

# CHALAT TUBE

## IoT Sensor for AWD Water Level Monitoring in Rice Fields

### Background

Cambodia's rice production is facing growing pressure from climate change, inefficient water use, and unpredictable rainfall patterns. Ensuring sustainable food security for millions of people requires not just better farming practices but smarter, data-driven solutions.

Rice farming consumes over 40% of the world's freshwater, with a large share in Southeast Asia. As water resources become scarce, the Alternate Wetting and Drying (AWD) method has gained attention. However, **manual monitoring** of AWD tubes remains a barrier to adoption.



### Challenges

Despite efforts to promote AWD in Cambodia, many challenges persist:

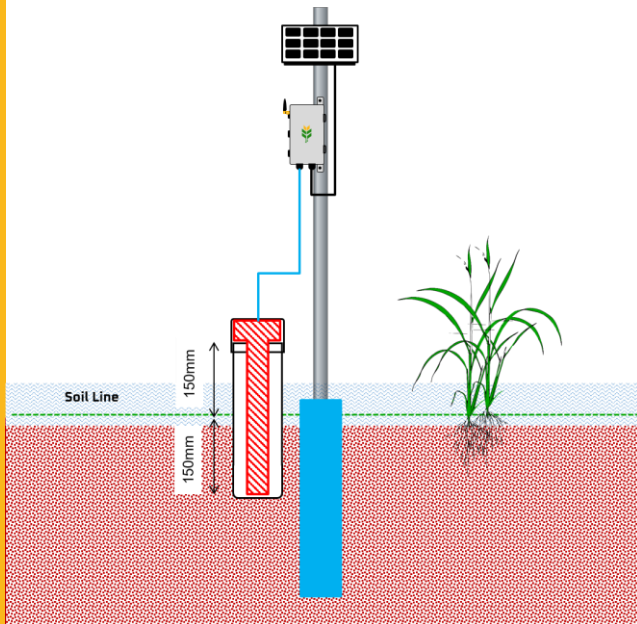
- Lack of **real-time water level data**
- Farmers struggle with **manual monitoring**
- **Low adoption** of efficient irrigation methods
- Need for **scalable, affordable, and locally adapted solutions**

### Introduction to Chalate Tube

**Chalate Tube** is an **IoT-based sensor** designed by Cambodians for Cambodian rice fields. Built to support the **AWD irrigation method**, this device collects and transmits water level data from fields in real time.

It empowers farmers with insights to irrigate **only when needed**, saving water while protecting yields. It's durable, solar-powered, and affordable for smallholder farmers.





## How it works

- **Installation:** Chalot Tube is installed into a perforated AWD pipe in the rice field.
- **Data Collection:** It measures water levels using analog sensors connected to a microcontroller.
- **Communication:** Water data is transmitted via **GPRS** to a centralized dashboard (Web App).
- **Insight Delivery:** Farmers, cooperatives, and agricultural officers receive updates and alerts for smarter water management decisions.

## Features & Benefit

- Powered by solar panel and low energy consumption
- Use 2G GPRS for connectivity
- Daily water level monitoring to determine irrigation schedule
- Support AWD method adoption to save water and improve productivity
- Data can be managed, sorted and download for research and analysis

## Technical Specifications

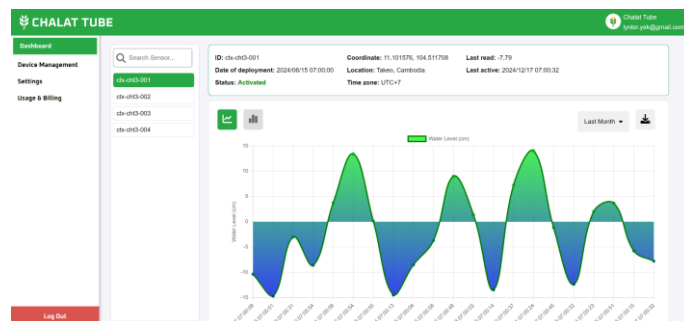
- Power: 5V Solar Panel
- Battery: 12000mAh
- Communication: GPRS
- Sensor Type: Multi-point analog probe
- Value range: -15.00 to 15.00cm
- Enclosure: Waterproof, field-ready casing (IP65)
- Application: Web App Dashboard
- Data Collection Frequency: Every 4–24 hours (adjustable)



## Lesson learned & Next step

From field deployments across Takeo provinces, we've learned:

- Network range and power efficiency management are crucial
- Farmers need simple data visualization platform to access data and form irrigation decision.
- The sensor must be robust and durable in long term operation within rice field environment.
- We are planning to expand our testing and development efforts to enhance long-term reliability and integrate machine learning for more efficient irrigation scheduling.



**Chalat Tube** is a proudly Cambodian innovation created by CHALATEX. We are looking for partners, NGOs, researchers, and government agencies to join us in scaling this solution.

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