

# Application of GIS Multi-Criteria Decision Analysis for Artificial Recharge Suitability Mapping in Thailand

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Groundwater is considered as one of the water resources that are important to the life of Thai people since the past to the present in the consumption, industry, and agriculture sectors. Economic expansion and urbanization have also increased the use of groundwater for various activities. Pumping groundwater is used in excess of the balance. And natural recharge of groundwater reduced as a result of forest ecosystems that slow down the flow of water so that it seeps underground. Together with the problem of global climate change, resulting in a continuous decrease in groundwater levels in a wide area. Especially in the area the upper Chao Phraya basin of Thailand where shallow groundwater is pumped up for agricultural use in excess of the appropriate amount and there is a problem of continually reducing the groundwater level by 10 to 20 centimeters per year. In addition, in many areas, there are problems of deterioration of natural water resources, and flooding.

People and various departments are becoming aware of the problem and need a way to increase the security of water sources for sustainable use. Managed Aquifer Recharge (MAR) is to store water underground and it is to add more and faster water from nature. To help maintain the balance of groundwater in that area to be sustainable. It is also one way to help alleviate drought and flooding problems. Which has the general public, and many departments are interested and widely artificial groundwater recharge. Which were found to be both successful and was unsuccessful due to the selection of suitable areas for artificial recharge of groundwater. This is important for artificial recharge of groundwater to be successful or unsuccessful.

Therefore, mapping the suitability of artificial groundwater recharge will be a tool to help preliminary consideration of the selection of suitable sites for artificial recharge of groundwater. The mapping of the suitability used GIS Multi-Criteria Decision Analysis (GIS-MCDA) method to identify suitable sites for implementing MAR method. This is a method that uses Weighted Index Overlay Analysis (WIOA). The 4 criteria used are geology, geomorphology, terrain slope, and top soil texture. Each area will be assigned different importance of criteria according to the conditions of the area. The analysis was assigned to 6 areas according to geographical regions of Thailand. The results of the area analysis are divided into 4 levels of preliminary suitability for artificial groundwater recharge, namely, highly suitable, moderately suitable, low suitability, and unsuitable areas. Then take the information of forest area boundary, saline soil and saline groundwater areas overlay to exclude areas that are at risk of negative social and environmental impacts. To carry out artificial recharge of groundwater in such areas, additional studies will be required. Most areas are low suitability, and unsuitable. The areas with low suitability are mainly in northeast part of Thailand. Most of the unsuitable areas were on the northern and western highlands, and the lower central estuary. The areas with highly and moderately suitable are in the central plains and river plains of Thailand.

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