Case Study: Goanna AG

Australian Cotton Growers Use LoRaWAN® for Better Water Management

www.lora-alliance.org

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LoRaWAN® is Transforming Water Networks Operations Towards a More Sustainable Water Sector

Cotton is one of the world's most water-hungry crops, requiring between 2,400 and 20,000 litres* of water to produce just one kilogram of cotton enough to produce one T-shirt and a pair of jeans.

Australia is one of the world's top cotton exporters. It's also one of the world's most water-stressed countries, according to the World Health Organization. So, for the more than 1,000 cotton growers in Australia, maintaining the viability of their crops requires continuous efforts to optimise crop production and water management.

A lack of real-time information has challenged farmers, for whom variations in water supply and seasonal rainfall can vary crop output from 400 to 4,000 square km - promising significant improvements for those who can better manage water flow to drier areas.

To improve overall output, agricultural technology firm Goanna Ag worked with Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Cotton Research and Development Corporation (CRDC) to explore how wirelessly connected sensors could improve monitoring of cotton crop water supplies and moisture levels.

Given the remote locations of most cotton farms, LoRaWAN provided a robust solution at lower cost and with better performance than satellite-based options. It could also be implemented even where there was no mobile network coverage.

The project team has been working with LoRaWAN operator NNNCo in since 2017 to deploy a network of 175+ gateways across five cotton-growing valleys in New South Wales, Queensland and Victoria. Each gateway covers a 10-kilometre radius and provides connectivity across 325 square km.

Those gateways supported the deployment of GoFieldPlus, a package of devices and services that includes real-time soil moisture probes, temperature sensors, and a mobile and desktop app that allows researchers and farmers to monitor canopy temperature stress.
Canopy sensors take moisture readings every five minutes and send data to the gateway every 15 minutes, while probes send data every 15 minutes and weather station data every hour.

https://australiancotton.com.au/supply_chain/does-it-take-20000-litres-of-water-to-grow-a-t-shirt

REDUCING THE COST OF COTTON PRODUCTION

Backed by specialised analytics algorithms created by CSIRO, and a wealth of current local weather data and forecasts, the data-rich platform allows farmers to forecast crop water use on a day-by-day basis. Trials have shown that at least 100 sensors per gateway are required to support an acceptable return on investment for canopy temperature stress technology - and that return can be significant.

By adjusting irrigation to optimise production, the pilot program demonstrated that the LoRaWAN, NB-IoT and satellite technology can generate an additional A$177 in net benefits per hectare per season – including reductions in labour and water use, increased yield, and other benefits.

These figures represent a seven-fold return against an implementation cost of just A$25 per hectare per season. Yet these benefits are only the beginning: The pilot program also identified other potential benefits such as: increase in water savings and in potential cotton yield, labour savings and reduced pumping energy costs associated with the saved irrigation**.

** Reference document: Smarter irrigation: https://smarterirrigation.com.au/wp-content/uploads/2021/01/Canopy-Temperature-Stress-CTS-technology-in-cotton-production-Jan-2021.pdf
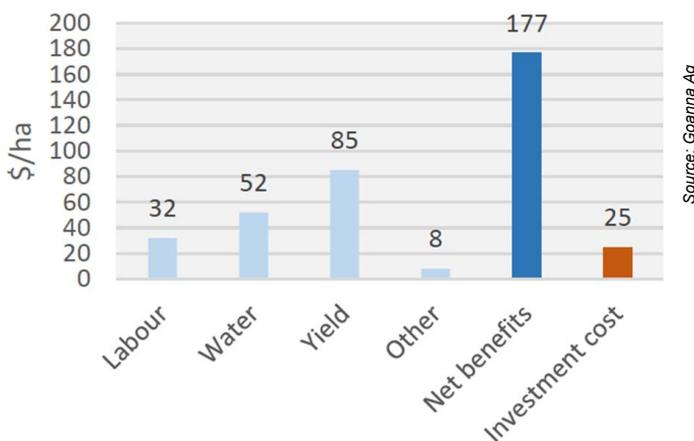
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