**Assessment of Managed Aquifer Recharge Impact on Shallow Groundwater resources and Social Return on Investment: A Case Study of Nontree Sub-district, Prachinburi Province, Thailand**

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**Abstract**

Nontree sub-district of Prachinburi district, Prachinburi Province was selected to be the Managed Aquifer Recharge (MAR) demonstration area due to this area has been facing floods, droughts, and a lack of water storage facility. The MAR systems have been constructed under the study of hydrogeological investigation, MAR suitability map and design dictates the MAR systems. The 34 shallow MAR systems of 4 methods including recharge basin (23), percolation tank (4), dry well (2), and rooftop harvesting (5) were conducted from 2019-2021 for harvesting excess water in rainy season to store in shallow groundwater, to use for agriculture in dry season, and to balance the aquifer storage. These monitoring systems installed to test and assess the impact of MAR on quantity and quality of groundwater. Nontree sub-district was classified into two major aquifers, first the fractured rock aquifer and second is unconsolidated rocks. The hydrogeology of Nontree sub-district were classified consist of five units, namely Fluvial Deposition, Colluvium, Middle Khorat, Metasediments and Volcanic. The characterization of groundwater in this area divided to shallow and deep groundwater. The shallow groundwater consists of the sand and laticers of Colluvium Aquifer and the weathered stone of Middle Khorat Aquifer with the thickness about 10-25 m. While the deep groundwater consists of sand and sandstone deposit of Middle Khorat Aquifer. There are about 3.70 Mm3/yr are being used for domestic, agricultural, and industrial purposes. Water supply wells: 1 Aquifer (Silt and sandstone Weathered) Khorat After in 2021.

**From 2019-2021 MAR systems recharged water to aquifer for around 5,317,299 m3**

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. Moreover, the socio-economic of MAR systems is also investigated using Social Return on Investment (SROI) method. An SROI analysis produces a narrative of how MAR systems create and destroy value in the economy of the area. Thus, this research shows that the created value is higher than the investment value by about 2.2 times and 16.81 times in 2021 and 2031, respectively.

**Achievement of MAR systems in Nontree sub-district**

1. There is an increasing variety of agricultural activities and increasingly high values.
2. Abandon agricultural lands have been changed to be fertile agricultural land.
3. Agricultural lands have been expanding.
4. Farmer incomes have been increased ranging from 10,000 to 100,000 baht per year.
5. More water security for water supply agriculture in a village level.

From calculating the social returns on investment (SROI) method in 2021 and 2031 are 2.2 and 16.81 respectively. Within a ten-year period (2021-2031) of MAR operation indicates that the system may be the most effective.