WALAILAK UNIVERSITY

SDG REPORT 2025-2026



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SUSTAINABLE DEVELOPMENT GOALS

6 CLEAN WATER AND SANITATION

WU SDG MOVE



1. EXPANDING ACCESS TO FREE DRINKING WATER AND ENSURES SAFE AND SUSTAINABLE WATER SERVICES
2. THE SYSTEMATIC PROCESSES FOR WASTEWATER MANAGEMENT AND WATER POLLUTION PREVENTION
3. PROMOTING CONSCIOUS WATER USE AND STRENGTHENS WATER SECURITY THROUGH MULTI-LEVEL COLLABORATION
4. APPLYING THE GR2M MODEL TO SUPPORT SUSTAINABLE WATER RESOURCE MANAGEMENT IN SOUTHERN THAILAND

SDG 6 : CLEAN WATER AND SANITATION

EXPANDING ACCESS TO FREE DRINKING WATER AND ENSURES SAFE AND SUSTAINABLE WATER SERVICES



Walailak University is committed to providing free drinking water that is clean, safe, and accessible to students, staff, and visitors as an essential public utility and component of quality of life. In 2025, the university strengthened its drinking water provision by expanding access points across the campus while simultaneously improving water production, filtration, quality control, and monitoring systems. This integrated approach ensures that the provision of free drinking water is not limited to the existence of facilities but is supported by systematic development, stakeholder engagement, and measurable evidence of water quality and safety.





The development of the university's water supply system began with an assessment of the capacity and requirements of its growing campus community. Since 2025, the Chalanusorn Water Treatment Plant has served as the university's main source of tap water production. The system uses rainwater and water collected from the Chalanusorn Reservoir, which covers approximately 329,385 square meters and has a storage capacity of approximately 4,940,775 cubic meters. The treatment plant has a production capacity of approximately 400 cubic meters per hour, equivalent to approximately 4,800 cubic meters per day or 1,728,000 cubic meters per year. The water is distributed throughout the university through an HDPE pipeline network, providing the infrastructure necessary to support reliable water services across the campus.

To improve the existence and accessibility of free drinking water provision, the university expanded the number of drinking water service points from 140 to more than 183 water fountains locations across the university. These water fountains cover key areas including academic buildings, student dormitories, academic and research facilities, food centers, and other operational buildings. As a result, students, staff, and visitors can access drinking water free of charge without having to travel long distances to obtain it. The expansion represents a substantial improvement in the availability of free drinking water and demonstrates the university's commitment to equitable access to essential public utilities.

The university has also developed the technical infrastructure supporting these drinking water fountains. Many service points use Reverse Osmosis (RO) filtration systems, while others provide stainless-steel hot and cold water dispensers and fountains. The four-stage RO filtration system has a filtration precision of up to 0.0001 microns, helping to remove suspended particles, impurities, heavy metals, bacteria, and viruses. Each drinking water dispenser and fountain has a production capacity of approximately 190 liters per day, with a 5-liter cold-water tank maintained at approximately 4-12°C and a 4-liter hot-water tank maintained at approximately 70-85°C. These systems enable the university to provide free convenient access to drinking water in different environments.



Also, the university's development of free drinking water provision is accompanied by a systematic quality assurance and safety management process. Drinking water dispensers are cleaned monthly, filters are replaced every six months, and water quality is regularly tested against the relevant Thai Industrial Standards (TIS) for drinking water, including standards applicable to non-bottled drinking water. The monitoring process covers microbiological, physical, chemical, and heavy-metal parameters, including Coliform, E. coli, Fe, Mn, Cu, Zn, Pb, Cd, Cr, As, fluoride, chloride, nitrite, nitrate, and sulfate. These procedures provide an ongoing mechanism for identifying potential risks and maintaining the quality and safety of the university's free drinking water services.



Moreover, the university's measurement and monitoring results provide evidence of the effectiveness of these systems. Water samples collected from drinking water service points showed no detection of Escherichia coli at any tested location or sampling period, demonstrating strong microbiological safety. Coliform results at most service points were negative. Physical water quality indicators were also favorable. Turbidity at the drinking water points was generally below 0.6 NTU, substantially lower than the applicable standards.

Chemical measurements further support the quality of the university's drinking water provision. At many service points, Total Dissolved Solids (TDS) and Total Hardness were measured at less than 5 mg/L, indicating effective filtration and low levels of dissolved substances. Key heavy metals, including Pb, Cd, Cr, As, Mn, Cu, Zn, and Fe, were either below the reporting limits of the analytical methods or within the applicable safety standards. Other chemical parameters, including fluoride, chloride, nitrate, nitrite, and sulfate, were also within the required standards. These measurement results provide evidence that the university's free drinking water system is capable of delivering water that meets required quality and safety criteria.

Through this integrated system, Walailak University goes beyond simply providing free drinking water. The university has established a wide service supported by reliable water production infrastructure, more than 156 free drinking water points, advanced RO filtration technology, regular maintenance, quality testing, and measurable safety outcomes. The initiative demonstrates the university's commitment to ensuring that students, staff, and visitors have equitable access to safe drinking water, while using evidence-based monitoring and continuous development to maintain the quality, reliability, and sustainability of this essential public utility.

THE SYSTEMATIC PROCESSES FOR WASTEWATER MANAGEMENT AND WATER POLLUTION PREVENTION



WU has established an integrated water management system that combines wastewater treatment, pollution prevention, water quality monitoring, infrastructure maintenance, and treated-water reuse to protect university water resources and minimize environmental impacts. By 2025, these processes had been incorporated into the university's infrastructure and routine operations, creating a systematic approach that addresses pollution risks from the point where water is generated and collected through treatment, discharge, and reuse.



The process begins with diagnostic assessment of water and pollution risks across the university. Wastewater generated from academic buildings, residential facilities, cafeterias, and service areas is identified and managed according to its potential pollution sources. Grease traps are installed in food preparation areas to prevent fats, oils, and grease from entering the wastewater system. Stormwater and runoff are also managed through retention and detention ponds, which temporarily store and slow runoff, allowing suspended solids and sediments to settle and reducing the risk that pollutants such as oil, dust, nutrients, and heavy metals will enter downstream water systems. Natural and semi-natural drainage canals further support campus water management, with annual dredging and maintenance to remove accumulated sediment, waste, and obstructions.

Based on these assessments, the university has developed and maintained infrastructure and treatment processes to control pollution and improve water quality. Wastewater is conveyed through pumping stations equipped with automatic mechanical screens that remove solid waste before treatment. The centralized wastewater treatment plant applies multiple treatment stages, including preliminary treatment, secondary biological treatment through an aerated lagoon and facultative ponds, and tertiary treatment using ultraviolet (UV) disinfection and a constructed wetland. Raw water is also tested using water quality Test Kits, while Jar Tests are conducted to determine appropriate coagulation and flocculation conditions and optimize the dosage of treatment chemicals such as alum and polymers. These processes help improve contaminant removal while reducing unnecessary chemical use and treatment-related impacts.





Effective implementation depends on engagement of responsible personnel in routine operation, inspection, maintenance, and decision-making. Staff monitor wastewater treatment processes, inspect drainage infrastructure, conduct canal maintenance, perform water quality tests, and use test results to adjust treatment operations when necessary. This approach enables the university to respond proactively to abnormal conditions, heavy rainfall, blockages, sediment accumulation, and other potential pollution incidents rather than relying solely on corrective action after problems occur.



The effectiveness of these processes is demonstrated through continuous measurement and monitoring. Wastewater quality analyses conducted in January, June, and September 2025 showed stable pH values of 6.8–7.1 and dissolved oxygen (DO) levels of 4.2–5.4 mg/L. Heavy metals, including nickel, manganese, zinc, copper, lead, cadmium, total chromium, and arsenic, remained substantially below regulatory limits. BOD was recorded at only 2.3 mg/L in January, while ammonia nitrogen (NH_3-N) was 0.11 mg/L in June. Water flow meters and the Smart Farm monitoring system are also used to compare water consumption and wastewater generation, strengthening data accuracy and management transparency. Inspection and maintenance records provide additional evidence for evaluating infrastructure performance and pollution risks.

Finally, treated wastewater that meets environmental quality standards is reused for non-potable purposes, including landscape irrigation, lawn sprinklers, fish ponds, cooling water for the waste incinerator, vehicle washing, and cleaning roads and public areas. Through this connected process of risk assessment, infrastructure development, operational engagement, measurement, and water reuse, Walailak University promotes water circularity, reduces pollution risks, and supports sustainable and responsible water resource management.

PROMOTING CONSCIOUS WATER USE AND STRENGTHENS WATER SECURITY THROUGH MULTI-LEVEL COLLABORATION

Walailak University has adopted a comprehensive approach to water conservation and sustainable water management, addressing both water use within the campus and practical conservation beyond the university. In 2025, the university implemented activities to promote conscious water usage on campus, provide off-campus water conservation support, promote conscious water usage in the wider community, and strengthen cooperation on water security at local, regional, national, and global levels. These efforts combine needs assessment, knowledge development, stakeholder engagement, practical action, and ongoing measurement to promote responsible water use and strengthen long-term water security.

Promoting Conscious Water Usage on Campus



The university began by identifying areas and behaviors associated with daily water consumption and developed communication measures that reach users directly at points where water is used. Water conservation campaign signs were installed in high-use areas to actively promote conscious water usage on university. Messages such as “Use only what is necessary” encourage university community to recognize in reducing unnecessary water consumption.



Also, these physical campaigns are complemented by continuous communication through electronic displays, WU website, and social media, allowing water conservation messages to reach the wider university community and reinforces conscious water use beyond individual activities. Also, “Water Mindfulness” activity is organized to actively promote conscious water usage to understand the value and importance of water. Rather than focusing only on reducing water consumed, these activities aim to influence attitudes and everyday behaviors so that responsible water use becomes part of its culture.

Additional awareness activities are organized around World Water Day and Water Conservation Day, including exhibitions and educational activities that explain the importance of water resources and the role individuals can play in conservation. Exhibitions covering the water cycle, water sources, and the importance of water resources help transform water conservation from an abstract environmental issue into practical knowledge that can be understood and applied in daily life.



The “One Person, One Bottle” campaign further encourages individuals to use reusable personal water bottles and reduce dependence on bottled drinking water. Together, these activities demonstrate active promotions of conscious water usage on campus and create opportunities for students and staff to participate directly in water conservation.

Supporting Practical Water Conservation Off Campus

Walailak University's role in water conservation extends beyond the campus through off-campus practical water conservation support that applies academic knowledge, data, and innovation to real community water challenges. The university’s role in supporting off-campus water conservation has demonstrated practical implementation and sustainable positive impacts through the Living Weir Project, promoting community engagement and integrates local wisdom with scientific research. It also organizes awareness-raising activities and practical workshops to develop and extend the lifespan of Living Weirs, ensuring their durability and compatibility with freshwater ecosystems. In addition, the university transfers accessible technologies, such as satellite imagery and Community Sensors, under the concept of Citizen Science, enabling local communities to independently monitor and track changes in aquatic ecosystems via the internet.





The university also supports the development and dissemination of the REMS Toolkit, consisting of Easy Agri, which supports agricultural water analysis, and Easy Prapa, which supports analysis of tap water and household water use. These tools help communities assess water quantities, water sources, and water demand. The resulting information can be used to plan water allocation more appropriately and reduce risks associated with drought. This represents a shift toward data-informed water management in which communities can use practical information to support their own water conservation.

In addition, university personnel participate in committees and water resource management programs in Southern Thailand, including initiatives addressing rainfall, flooding, and drought. Through these activities, academic knowledge is connected with practical water management, including the development of water storage capacity, drainage management, and watershed restoration.

Promoting Conscious Water Usage in the Wider Community



The university's off-campus activities also contribute to promoting conscious water usage in the wider community by transferring knowledge, tools, and practical approaches to communities and organizations. Rather than treating water conservation solely as an institutional responsibility, the university supports communities in understanding their local water conditions and developing appropriate responses.



Through living weir, the REMS Toolkit, participation in water management committees, and knowledge exchange with local stakeholders, communities gain opportunities to understand water availability, water demand, conservation practices, and risks associated with floods and droughts. These activities encourage more informed and responsible water use while strengthening local capacity to manage water resources.

The university's approach therefore combines promotion, practical support, and knowledge transfer, allowing water conservation messages to move beyond the campus and become part of wider community water management practices.

Cooperation on Water Security at Local, Regional, National, and Global Governments

Because water security requires coordination across administrative boundaries, Walailak University has established cooperation on water security with government agencies, academic institutions, communities, civil society organizations, and international organizations.



At the local level, the university works with municipalities, the Nakhon Si Thammarat Provincial Disaster Prevention and Mitigation Office, the Royal Irrigation Department, local administrative organizations, agricultural agencies, community-based water management organizations, and communities in the Pak Phanang River Basin, as well as agencies working in the Khuan Kreng peat swamp area. Cooperation focuses on addressing real water challenges, including flooding, saltwater intrusion, acidic water, drainage, and peatland restoration. This local engagement enables academic knowledge and technical expertise to be connected directly with community-level water problems.



At the regional level, the university collaborates with the Office of the National Water Resources (ONWR) Region 4, Rajamangala University of Technology Srivijaya, river basin committees, the Nakhon Si Thammarat Provincial Water Resources Subcommittee, and the Upper East Coast Southern River Basin Committee. These partnerships support the integration of water-related data and the development of water management plans at the river-basin level, helping different agencies coordinate their responses to shared water challenges.



At the national level, Walailak University cooperates with the Office of the National Water Resources (ONWR) and relevant government agencies to connect local information, projects, and water management plans with national water governance mechanisms. This creates a pathway for knowledge and evidence generated at the local level to contribute to broader national water security planning.



At the global level, the university collaborates with GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) under Thai-German cooperation to exchange knowledge, technologies, research, and approaches to water security linked to ecosystems and climate change. International engagement enables the university to learn from broader experiences and incorporate relevant approaches into water security management suited to local and regional contexts.

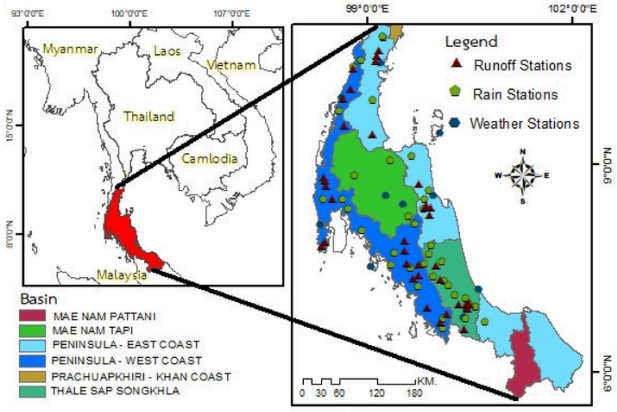
The university's overall approach demonstrates a continuous process of diagnostics, development, engagement, and measurement without treating these as separate activities. Diagnostics involves identifying water-use behaviors, community needs, water availability, and risks such as flooding and drought. These findings inform the development of practical interventions, including awareness campaigns, living weir, the REMS Toolkit, water management activities, and coordinated planning.

Engagement brings together students, staff, communities, local authorities, river basin committees, national agencies, academic institutions, and international organizations. Measurement is supported by the collection and analysis of water-related information, including water availability, demand, local water conditions, and risks, which can be used to guide planning, evaluate interventions, and improve future actions.

Through this integrated approach, Walailak University goes beyond conducting individual conservation campaigns. It has developed a broader system for promoting conscious water usage on campus, supporting practical water conservation off campus, promoting conscious water usage in the wider community, and strengthening cooperation on water security across Local, Regional, National, and Global levels. By connecting awareness, behavioral change, practical innovation, evidence-based decision-making, stakeholder engagement, and continuous improvement, the university contributes to more responsible water use and stronger long-term water security for the campus, surrounding communities, and the wider region.

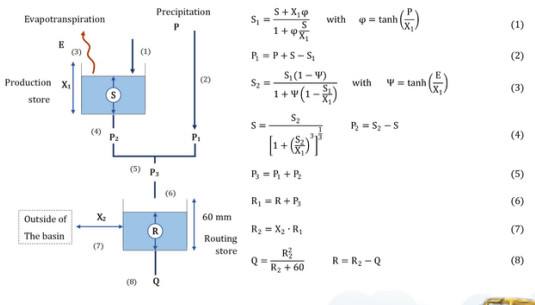
APPLYING THE GR2M MODEL TO SUPPORT SUSTAINABLE WATER RESOURCE MANAGEMENT IN SOUTHERN THAILAND

Effective water resource management is essential for sustainable development, particularly in regions facing increasing risks from floods, droughts, and seasonal variations in water availability. In line with Sustainable Development Goal 6 (SDG 6: Clean Water and Sanitation), the application of scientific knowledge and hydrological modeling can strengthen water resource planning, improve water security, and support evidence-based decision-making. This study evaluated the performance of the GR2M hydrological model for simulating monthly runoff in southern Thailand.



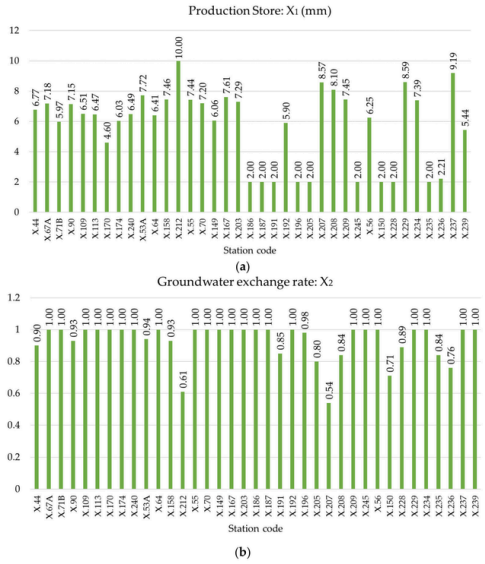
The study covered three major sub-basins: the Thale Sap Songkhla (TSS), Peninsular-East Coast (PEC), and Peninsular-West Coast (PWC) basins, encompassing a total of 37 streamflow monitoring stations. The southern region receives substantial rainfall influenced by the northeast and southwest monsoons, but also experiences recurring floods and short periods of drought. Accurate estimation of monthly runoff is therefore important for water allocation, reservoir management, flood preparedness, and drought mitigation.

The GR2M model is a conceptual rainfall-runoff model that uses only two main parameters, X1 and X2, together with monthly rainfall, runoff, and potential evapotranspiration data. Its relatively simple structure makes it particularly useful for areas where comprehensive hydrological datasets are not available. The assessment showed satisfactory model performance, with

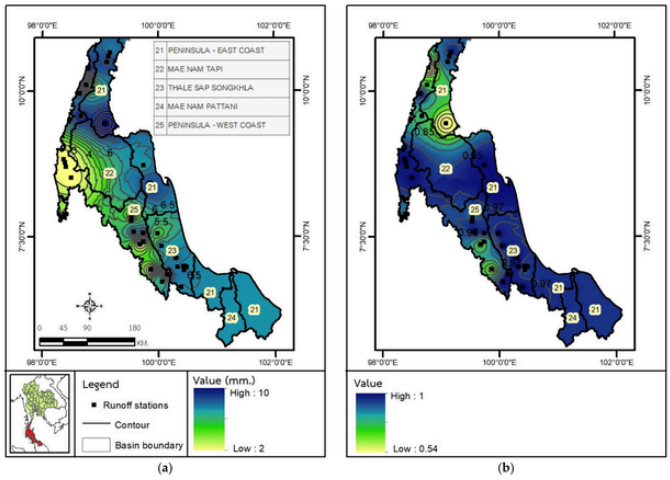


an average Nash-Sutcliffe Efficiency (NSE) of 0.657 during calibration and 0.472 during verification. The average correlation coefficients were 0.825 and 0.750, while the Overall Index (OI) values were 0.757 and 0.639, respectively.

Sensitivity analysis indicated that X1 was highly sensitive to model performance, while higher values of X2 generally improved the model results, with the best performance observed when X2 exceeded 0.90. Spatial analysis using the Inverse Distance Weighting (IDW) method also helped identify variations in hydrological characteristics across the southern region. These findings provide useful information for improving the application of the model to different watershed conditions.



The study demonstrates that GR2M can serve as a practical tool for water allocation planning, water storage management, and preparedness for floods and droughts, especially in areas with limited hydrological observations but available rainfall and temperature data. By improving the understanding and estimation of water availability, the model can support more informed decisions regarding the use, conservation, and management of water resources.



Overall, the application of GR2M contributes to evidence-based and sustainable water resource management by strengthening hydrological assessment and supporting preparedness for water-related risks. The approach can also be adapted to watersheds with similar characteristics, providing a useful foundation for enhancing water security, climate resilience, and sustainable management of freshwater resources, in support of the objectives of SDG 6.

Applying GR2M Model to Community-Based Water Resources Management

Beyond macro-level policy planning, the GR2M model can be effectively translated into concrete, community-based water management practices. Because the model relies on minimal baseline inputs–primarily rainfall and temperature data–local communities and administrative organizations can readily utilize simulated monthly runoff insights as a practical planning tool. This enables local agricultural sectors to align cropping schedules and irrigation allocation directly with expected seasonal water availability. Furthermore, understanding monthly runoff trends allows communities to anticipate short-term drought periods, prepare household water storage in advance, and establish early-warning measures for flood risks. Ultimately, this shifts community climate adaptation from a reactive response to a proactive, resilient framework that safeguards long-term local water security.