



SWaDE: Revolutionising water and energy use in Ethiopia

Case study

Background

In rural Ethiopian communities, such as Garda Marta, estimating energy demand for agricultural purposes presents numerous challenges. The lack of historical data, unreliable forecasting methodologies, and various on-the-ground obstacles hinder the identification of viable sites for sustainable energy projects. Crop failure and reliance on rainfall for irrigation are key problems in this area, further complicated by the need for affordable energy solutions and climate-resilient agricultural practices. The region's dependency on rain-fed farming exposes farmers to significant risks, making it essential to introduce technologies that can boost productivity and reduce environmental impact.

Recognising these challenges, SWaDE (formally LENKE) embarked on a project, with support from the UK Agri-Tech Centre, Arba Minch University and CABI, to develop a solution aimed at understanding the energy needed for irrigation which is crucial for mini-grid developers and renewable energy providers to avoid under or over investments.

Their innovative SWaDE (Smart Water Demand Estimation) technology integrates satellite data and machine learning techniques to optimise irrigation and energy use, creating new opportunities for sustainable agricultural development.



Innovation story

SWaDE's technology focuses on providing a decision-support tool for predicting agricultural irrigation water demand. This innovative solution is built upon Earth-observation (EO) satellite data, advanced climatology models, and cutting-edge software computation techniques. By using machine learning, the system can forecast a farm's future and historical irrigation needs based on crop types, thus allowing more informed and data-driven decisions around water usage and energy demand.

One of the key innovations developed in this project supports the transition from diesel-powered to solar-powered irrigation pumps. This shift not only reduces greenhouse gas emissions but also significantly lowers the operational costs for farmers and meets Ethiopian Government objectives. SWaDE installed a surface solar water pump with a capacity of 3.3kW, capable of pumping water from a height of 20 meters at a flow rate of 35 cubic meters per day. This system has so far benefited 30 farms, directly impacting 1,500 people and irrigating 17 hectares of farmland that had previously suffered from six failed harvests.

This innovative approach has been game-changing for the community of Garda Marta, which had seen six failed harvests due to the crippling cost of diesel and extreme droughts in the area, resulting in severe food insecurity. Therefore, this project has not only helped farmers improve productivity, decrease costs and adopt more sustainable practices, but fundamentally brought greater food security to a region that was struggling. The project demonstrated the potential for renewable energy sources to transform agricultural productivity, building resilience to climate change and reducing dependency on fossil fuels.



“Partnering with the UK Agri-Tech Centre on the project delivery of SWaDE in Garda Marta, Ethiopia, has been a rewarding experience. They helped us streamline operations, produced an impactful proposal and stay aligned with our mission to empower smallholder farmers. Their leadership and collaborative approach enhanced our ability to address the challenges in rural agriculture.”

Dr Lensa Jotte, CEO of SWaDE



UK Agri-Tech Centre Collaboration

A crucial element in the success of SWaDE's project was the collaboration with the UK Agri-Tech Centre. The UK Agri-Tech Centre played a pivotal role in providing the necessary technical expertise, infrastructure, and data-sharing platforms that enabled the development of SWaDE's advanced decision-making tool. Their support facilitated the on the ground data gathering, integration of EO satellite data and machine learning algorithms to forecast water demand more accurately. Moreover, the UK Agri-Tech Centre's involvement helped SWaDE to ensure the scalability and adaptability of the technology for rural Ethiopian communities.

The UK Agri-Tech Centre's collaboration also extended to capacity building and training for local farmers, empowering them to utilise the new technologies effectively. Through a series of workshops and training programs in collaboration with CABI, farmers were trained on how to operate solar-powered water pumps and leverage the SWaDE tool to optimise irrigation. This knowledge transfer enabled farmers to take ownership of the technology, fostering long-term sustainability.

Beyond technology support, the UK Agri-Tech Centre helped in forging partnerships and networks. Alongside CABI and Arba Minch University, they played an instrumental role in the creation of a new farmer association aimed at optimising irrigation practices, encouraging knowledge sharing and building collective resilience. This association allowed for the pooling of resources and shared expertise, further empowering farmers to adopt renewable energy solutions and improve irrigation efficiency.

Additionally, the project created local jobs, with 30 people employed during the installation phase and another seven hired for surveying work. These employment opportunities contributed to the economic upliftment of the community and further solidified the project's long-term impact.



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