In the urban world, data analytics has become a cornerstone of business operations, influencing everything from supply chain management to factory operations and customer engagement. However, its application in the agricultural sector isn't as widely discussed, despite the sector's inherent complexity and the need for meticulous decision-making. Farmers routinely face complex choices – determining the optimal timing for watering crops, deciphering the fine line between too much and too little, pinpointing the ideal moments for planting and harvesting, and making calculated decisions on pesticide and fertiliser usage, all while contending with unpredictable weather patterns and unforeseen events. These tasks are daunting for anyone, but more so for smallholder farmers who lack access to extensive data and often rely on instinct or traditional knowledge, which may falter in a world of rapid climatic shifts and market changes.

Read through, to understand the crucial role of data in the AgWater sector.

While government initiatives have aimed to provide better advisory and information services, tailoring these to the unique demands of small-scale farming has been a formidable challenge. However, a promising wave of startups is emerging to bridge this gap. Utilising an array of technologies from drones to the Internet of Things (IoT), coupled with mobile applications, they are poised to revolutionise small-scale farming.

The DCM Shriram AgWater Challenge, launched in partnership between The/Nudge Prize and DCM Shriram Foundation, has spotlighted 16 promising business models since its inception in June, 2023. The challenge aims to uncover a range of scalable AgWater tech solutions that are accessible and cost-effective for smallholder farmers while also ensuring profitability. This initiative covers a broad spectrum of innovations, from tech-based information and advisory services to diverse areas such as irrigation services. Among these innovations, several startups are addressing the critical issue of limited access to real-time data, which is vital for effective irrigation and crop management. This lack of data can lead to reduced crop yields and financial losses for small-holder farmers. BharatRohan, PhyFarm, CensaNext, and Manna (Rivulis) are a few startups tackling this problem through complementary approaches.

BharatRohan uses advanced drones with hyper-spectral imaging to capture detailed field images, which are analysed to identify waterlogged and water-scarce regions, crop health, and blight patterns. This technology has been deployed in Uttar Pradesh and Rajasthan, leading to significant water savings of up to 215,000 litres per acre per season and an average profit margin increase of ₹30,000 per acre. PhyFarm complements BharatRohan's aerial prowess with on-ground sensors linked to a central platform by IoT technology. The company offers a three-tiered approach: community-level irrigation scheduling advice, precision irrigation starter kits, and advanced automation systems for remote control of irrigation and fertigation. This saves time and resources while optimising crop health, demonstrating an 11% increase in farm output and a 12% reduction in water and energy inputs for sugarcane in Maharashtra.

In water-scarce regions, CensaNext steps in with its IoT and AI-powered solutions, delivering daily irrigation recommendations via SMS in six vernacular languages. This ensures farmers in water-stressed areas receivetimely, accurate advice to optimise water use for various crops, helping them make the most of limited resources.

Manna (Rivulis) combines micro-irrigation and remote sensing technologies, providing farmers with precise irrigation schedules based on hyper-local weather data collected through satellite imaging and field sensors. This approach has dramatically enhanced crop yields and water efficiency across 18+ states, working with water-intensive crops like cotton and sugarcane, resulting in a 30-50% increase in crop yield and significant water savings of 40-60%.

While these solutions cater to different regions, crops, and water scarcity levels, they share a common goal: empowering farmers with real-time insights and capabilities that were once exclusive to large-scale operations. However, information availability does not guarantee accessibility. Farmers may be unaware of these services, underestimate their value, or feel hesitant about using advanced technology. Organisations must work consistently to build trust, address social and behavioural factors, and demonstrate the benefits of these interventions on the ground.

Overcoming these challenges is critical because no solution to India's impending water crisis can exist without the participation of smallholder farmers, who make up 86% of agricultural households and consume 78% of India's water resources. Their well-being and livelihoods are deeply intertwined with the health of our water reserves, and the success of companies like BharatRohan, PhyFarm, CensaNext, and Manna in empowering them will decide if we can achieve and hold on to water security as a nation.

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"This article is one part of an 8-part series covering agricultural water utilisation in India."