The Regional Network Office for Urban Safety (RNUS)

Monthly Report (January 2025)

Report to STE/SET

Prepared by RNUS

Date: 14th February 2025

Contents

1.1 Summary

This report summarizes the activities done in RNUS office during the month of January 2025.

A new research activity on oil palm trees was introduced in RNUS office this month, with the objective of investigating the challenges associated with waterlogging and the increased susceptibility to diseases in oil palm trees. This comprehensive study aims to thoroughly assess the extent of waterlogging issues and how they contribute to the vulnerability of oil palm trees to various diseases and the yield. The details of this research activity will be discussed in session 1.3.6.

Progress has been summarized in the following orders:

1) RNUS Outreach Activities
2) Progress on Research Activities
    - Satellite-based flood map (support in RIMES's project)
    - Water level measurement with low-cost device for CH4 emission mitigation in Thailand
    - Structural Health Monitoring with remote sensing techniques
    - Study on post-disaster recovery dynamics
    - Study on Development of Land-use Optimization tool
    - Water logging issue in oil palm field (tentative topic)
3) Plans

1.2 RNUS Outreach Activities

The first RNUS Seminar Series of 2025 is rescheduled to take place in March 2025. The speaker of this series has been confirmed as:

- Prof. Dr. Pornchai Supniti (Telecommunications Engineering Department, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang)
  Tentative topic: Satellite-based air pollution monitoring

1.3 Progress on Research Activities

1.3.1 Satellite-based flood map (support in RIMES's project)

No update for this month.

1.3.2 Water level measurement with low-cost device for CH4 emission mitigation in Thailand

Three water level measurement devices (Manufacturer: Farmo/Japan) installed inside RID paddy field located in Nakhon Pathom, are continuously monitored to ensure it is functioning correctly. We received error in measurement data since last month and contacted to manufacturing

company in Japan for troubleshooting. A new substitute device was brought from Japan to assess and compare its data connection and sensor malfunction issues with those of the existing devices.

On 17th and 31st January 2025, Dr. Khin and Khun Metta made a visit to RID paddy field to repair sensors. During their visit, they carried out an inspection of the three Farmo sensors that were installed in the field. It was found that one of the sensors had significant damage during the harvesting season and was now completely broken and unusable. However, the remaining two sensors were meticulously cleaned and troubleshooted to ensure their optimal performance. These two sensors are now functioning perfectly along with substitute device from manufacturer. Real-time water level and temperature can be continuously accessed from dashboard as shown in Fig-2 and Fig-3.

Figure-1. Solar-powered Farmo water level sensors in RID paddy field

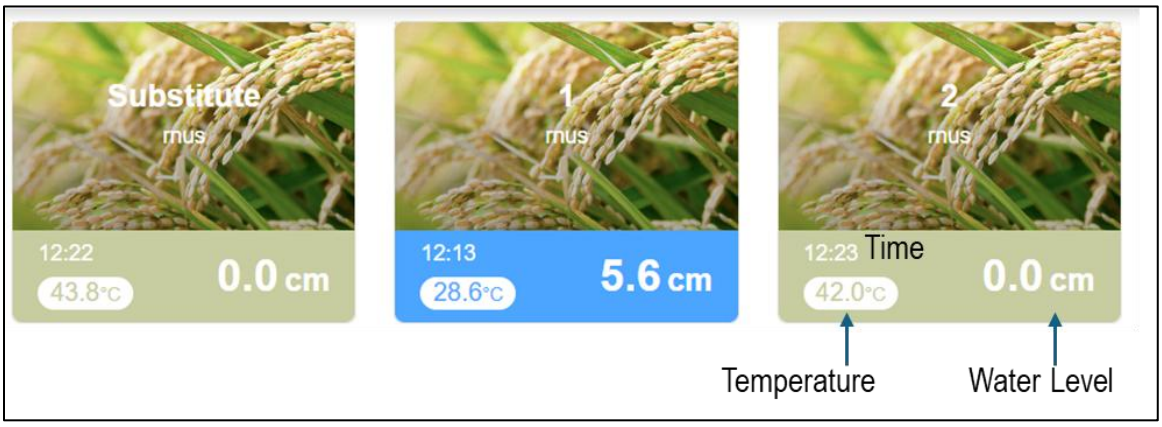

Figure-2. Farmo sensors dashboard configuration (left: Substitute device from manufacturer, middle and right: from RNUS)

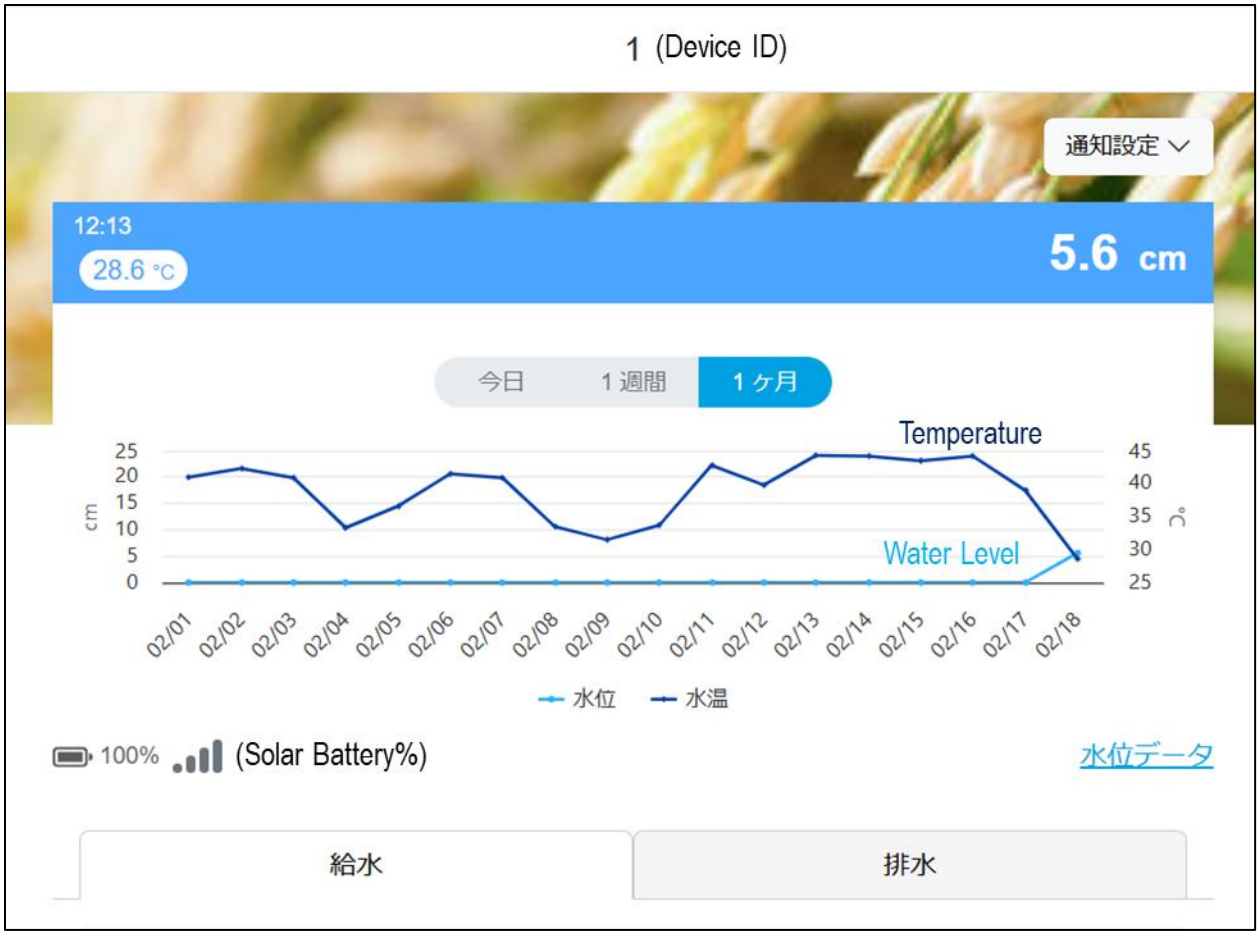

Figure-3. Water level and temperature measurement from RNUS device1

On 21st January 2025, RNUS team attended a technical seminar titled “Strategies for using satellite data for carbon trading of CH4 from paddy rice through public-private collaboration” organized by “SAFE CH4Rice Project” in GISTDA. During this event, the team had the opportunity to gain insights into the innovative work that private companies are conducting in the field of sensor device development. The seminar provided a platform for learning about the advancements and strategies being employed by different institutions to use satellite data effectively for carbon trading, specifically focusing on methane emissions from paddy rice cultivation. Through this technical event, the RNUS team was able to acquire a deeper understanding of the crucial role that sensor devices play in facilitating the accurate and efficient measurement of methane emission.

Figure-4. Technical seminar of "SAFE CH4Rice Project" in GISTDA

As part of the ongoing research efforts, the measurement of methane emission is set to commence in the upcoming cropping season, around 2nd week of March 2025. Preparations are currently underway, which include the procurement of specialized closed chamber for measuring methane emission. RNUS team is currently consulting with the Ambient lab (under SERD), as the lab has prior experience in making similar chamber. Prof. Takeuchi will bring methane emission measurement sensor from UTokyo in March 2025. Additionally, the team is working through the essential administrative procedures and securing the necessary approval required for the installation of methane emission measurement sensors and chambers inside RID's paddy field.

Figure-5. Consultation with Ambient lab's supervisor for procurement of closed chamber.

1.3.3 Structural Health Monitoring with remote sensing techniques

No update for this month.

1.3.4 Study on post-disaster recovery dynamics

Work is underway on model development for recovery financing. Data collection efforts for the country of Nepal on the recovery aid provided by the government following the Kathmandu Earthquakes in 2015 is also underway to empirically relate the model. Aid distribution data collection for Kumamoto and the Great East Japan Earthquake is also underway. A comparative study which considers the characteristic differences in the financing schemes of U.S., Japan, and Nepal and their retrospective impact on the recovery outcome is in progress as well. Furthermore, journal paper writing for recovery modelling literature review is likely to be finalized in the coming months.

1.3.5 Study on Development of Land-use Optimization Tool

No updates for this month.

1.3.6 Water logging issue in oil palm field (tentative topic)

RNUS office initiated a new research activity focusing on oil palm trees. This extensive study aims to provide

- an in-depth assessment of the waterlogging issues not only by sensor measurement but also by remote sensing technique, and
- how they contribute to the vulnerability of oil palm trees, affecting both their susceptibility to various diseases and their overall yield.

This comprehensive analysis seeks to offer valuable insights into the impact of waterlogging on oil palm trees' health and productivity.

From January 22nd to January 24th, 2025, Professor Takeuchi, Dr. Khin, and Khun-Metta travelled to the oil palm fields located in Prachuap Khiri Khan province. During this visit, they installed three water level sensors, manufactured by Rynan in Vietnam, within the oil palm area. These sensors are designed to measure changes in the ground water level. The installation is set to last from January 2025 until December 2025. This setup is intended to provide continuous monitoring and valuable insights into the ground water levels within the oil palm fields throughout the year. The real-time water level data can be accessed instantly through the dashboard, as illustrated in Figure 7.

Location of oil palm field where three water level sensors were installed: Lak Mueang, Phongprasan, Bang Saphan District, Prachuap Khiri Khan 77140, Thailand

Figure-6. Water level sensors installation in oil palm field (Prachuap Khiri Khan province)

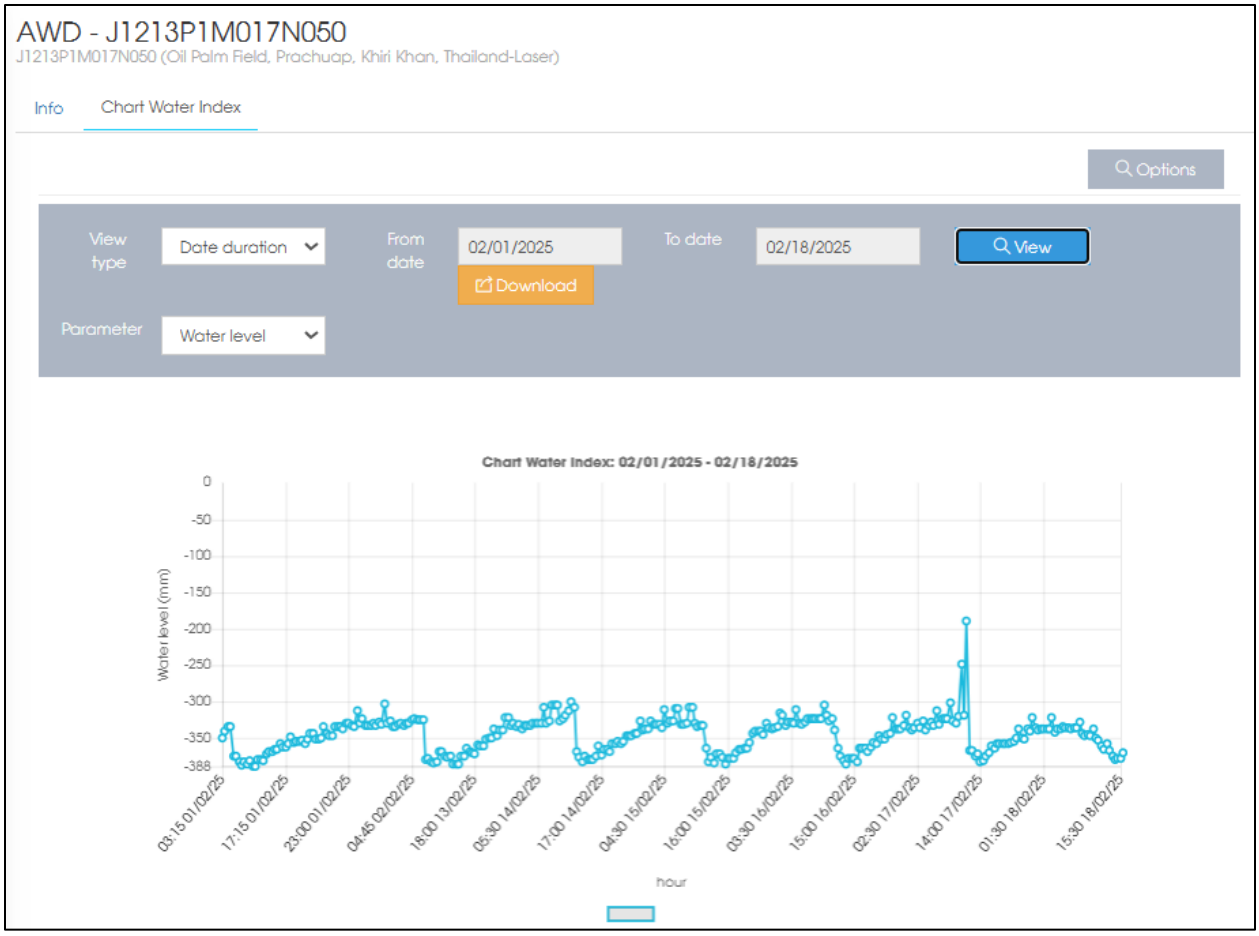

Figure-7. Real-time water level data from Rynan dashboard

1.4 Plans

RNUS team will visit to RID paddy field during 2nd week of March 2025 (tentatively 10th or 11th March 2025) to measure methane emission inside paddy field.

Dr. Khin will be out of RNUS office from 1st March 2025 to 30th April 2025.