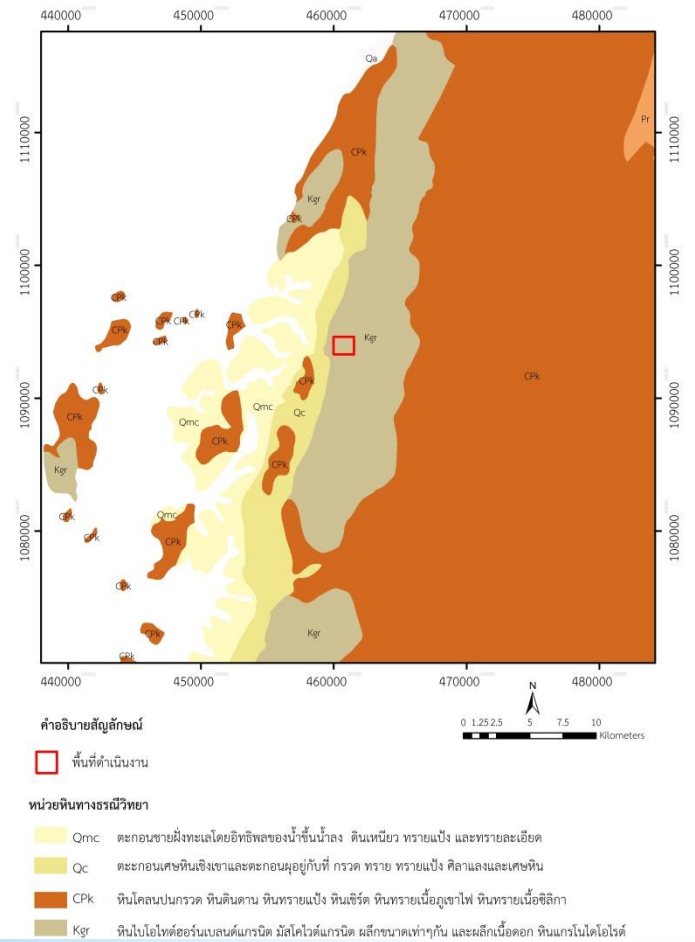


Fig. 2 : Geological map of Ranong Provinc

Stratigraphically, the oldest rock unit is composed of pebbly sandstone, greywacke, arkose, siltstone, mudstone, conglomeratic sandstone of Carboniferous-Permian age

The granitic rocks play an important role as the host rock of the Ranong geothermal resources

- Khlong Ban Rin granite(Kgr-br)
  It is mainly porphyritic biotite-muscovite granite

Hydrogeology

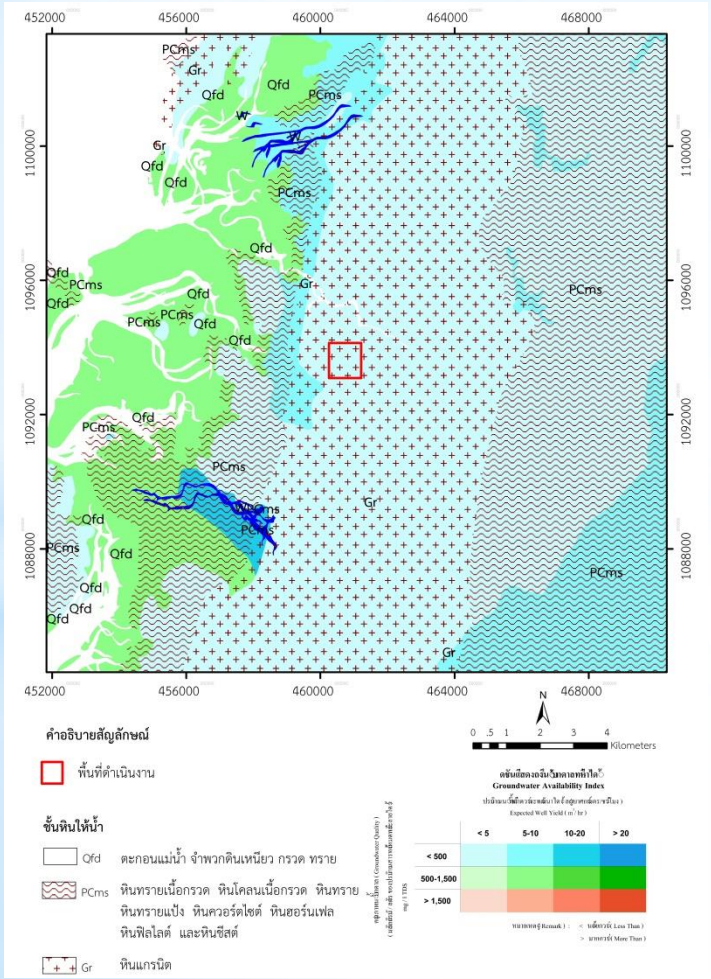


Fig. 3: Groundwater map of Ranong Provinc

- **Groundwater potentials are 2-10 m3/hr. and water quality with total dissolved solid less than 500 mg/l**

- groundwater in faults and fractures in a granite.

Geological survey

- It is porphyritic biotite-muscovite granite

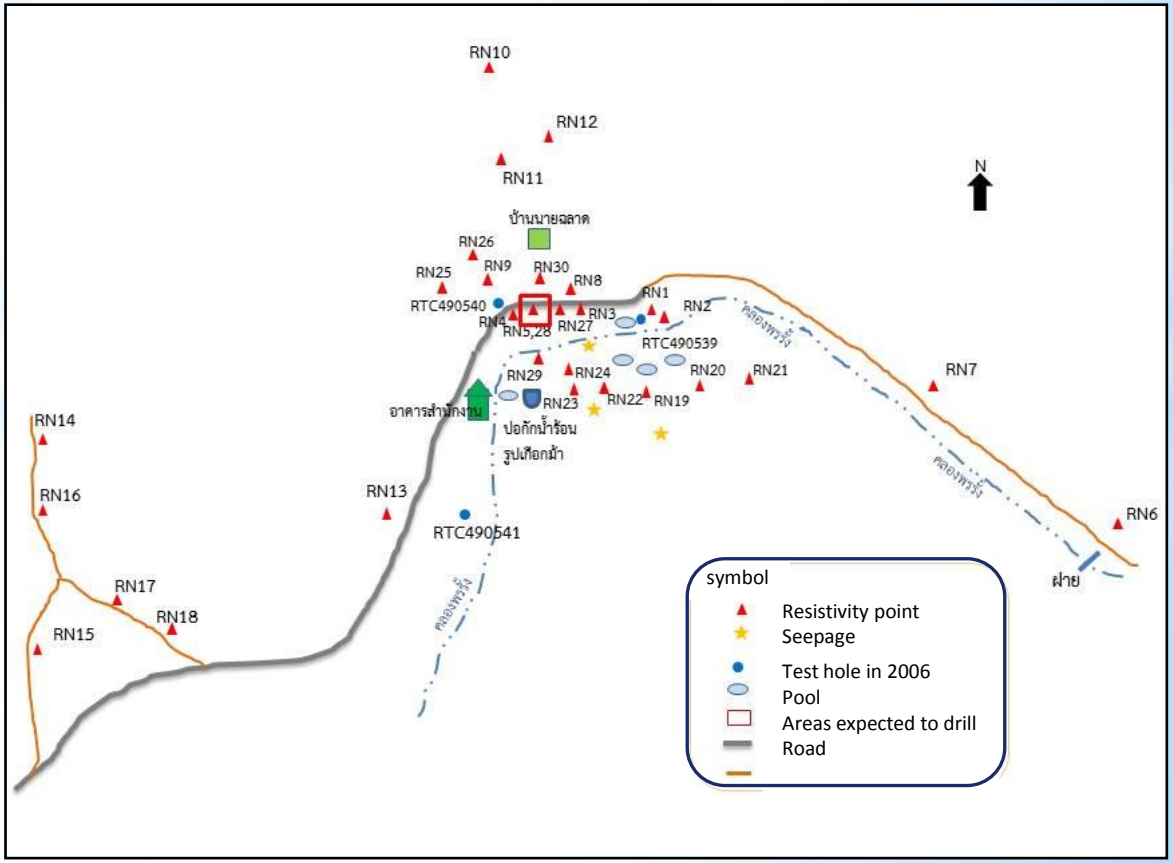





Geophysical survey

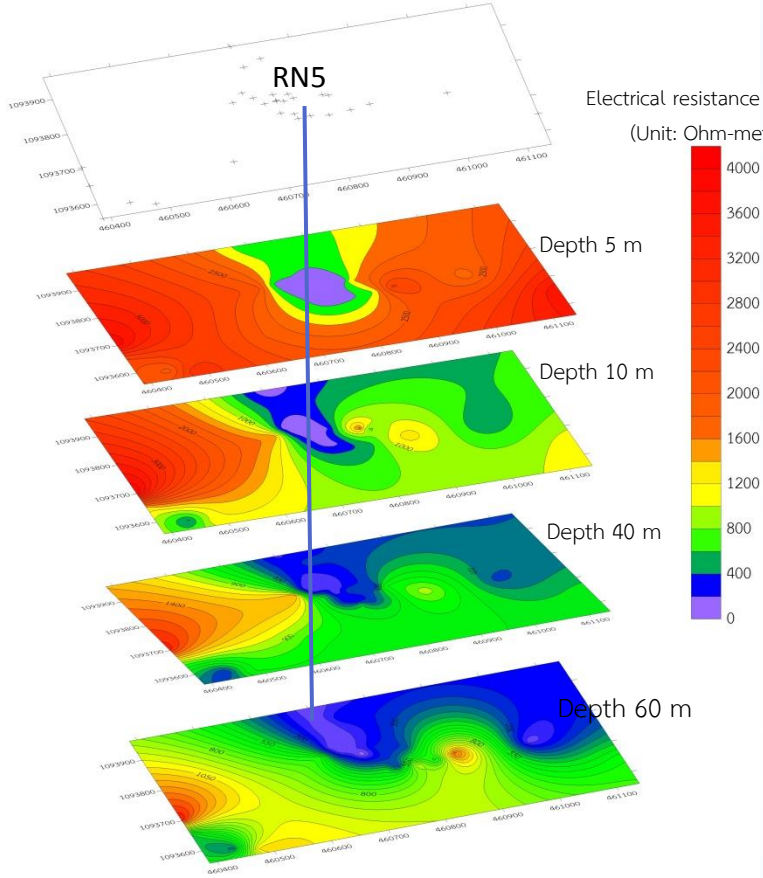
Exploring Geophysics with Specific Electrical Resistivity Method

- Resistivity survey 5 lines which consists of vertical electrical sounding (VES) a total of 30 points



Geological Interpretation

- Interpreted a data to know the type and thickness of each rock layer for determine groundwater drilling points in appropriate location that are expected to be found as hot spring.



-Areas that are expected to have hot water are those with low electrical resistance.

Point	Layers	Depth (meters)	Thicness (meters)	Resistivity (ohm- m)	Rock
RN8	1	0-0.68	0.68	851	Top soil
	2	0.68-8.26	8.26	252	Sand
	3	8.26-15.2	15.2	39.1	Sandy clay
	4	15.2-27.8	27.8	572	Gravel
	5	lower 27.8	INFINITY	13.4	Granite

Drilling for investigation and groundwater well development.

Chemical analysis

- Collect water samples from wells that have been drilled and developed groundwater.

- The samples have been analyzed for Na, K, Mg and Ca, F, Cl, SO_4, HCO_3 and CO_3 and physical parameters such as TDS, TH, Ec and pH

Result

- 74 meters depth

- High flow rate about 100 m3/hr.

- Temperature 56-58 C

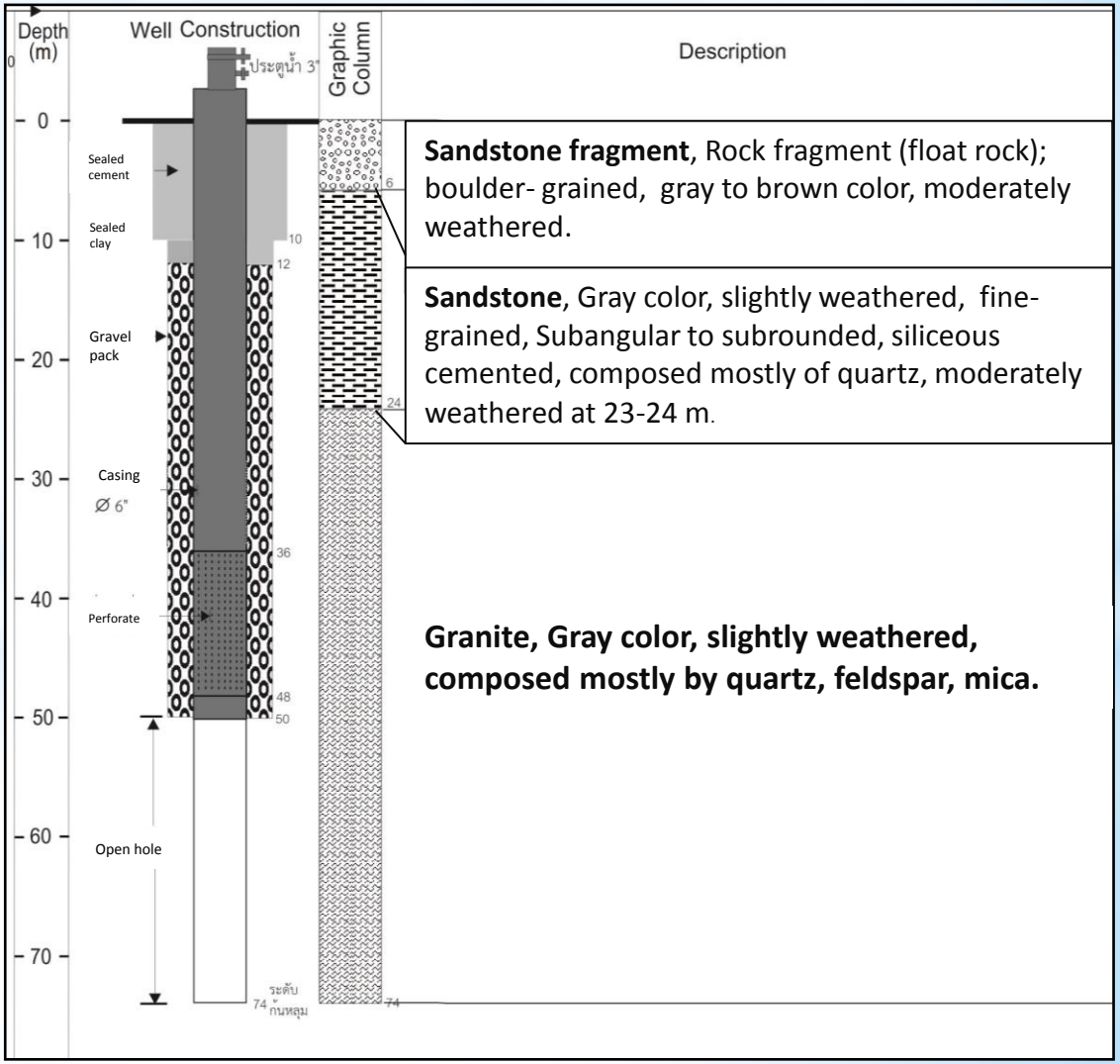


Fig.4 : Hot spring well construction and lithological logging

Result

Table 1 : The chemistry of the hot waters (ml/l)

parameters	pH	TDS	Na	K	Ca	Mg	Fe	Mn	HCO_3	F	SO_4	Cl
Natural hot pools	8.4	330	46	3.0	44	0.01	0.0	0.0	190	5.4	44.9	10
Natural hot pools	8.3	320	44	3.1	43	0.01	0.0	0.0	186	5.7	45.3	11
Natural hot pools	8.4	330	42	3.0	41	0.01	0.0	0.0	200	5.2	24.7	11
Hot spring groundwater well	7.9	210	49	35.0	9.6	7.3	0.0	7.3	74	6	68.0	4.0

- The chemistry of the hot waters are quite similar and they contain low total dissolved solids.

Conclusion

1. Hot spring systems in Changwat Ranong are associatedwith Khlong Bang Rin Granite and Khlong Ngao Granite of Cretaceous age.
2. The hot springs is fault controlled and likely to be formed as fractured shallow reservoir.
3. Heat sources of these thermal systems may be the anomalously high heat flow from high heat generating capacity of granite or radiogenetic heat from granitic rock.
4. Its high flow rate about 100 m^3/hr with temperature 56-58 C
5. Low Na and Cl contents confirm no invasion of sea water from the Andaman Sea.
6. Fluoride is higher than the standard for drinking. If it is to be consumed, RO must be used.
7. Its sufficient quality and quantity for For Consumption To support tourism and services which promotes the Ranong tourism industry to expand and sustainably

Thank You for Your Attention