



Decision Support System for Planning and Implementing the Managed Aquifer Recharge System Using Geo-Informatics Technology

Nimwenai, W.¹, Reungsang P.², Apichontrakul, S.², Saraphirom P.^{1,3}, Yongmanee N.¹, Musikapun, S.¹

¹ Groundwater Resources Institute, Khon Kaen University, Khon Kaen 40002, Thailand

² College of Computer Science, Khon Kaen University, Khon Kaen 40002, Thailand

³ Faculty of Engineering, Khon Kaen University, Khon Kaen 40002, Thailand

Introduction

Geospatial database and Decision Support System (DSS) are developed to support the Managed Aquifer Recharge (MAR) planning and implementation in Huai Saibat watershed, Khon Kaen, northeast Thailand. The database was developed from the relevant information layers in geographic information system (GIS) of Huai Saibat watershed.

Methodology

The DSS was designed and developed to provide the data set and tools for implementing MAR in the NE, Thailand. The DSS graphic user interface will provide based on the web service system that consists of 3 main components namely, MAR Database System (MARDS), Managed Aquifer Recharge (MAR) Designing Tools (MARDT), MAR Knowledge and Guidelines (MARKG).

The MARDS provides the MAR suitability maps and related information such as monitoring system, MAR location, and production well locations. The MAR suitability map was developed from 6 factors, namely geological units, soil infiltration rates, depth to groundwater level, thickness of sediment, recharge-discharge areas and land use maps. In addition, groundwater salinity and soil salinity information were used to separate the highly salinity risk areas from the first stage suitability map. Then, the MAR suitability maps was reinterpreted to provide the suitability maps for 4 MAR methods which are dry well, rooftop harvesting, recharge basin and trench methods.

The MARDT was designed to use as a tool for MAR site selection, design, and planning of the MAR system in the public area by the local administration office (LAO) staff and other governmental unit staff. MAR component consists of cost, construction process, and related important regulation.

The MARKG provide a big picture of the MAR such as the history of MAR development in the world and Thailand, advantage and disadvantage of each method, case study of the MAR and the standard and guideline of MAR for Thailand and other countries. The users can access the system through a web browser of Khon Kaen University, Thailand.

Decision Support System Architecture

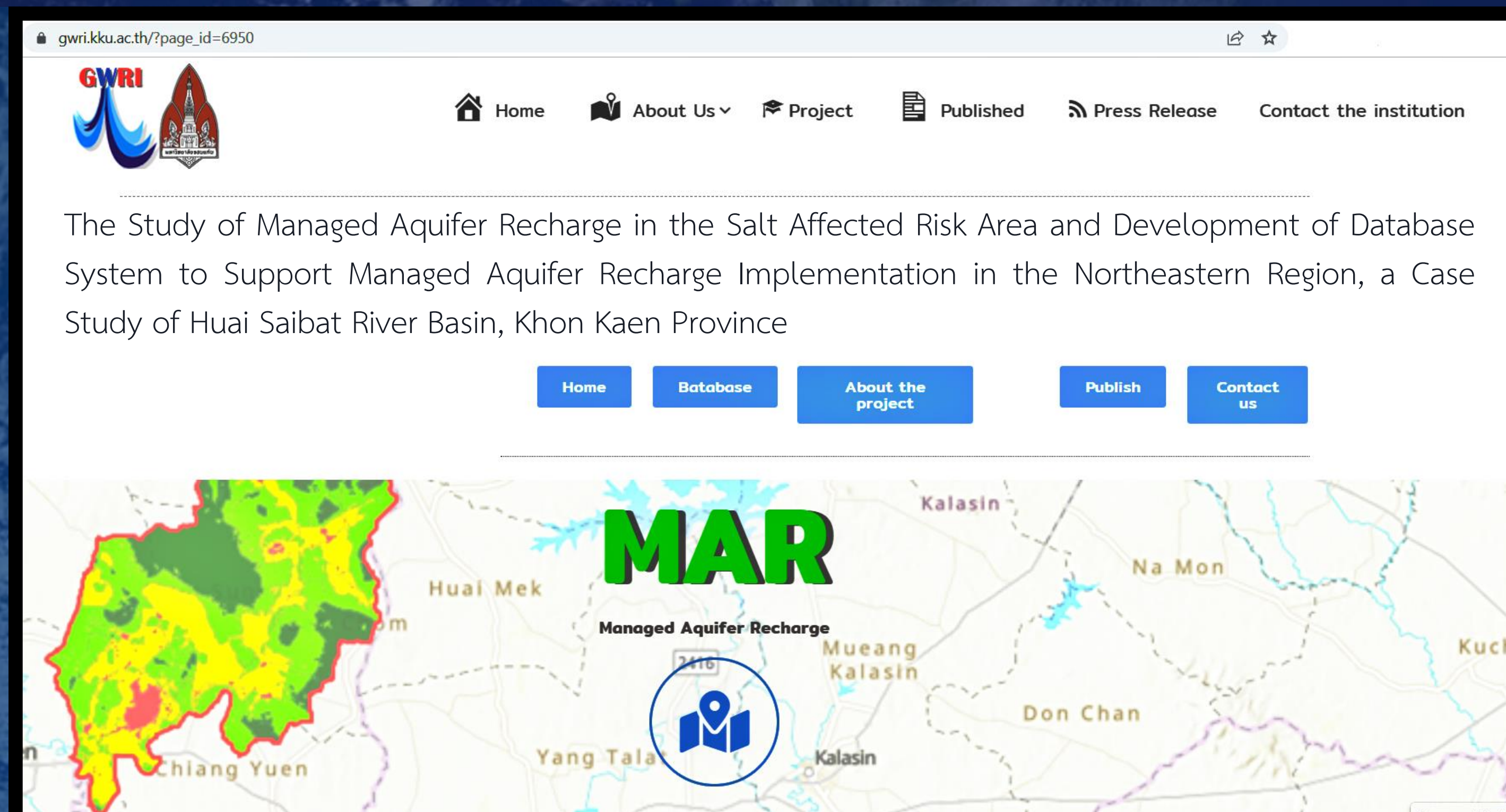


Figure 1 MAR Decision Support System Architecture

Results

MAR Database System (MARDS)

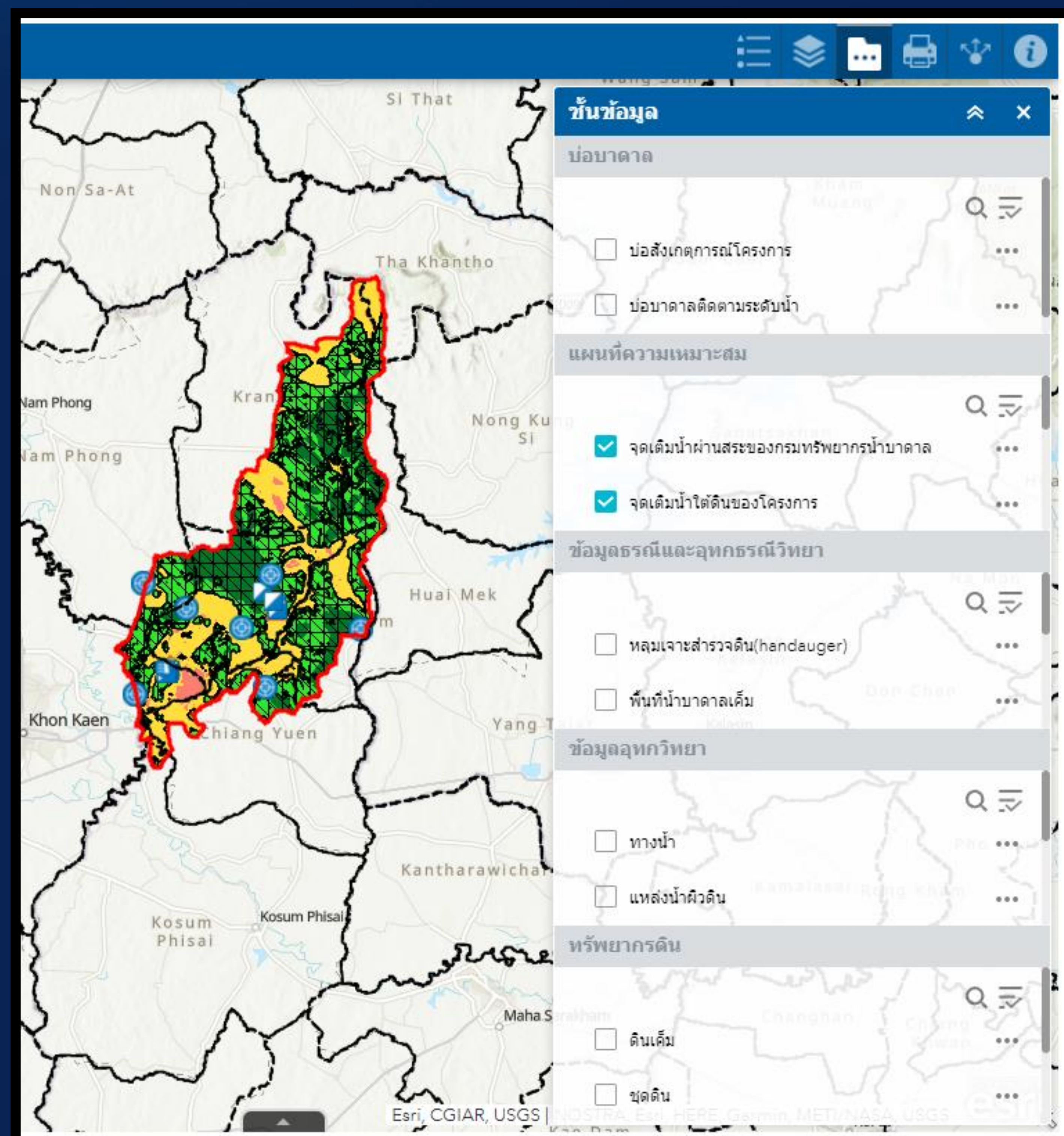
The database was developed from the relevant information layers in geographic information system (GIS) of Huai Saibat watershed. The main objective is to develop the MAR suitability maps and provide the necessary data for MAR implementation (Figure 2). User can use the system by link to the website of Groundwater Resources Institute, Khon Kaen University.



Website of Groundwater Resources Institute

or URL : https://gwri.kku.ac.th/?page_id=6950

(a) MAR DSS online system



(b) MAR suitability maps

Figure 2 MAR database system

Acknowledgement

This research project was supported by the National Research Council of Thailand.