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Quote by Devroop Dhar, India CEO & Co-founder, Primus Partners

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How is Bengaluru Using AI to Prevent Water Shortages?

Authored By Shalini Mondal

Read on: https://analyticsindiamag.com/ai-features/bengaluru-bets-on-ai-to-predict-water-shortages-before-they-happen

Article Content:

After years of battling recurring summer water crises, the Bengaluru Water Supply and Sewerage Board (BWSSB) is turning to AI to make the city's water management more predictive than reactive.

According to the Bengaluru Urban Water Balance Report, groundwater recharge from anthropogenic sources—particularly leakage from water supply pipelines—is estimated at 331 million litres per day(MLD), although the report notes that this remains an approximation.

The finding is significant because the Bengaluru Water Supply and Sewerage Board (BWSSB)spends substantial public funds to pump Cauvery water into the city, making it essential to accurately quantify distribution losses and understand how much of the supplied water eventually recharges aquifers.

The report also cautions that while reducing non-revenue water (NRW) through leak detection and pipeline repairs is critical for improving water-use efficiency, it could inadvertently reduce groundwater recharge from these unintended sources.

It further estimates that Bengaluru generates approximately 1,940 MLD of wastewater, underscoring the need for integrated water resource management across the city's supply, wastewater, and groundwater systems. Around 63% of this wastewater is treated by centralised treatment plants, and 13% by decentralised treatment plants. About 24% goes untreated.

The utility is set to inaugurate its Integrated Intelligent Water and Sewerage Management Centre (SCADA), developed under the JICA-assisted Cauvery Stage V Project at a cost of ₹91.12 crore. Housed at Shimsha Bhavan in Jayanagar, BWSSB describes it as one of Asia's largest integrated command centres for water and wastewater management. The facility is designed to bring Bengaluru's drinking water and sewerage infrastructure onto a single AI-enabled platform capable of monitoring operations, predicting shortages, detecting leakages, and improving the efficiency of the city's water network.

The command centre currently integrates five water treatment plants, 30 pumping stations, 83 ground-level reservoirs (GLRs), 100 service stations, and 35 sewage treatment plants (STPs), providing 24x7 visibility into critical infrastructure.

It will also manage the 775 MLD Cauvery Stage V water supply serving 110 villages, while monitoring the city's broader water distribution and wastewater network in real time.

In a conversation with **AIM**, BWSSB said its immediate objectives include reducing Unaccounted-for

Water (UFW)/Non-Revenue Water (NRW) through AI-based leak detection, continuously monitoring water quality, enabling predictive maintenance of assets, improving energy efficiency, and using AIdriven demand forecasting for better planning.

“The long-term goal, according to the utility, is to transform itself from a conventional water board into an AI-enabled digital water utility, where operational decisions are increasingly driven by real-time data and predictive intelligence. The platform also lays the foundation for building a digital twin of Bengaluru's entire water distribution network in the future,” BWSSB Chairman Ram Prasath Manohar V tells **AIM**.

AI to Forecast Water Stress Before Crisis Hits

One of the platform’s most significant capabilities is its predictive analytics engine. Manohar states, “BWSSB is working with the Indian Institute of Science (IISc) to develop AI models that combine groundwater levels, rainfall patterns, water consumption, network performance, and IoT-generated field data.”

The models are expected to predict potential water stress before shortages occur, identify neighbourhoods likely to become dependent on water tankers, forecast groundwater depletion, prioritise Cauvery water connections, and support proactive infrastructure planning instead of emergency response.

“Similar analytics have already been used to identify vulnerable wards and implement preventive measures before peak summer demand,” Manohar says.

He further states that the command centre also continuously monitors chlorine, pH, total dissolved solids (TDS), and turbidity across water treatment plants at TK Halli, Harohalli, Tataguni, and the city’s reservoir network.

“If contamination is detected, the system immediately generates alerts to enable rapid intervention. On the wastewater side, all connected STPs are monitored for compliance with National Green Tribunal standards while also tracking biogas generation,” he adds.

Beyond conventional SCADA, the platform has been designed as a scalable digital ecosystem by integrating public borewell IoT systems, GIS, smart meters, and groundwater monitoring.

“By combining these data streams, BWSSB aims to build an Integrated Urban Water Management system that simultaneously tracks surface water, groundwater, treated wastewater, and consumer demand,” Manohar mentions.

Success Will Depend on Data Quality

While AI promises to improve urban water management, experts caution that predictive accuracy will depend less on algorithms and more on the quality of the underlying data.

Devroop Dhar, Co-Founder and India CEO, Primus Partners tells AIM that the system's effectiveness will be determined by the consistency of information flowing into it.

“It all depends on the quality and consistency of the data collected. AI will not be able to foresee the water crisis months before if the data fed into the system is either insufficient or delayed. But in case the system receives consistent inputs from the reservoirs, treatment plants, the distribution network, weather forecasts, and patterns of consumption, it will be able to issue warnings about impending problems,” Dhar mentions.

He notes that AI can significantly improve response times compared to traditional planning methods.

“In reality, the time window between when the warning should have been issued by the traditional method and when it is issued by an AI system ranges from a few days up to a couple of weeks. The point is that what AI does is not predict droughts. It anticipates potential shortages of water before they happen because of the gap between consumption and supply of water,” he adds.

Dhar adds that AI models typically rely on data collected from flow meters, pressure sensors, reservoirs,

pumping stations, valve controls, weather forecasts, groundwater resources, pump energy consumption, and historical demand patterns.

However, he argues that data governance remains the bigger challenge.

"The problem is not the gathering of data but its reliability. Sensors should undergo frequent calibration, gaps in the data should be detected quickly, and data formats for the various systems should be standardised to allow proper integration," he explains.

Dhar believes that utilities should pay as much attention to data management as to AI. Inaccurate or conflicting data fed into an AI system will result in inaccurate recommendations regardless of the AI technology used.

Prediction Windows Vary by Use Case

Talking to **AIM**, Naina Gupta Bandyopadhyay, Vice President, AI Technologies & Delivery, Findability Sciences, says that the lead time AI can provide depends on the type of event being predicted.

"Realistic advance warning depends on what the system is tracking. For reservoir and supply-side shortages, seven to 14 days of lead time is achievable once historical consumption, rainfall, and reservoir inflow data are integrated. For localised distribution failures like a burst main or a starved zone, warning windows shrink to hours, sometimes minutes, because the trigger is mechanical, not seasonal," Bandyopadhyay mentions.

She adds that ensuring high-quality data remains the biggest hurdle.

"The data feeding these models typically spans SCADA sensor readings, smart meter consumption, groundwater levels, rainfall and reservoir data, and historical demand patterns. Quality is the harder problem than the algorithm," she states.

"Sensors drift, meters go offline, and manual readings get entered late. Getting this right means continuous calibration checks, cross-validating sensor data against ground truth, and building models that flag their own confidence rather than presenting every prediction as certain," she further highlights.

Manohar says that the integrated command centre represents a major leap in the utility's digital transformation.

As Indian cities grapple with climate variability, groundwater depletion, and rapidly growing populations, Bengaluru's AI-enabled command centre represents one of the country's most ambitious attempts to use predictive intelligence for urban water management. Its success, however, will ultimately depend on whether the city can build not just smarter algorithms, but a reliable and continuously updated data ecosystem capable of powering them.