



LOCATION



Central Macedonia region in Greece

PARTNERS



1.3

Smart Irrigation Service in Rice & Maize Cultivation

CHALLENGE

Rice is a high-input cultivation, especially in terms of irrigated water needs. Rice farmers frequently crop-rotate with maize, which also has substantial needs for irrigated water during the cultivation season. Current irrigation systems, especially for rice, are mainly based on farmers' experience and make suboptimal use of water, increasing the cultivation's cost, energy consumption particularly and the environmental footprint.

AIM

This pilot aims to maximise water use efficiency in the rice-maize crop rotation system, through the deployment of appropriate sensor systems and science-based decision making. Since irrigation is tightly linked to fertilisation, a nitrogen fertilisation advisory service is also provided by the pilot. This will lead to optimisation of the spatial distribution of nitrogen application based on the real needs of the field.



HOW

Customised in-field sensors are used for determining rice irrigation needs and remotely-controlled water electrical valves are employed for automatically optimising the irrigation. Additionally, remote sensing imagery and inputs from meteorological stations are used for determining the irrigation needs of maize crops. Sub-parcel nitrogen fertilisation needs are estimated through UAV and satellite imagery, leading to optimal fertiliser use via variable rate application machinery.

BENEFIT

The pilot will achieve increased, or standardised, crop production and improve the efficiency in the water and nitrogen fertilisation savings. This will decrease the carbon and, in general, the environmental footprint of both crops. Apart from the immediate benefits, this also adds a level of long-term investment security, especially in view of probable changes in water use strategies/policies due to the impact of climate change.



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DEMETER Integration

Support for efficient rice irrigation is provided via a specialised IoT sensor called WISyNode, which monitors water status (salinity and water height) in rice fields, together with IoT electric water valves, which are remotely operated via SMS commands. The Smart Irrigation Service for Rice (SIS-Rice) can then optimise water usage in rice irrigation by automatically operating the IoT valves in accordance with the crop's real-time needs. The Smart Irrigation Service for Maize (SIS-Maize) integrates satellite imagery and weather forecasts to recommend irrigation scheduling. The Fertilization Advisory Service for Rice and Maize (FertiRM) provides variable rate technology (VRT) fertilizer recommendations by analysing management zones within each field. The DEMETER system is designed to flexibly incorporate data streams from any vendor through open interfaces. This allows fusion of diverse data sources and analytics to enable the specialised irrigation and fertilization services for rice and maize crops.

Feedback From Farmers

To collect user feedback on the usefulness and usability of the digital services, the DEMETER project held multiple meetings and workshops with farmers and other stakeholders. Feedback was gathered through in-person discussions and phone calls. Overall, users were highly satisfied with the digital solutions, recognizing their potential to cut costs and optimise farm operations. A few specific concerns were raised. Some users felt that the current water pricing policy, which charges a flat rate regardless of consumption, should be updated to reward efficient water use. However, the prevailing sentiment was that the DEMETER services could generate significant benefits by reducing expenditures and improving work schedules.

Outcomes

The DEMETER apps have been deployed into seven pilot sites: two experimental sites and five active farms owned by farmer groups. The SIS reduced water use by about 15% while keeping salinity below harmful levels for the crops. Using the FertiRM recommendations resulted in a 20% average gain in cost efficiency, measured by fertilizer cost per unit area and yield. Overall, the pilot deployments demonstrated that the DEMETER Smart Irrigation Service in Rice & Maize Cultivation empowers farmers to optimize irrigation and fertilizer practices for their rice-maize crop rotations. The tools helped them make informed decisions to sustainably boost yields and improve cost-efficiency, thus offering digital solutions to increase productivity and profitability for farmers.

