

# From Reservoir to Root: Transforming Irrigation with Digital Technologies

Integrated Climate Smart Irrigation Systems for Farmers, Field Engineers, and Policy Makers

## About Vassar Labs

### What We Do?

Vassar Labs is a global Climate Tech company leveraging technologies such as AI, Remote Sensing, Cloud Computing, Big Data, and Digital Twins etc. to build solutions for effective monitoring and management of Water, Energy, Disaster, Agriculture and Smart Cities.

6+

Country Scale Projects

17+

State & Basin Scale Projects

40+

Projects for Fortune 500s and Enterprises



2014

The Establishment



Sustainable Systems

Climate-resilient AI/ML powered GIS-based solutions for sustainable water, power, agriculture and disaster management solutions



420+

Employees from NIT, IIT, IIITs



India & USA

HQ: Woburn, MA  
Dev. Centre: Hyderabad

### Key Highlights

- Digital Twin deployed covering 1832 Km water conductor system for realtime monitoring
- 30+ irrigation management projects deployed covering 120 million hectares farmlands across 3 states
- Flood monitoring done for 406 reservoirs and 35 river basins
- Integrated Digital Water Management platform deployed across 8+ cities serving 1.3M+ people

### Various Deployments for countries, states, F500 enterprise and industries



وزارة البيئة والمياه والزراعة  
Ministry of Environment Water & Agriculture



aquaWISE provides a suite of **20+ products available as SaaS** or custom solutions, deployable on customers' cloud or local infrastructure, designed to meet a wide range of **water management needs across various scales** and environments.

**Water Storage Management**



- **Digital Twin** of Natural & Conveyance Systems
- Sectoral **Water Demand** Forecasting
- **Dam Network** Optimization
- Inflow Forecasting & **Future Flow** Projections

**Command Area Monitoring**



- **Realtime Monitoring** of Canal Networks
- **Digital Twin** of command area
- **Catchment** Analysis & Ayacut
- Identification of **Farm boundaries**

**Distribution Management**



- **Warabandi Scheduling** Advisories
- **Irrigation Insights** & Planning
- **Crop Zone Analysis** & Mapping
- **Crop water** requirement

**Health Monitoring**



- **Crop Health** Monitoring
- **Wetness Index** & Soil Moisture
- **Crop Intensity** & Patterns
- **Crop Growth** Monitoring

aquaDRROP: Platform for Integrated Reservoir, River, Hydro Power and Pump Optimization

**Objective:**

aquaDRROP is an advanced platform for optimizing **reservoirs, rivers, hydropower, and pump operations**. It enables real-time monitoring, predictive analytics, and automated scheduling to maximize water utilization and energy efficiency. By integrating hydrological data, flow forecasting, and operational decision support.

**Managing**



Reservoirs: **205**  
States: **10**      River Basins : **25**

**Helping**



Irrigation Officers : **3K**



Hydropower Operators : **50 K+**



River Basin Authority: **200**



Policymakers: **500**

**Monitoring**



**Type of Assets:** Weather, Dams, Barrages, Rivers, Canal, Hydropower Stations, Pump Houses, Crops etc.,



Real-time Monitoring of Water & Energy Systems

Tracks reservoirs, river flows, hydropower stations, and pump operations continuously, **enhancing operational efficiency by 20-25%**



Energy-Water Nexus Optimization

Aligns water availability with energy demand to enhance **hydroelectric reliability** and grid stability.



Climate-Resilient Water Planning:

Uses **long-term climate projections** to identify vulnerabilities, aiding in the design of adaptation strategies for sustainable water management.



Optimized Reservoir & Hydropower Management:

Uses AI-driven models to maximize power generation while ensuring sustainable water releases, increasing **hydroelectric output by up to 15%**.



Decision Support for Inter-Basin Water Transfers

Ensures **scientific and need-based transfers** between basins, reducing water stress in deficit regions.



User-Friendly Dashboards & Mobile Accessibility

Enables real-time decision-making for policymakers, utilities, and water managers, **cutting response times by up to 40%**.

- Balances **inflow vs. demand** to prevent overflows, shortages, and ensure sustainability
- Models **seasonal and climate-based variations** to plan dam operations effectively
- Tracks dynamic needs **from agriculture, industry, and urban sectors** to guide water allocation
- Predicts river inflows using weather, **upstream discharge, and hydrological models** to anticipate flood and drought conditions



Inflow Forecast



Future Flow Projection



Water Demand Forecasting

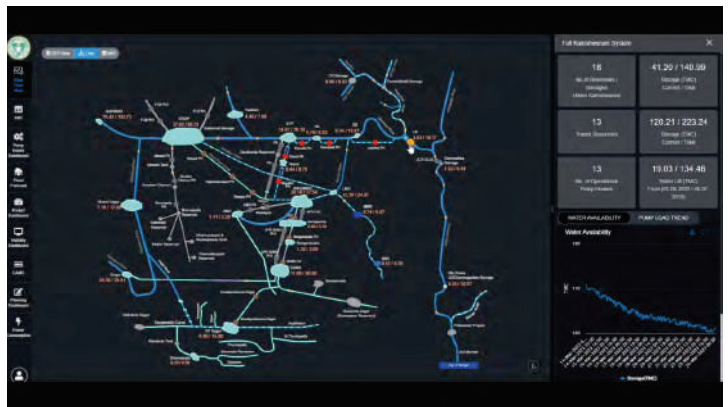
Copyright © 2025 Vassar Labs | All Rights Reserved.

## Digital Twin for Natural and Conveyance System to Manage Bulk Water

### System Overview:


The Integrated Decision Support System (IDSS) is designed to address dam safety concerns. It offers tools for hydrological assessments, dam safety risk analysis, flood forecasting, and disaster management using predictive AI and cloud infrastructure.

- Simulate real-world scenarios inside an IT system to be prepared and aware of current reality
- Optimizing energy utilization and water use efficiency to ensure climate resilience operations by creating digital twin for natural and conveyance systems
- Monitor large-scale natural & conveyance systems in real-time for bulk water management




Digital Twin


- Integrates **hydrological models and real-time data** for synchronized, system-wide dam operations
- Track water availability, usage, losses, and **ensure equitable distribution** across sectors
- **Simulates future scenarios** based on rainfall patterns, demand curves, and storage capacity



Dam Network Optimization



Water Allocation & Accounting



Reservoir Planning & Analytics


Copyright © 2025 Vassar Labs | All Rights Reserved.

## aquaIRRIGATION: Platform for Smart & Sustainable Irrigation

**Objective:**

**aquaIRRIGATION** optimizes irrigation with real-time monitoring and data-driven management. It integrates canal network monitoring, source tracking, and conjunctive water use to balance surface and groundwater resources. With GIS analytics, automated scheduling, and crop-based demand-driven allocation, it enhances efficiency, minimizes water loss, and boosts agricultural productivity.

**Managing**




States : **3**   Projects: **30**   Area : **120 Mha**


**Helping**


 Farmers : **30 M**  
  Govt officers: **1200**


**Monitoring**





**Type of Assets:** Dams, Barrages, Rivers, Canal, Regulators, farms, borewells.


 **Real Time Monitoring:**  
Tracks Canal Releases, Crop Sown Information, Soil Moisture and Ground water Status in the command area

 **Automated Irrigation Scheduling:**  
Adjusts water releases based on crop stages and climatic conditions, improving yield by up to 12% while reducing excessive withdrawals

 **Boosting Agriculture Productivity:**  
By ensuring precise water supply, farmers experience up to 15% yield improvement, enhancing food security and profitability.

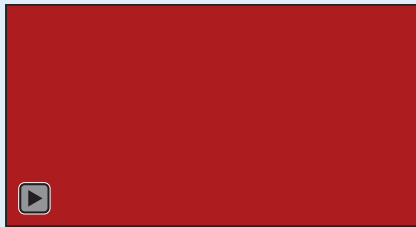
 **Conjunctive use of Water:**  
Integrates both sources dynamically, helping recharge aquifers and improving water sustainability for over 30% of irrigation demand.

 **Minimizing Water Loss:**  
Reduces seepage and operational inefficiencies, leading to a 10-20% reduction in water losses in canal systems.

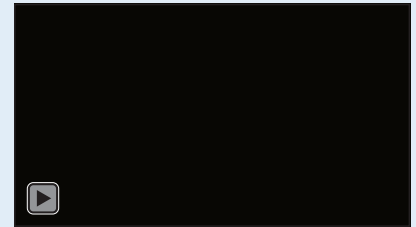
 **SMS notifications:**  
Automated alerts to engineers & policymakers via SMS and WhatsApp, App Notifications

Copyright © 2025 Vassar Labs | All Rights Reserved.

- Enables remote monitoring, predictive maintenance, and **optimized water delivery across the canal system**
- **Estimate precise water needs** based on crop type, growth stage, soil, and weather
- **Digitally model the entire irrigated** command area to visualize and manage water distribution
- **Plan water releases** in alignment with crop stages, soil moisture, and water availability



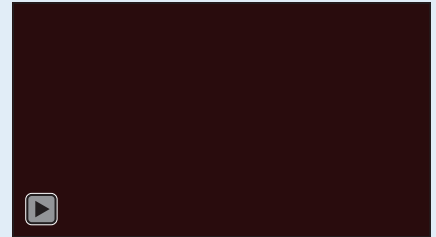
Digital Twin of Canal Network



Crop Water Requirement



Command Area Digital Twin

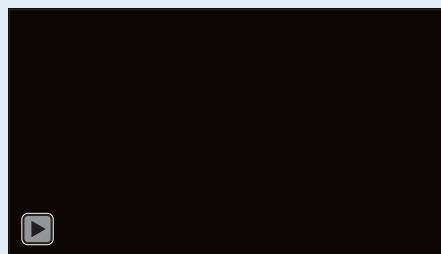


Irrigation Scheduling planning

Copyright © 2025 Vassar Labs | All Rights Reserved.

**Automated web-based interactive canal monitoring system:**

- Brings canal-wise irrigation (i.e., water release) and crop information into the decision support system in both GIS and MIS Based system .
- Tracks entire canal irrigation practice followed in the field.
- Individual field level engineers can use to monitor the various information related to their jurisdiction.
- Visualize water releases information at distributary, minor and sub minor level, cycle-wise water release information for each distributary, minor and sub-minor canals.



Monitoring Canal Supply till sub-minor level



Monitoring Canal Operation till Water User Association, Chak Level and Crop Plot Level

Copyright © 2025 Vassar Labs | All Rights Reserved.

## Crop Water Stress, Surface Wetness and Irrigation

Crop water stress and helps in understanding areas under critical water stress. This dashboard forecasts 10-day water needs, highlights dry spells, and estimates water to save crops.



State to Farm level Crop Water Stress Monitoring



Ayacut & Gap Ayacut Analysis



Farm Level Irrigation Forecast



Minor Irrigation Tanks Monitoring

Satellite data allows **continuous monitoring of water bodies** by assessing historical trends and catchment health, detects unauthorized land use, and alerts authorities.



Cropping Intensity



Cropping Pattern

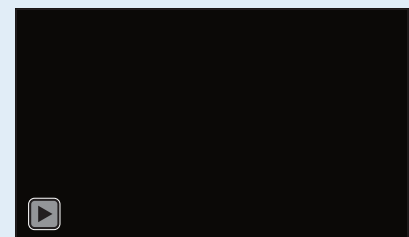
To ensure irrigation planning is responsive and data-driven, the system integrates satellite-based monitoring of both long-term and real-time agricultural dynamics. Annual products like cropping pattern and intensity help estimate water demand, while seasonal indicators such as crop type, wetness index, and crop growth enable in-season irrigation adjustments



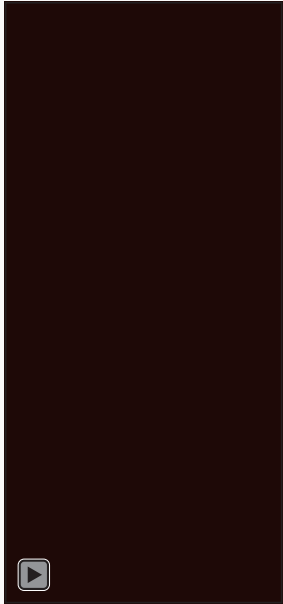
In-Season Crop



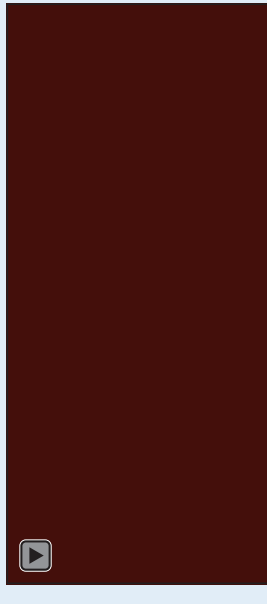
Wetness Index



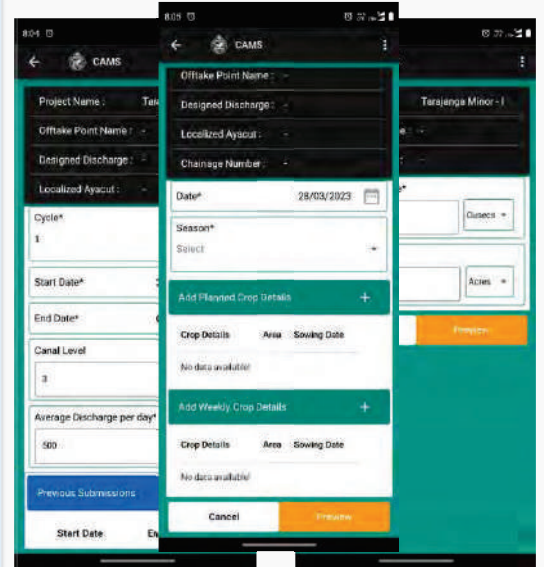
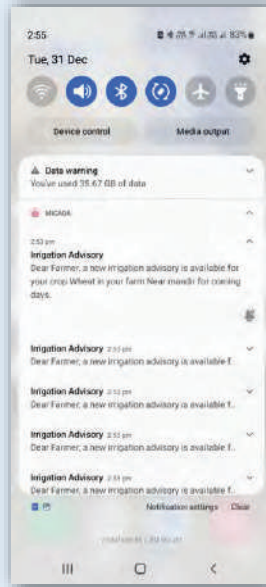
Crop Growth



Crop health and Soil Moisture Status on Farmer's mobile app



Irrigation advisories on farmer's mobile application and sent via push notifications



Mobile app for department engineers in the command area to update the daily canal water releases in the command area for each of the off-take points in the command.

Copyright © 2025 Vassar Labs | All Rights Reserved.

**Objective:**

Integrate real-time data from IoT sensors, remote sensing, and crop models for precise, efficient irrigation management. Enable efficient water allocation and advanced crop models to optimize water use, boost yields, and reduce waste. Remotely manage systems, customize irrigation strategies, and access detailed reports for informed decisions.

[Click To See the Video](#)



Copyright © 2025 Vassar Labs | All Rights Reserved.

<p><b>15.4M</b> Agriculture area covered</p>	<p><b>70TB</b> Satellite data processed</p>
<p><b>225+</b> Dams Monitored</p>	<p><b>8%</b> Energy Consumption Reduced</p>
<p><b>30M</b> Farmers Onboarded</p>	<p><b>200K</b> Irrigation tanks monitored</p>



**Andhra Pradesh - AIMS**  
Comprehensive agriculture information & management system



**Andhra Pradesh - IIATP**  
Monitor and track all the activities as per World Bank norms



**Andhra Pradesh - AIMS 2.0 (DPI)**  
State Agriculture Data Hub and Technology Platform



**Haryana AIMS**  
Comprehensive Farmer Database, enabling scientific crop planning & harvesting assessment



**Haryana - MICADA (IISIF)**  
The system aims to increase crop yield and optimize inputs while building climate resilience



**Kerala - KATHIR (DPI)**  
Integrated agriculture data hub and digital farmer services platform



**Telangana CAMS**  
Canal Irrigation Monitoring database enabling efficient water usage



**Odisha CAMS**  
Canal Irrigation Monitoring at Orissa enabling efficient water usage

- 8 State Level Projects
- 35+ Major Irrigation Projects

Digital Platform Advancing Water Security for All

Water Storage Management  
(Reservoir/Dams, Rivers, Lakes & Tanks)



Building knowledge-driven digital platform-enabled products that secure water resources, addressing the full lifecycle of water. Our solutions extend water security to critical nexuses in food, energy, agriculture, urban resilience, and disaster readiness.

- Interoperable
- Low Code
- Cloud Agnostic
- Digital Integrations



Reach out:  
[marketing@vassarlabs.com](mailto:marketing@vassarlabs.com)

Thank You!