Smart Water Monitoring, Sustainable Water Extraction Management and Government Cooperation in the Songkhla Lake Basin

Integrated Water Management for Agricultural Communities

Rajamangala University of Technology Srivijaya (RUTS), through its Water Management and Geoinformatics Research Unit under the Faculty of Engineering, has undertaken an integrated water management research initiative to address challenges related to freshwater availability, seasonal saltwater intrusion, and agricultural water use in the Songkhla Lake Basin. Led by Asst. Prof. Dr. Nattapon Kaewthong, the research project, *Integrated Water Management Innovation for Enhancing Community Economies in the Songkhla Lake Basin*, is supported by the Agricultural Research Development Agency (Public Organization), or ARDA, under a research program focusing on water security and the prevention of floods and droughts. The initiative combines environmental monitoring, engineering research, mathematical modelling, artificial intelligence, and digital information services to provide reliable water information for farmers, local communities, and relevant government agencies. A central component of the project is an automated salinity monitoring and forecasting system developed by RUTS researchers. The technology helps address water management challenges in areas where changes in salinity can affect freshwater availability and agricultural activities.

University-Managed Field Research Infrastructure

With its main campus located in Songkhla Province, RUTS extends its research activities into the surrounding Songkhla Lake Basin, where freshwater availability and seasonal saltwater intrusion are important concerns for agricultural communities. As part of its integrated water management initiative, the university has established a network of 19 automated salinity monitoring stations located around Songkhla Lake and its connecting waterways. All 19 stations were installed by RUTS and remain under the responsibility of the university's research team for their operation, monitoring, and maintenance. These installations form part of the university-managed field research infrastructure, allowing researchers to collect environmental data directly from natural water sources and monitor changing salinity conditions under actual field conditions.

The university's continued responsibility for these monitoring stations demonstrates its active involvement in field-based water research beyond the main campus and its commitment to applying research technologies to local water management challenges.

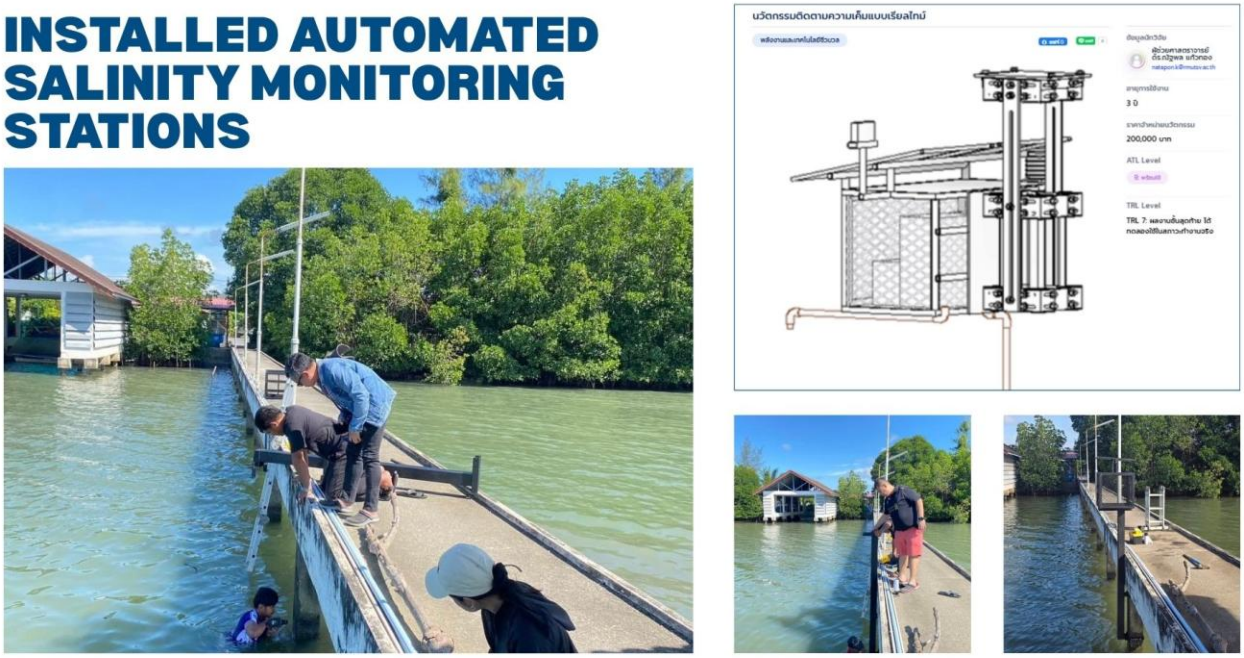


Figure 1. University-installed automated salinity monitoring stations at field research sites in the Songkhla Lake Basin.

Real-Time Water Monitoring and Forecasting

The monitoring stations collect salinity measurements from natural water sources and transmit the information to a central platform for processing and analysis. Using mathematical models and artificial intelligence, the system assesses current water conditions and generates salinity forecasts for the following seven days. The results are made available through the SKA Water digital platform (www.skawater.com), providing farmers, local communities, and relevant authorities with access to current and anticipated salinity information. This information is particularly important in the Songkhla Lake Basin, where seasonal saltwater intrusion can affect the suitability of water for irrigation and other agricultural purposes. The availability of real-time measurements and forecasts enables water users to anticipate changes in water quality and make more informed decisions about freshwater extraction and storage.

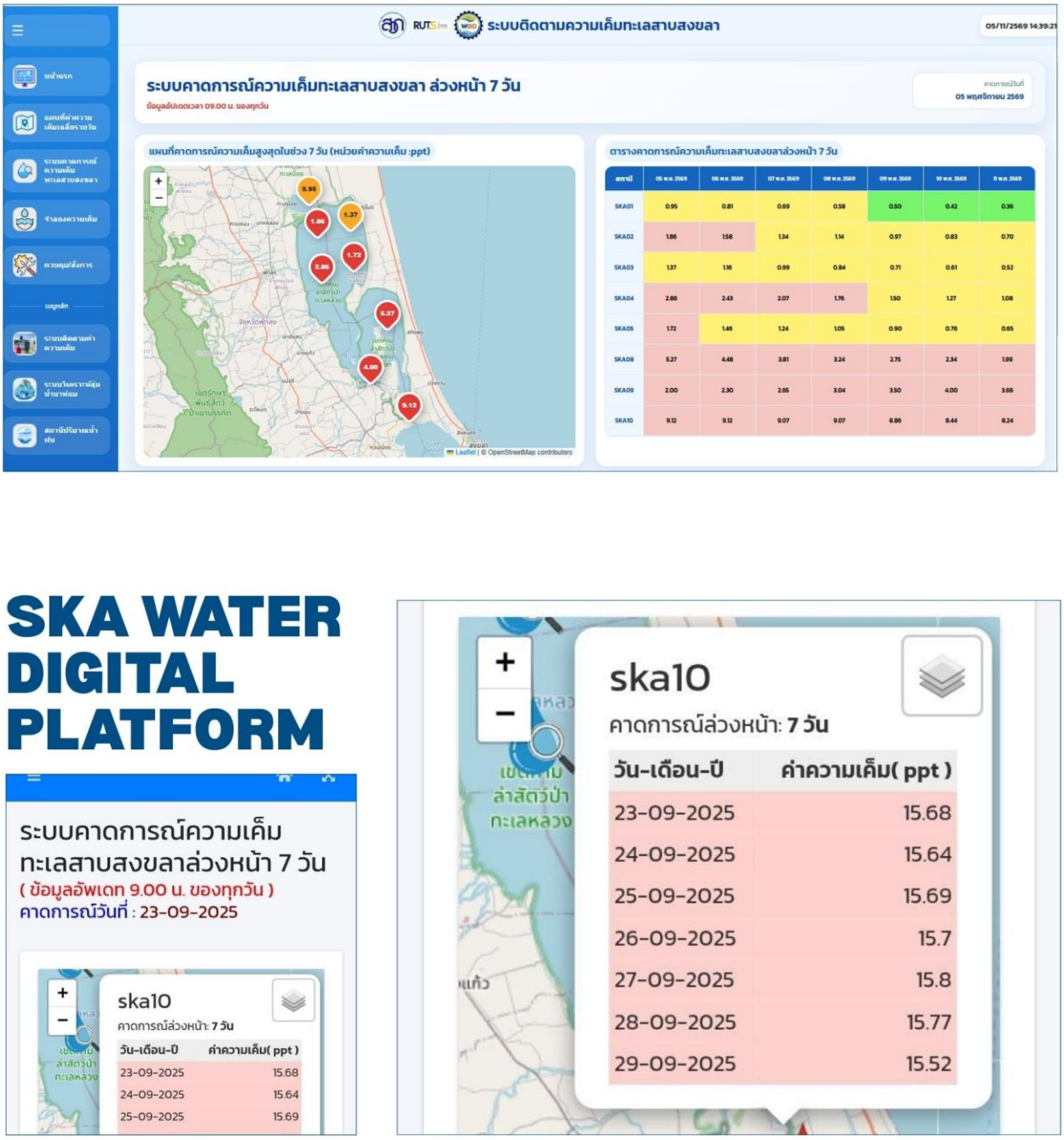


Figure 2. SKA Water digital platform providing real-time salinity information and seven-day forecasts for the Songkhla Lake Basin.

Supporting Sustainable Water Extraction Practices

Water extraction from natural waterways is an essential activity for agricultural communities surrounding Songkhla Lake. Local farmers and other water users operate their own pumping equipment to obtain water for irrigation and agricultural purposes. However, the suitability of water for agricultural use varies depending on seasonal conditions and changes in salinity. Extracting water during periods of elevated salinity may affect agricultural production and create additional challenges for freshwater management. To address these challenges, RUTS provides monitoring and forecasting information that helps farmers assess water conditions before operating their pumping equipment. Through the SKA Water platform, users can review salinity measurements and forecasts to identify periods when freshwater may be suitable for agricultural use and consider postponing extraction during periods of elevated salinity. The university's contribution lies in the development, installation, and operation of the monitoring infrastructure and the provision of forecasting services. The pumping equipment itself is owned and operated by local farmers or other water users.



Figure 3. Community-owned water pumping equipment used for agricultural water extraction in the Songkhla Lake Basin.

By connecting environmental information with agricultural water management practices, the initiative supports more informed decisions about freshwater extraction and storage. The system can also assist government agencies responsible for water management in planning irrigation activities, considering water storage requirements, and responding to changing salinity conditions. Although the monitoring system does not directly control water extraction, it provides information that can support more appropriate water management decisions.

Government Cooperation on Water Security

Cooperation with public agencies is an important part of RUTS's approach to addressing water security challenges. Through its research activities and institutional partnerships, the university works with national public organizations and relevant stakeholders to strengthen water monitoring, improve access to environmental information, and support practical applications of water management research.

Cooperation with the Agricultural Research Development Agency (ARDA)

The integrated water management research initiative in the Songkhla Lake Basin receives support from the Agricultural Research Development Agency (Public Organization), a national research funding organization in Thailand. The collaboration supports the development of technologies and research-based approaches to addressing water management challenges affecting agricultural communities.

On 5–6 November 2025, four researchers from the Water Management and Geoinformatics Research Unit of RUTS participated in an ARDA research monitoring and knowledge exchange visit in Kamphaeng Phet Province. The visit was conducted under the targeted research program Water Security: Addressing Floods and Droughts in Ten Provinces. During the visit, participating researchers and ARDA representatives reviewed the progress of research projects and exchanged experiences, practical approaches, and lessons learned from water management initiatives implemented in different areas. The activity provided an opportunity for RUTS researchers to learn from other research teams and explore ways to translate water management research into practical applications that respond to local agricultural needs.



Figure 4. RUTS researchers participating in an ARDA research monitoring and knowledge exchange visit in Kamphaeng Phet Province on 5–6 November 2025.

Cooperation with the Hydro-Informatics Institute (HII)

RUTS has also engaged in water management research collaboration with the Hydro-Informatics Institute (Public Organization), or HII, particularly in relation to water information systems, water balance modelling, and salinity monitoring. On 18 February 2025, Asst. Prof. Dr. Nattapon Kaewthong participated as a resource person in a workshop on water balance modelling and salinity monitoring in Phatthalung Province. The activity formed part of the cooperation between RUTS and HII and provided an opportunity to exchange technical knowledge and approaches to applying environmental information in regional water resource management. The collaboration reflects the importance of integrating academic research and public-sector expertise to improve water information systems and support more informed water management decisions.



Figure 5. RUTS participation in a workshop on water balance modelling and salinity monitoring in Phatthalung Province on 18 February 2025.

Research Dissemination and Engagement with Local Communities

In addition to cooperation with national public organizations, RUTS promotes the exchange of research knowledge and engagement with local communities through activities focused on appropriate technologies and water resource management. On 14 November 2025, the Water Management and Geoinformatics Research Unit presented its real-time water quality monitoring innovation at Appropriate Technology Matching Day 2025, held at the 60th Anniversary of His Majesty the King's Accession to the Throne International Convention Center (ICC Hat Yai), Songkhla. Organized by the Program Management Unit on Area Based Development (PMU-A), the event brought together researchers, public agencies, private organizations, and community representatives to exchange knowledge and explore opportunities for applying research-based technologies to local development challenges. The RUTS research team presented its real-time water quality monitoring innovation and shared information about its applications in water resource management. The activity also supported continued engagement with the Sathing Phra Peninsula community network in addressing water management challenges affecting local agricultural communities.



Figure 6. RUTS researchers presenting real-time water quality monitoring innovation at Appropriate Technology Matching Day 2025 in Songkhla on 14 November 2025.

Strengthening Water Security through Research and Collaboration

The integrated water monitoring and forecasting initiative demonstrates how RUTS combines university-managed research infrastructure, digital technologies, and public-sector collaboration to address water management challenges in the Songkhla Lake Basin. Through its network of 19 automated salinity monitoring stations, the university provides environmental information that can support decisions concerning freshwater extraction, agricultural water use, and water storage. Cooperation with ARDA and HII strengthens opportunities for research development, technical knowledge exchange, and the application of water information systems to practical water management challenges. Together, these activities reflect RUTS's continuing commitment to connecting academic research with the needs of agricultural communities and supporting more informed and sustainable approaches to water resource management.

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