aqua™ WISE

Vassar LABS

Unified Water MANAGEMENT

Powered by aquaWISE

www.vassrlabs.com

VISION

aquaWISE is a web-enabled digital water platform and aims to provide a suite of digital products for water resource monitoring, planning, management, and day-to-day operations across diverse scales, from individual facilities like farms, canals, lakes, reservoirs, factories, treatment plants, etc to vast geographies like rivers, river basins, country, states, cities, etc. ensuring responsible and sustainable water management for everyone

It integrates data from various sources such as sensors, satellites, drones, SCADA, existing ERPs, legacy databases, global forecast systems, simulation runs, etc, to run scientific and AI models that mimic real-world physics to create an integrated digital twin of various water life cycle components: rain system, run-off, and natural conveyance, water storage, water transmission, water treatment, water distribution, water demands, water re-use, floods, water infrastructures, water assets, water quality, stormwater, city water, etc.

PLATFORM OVERVIEW

aquaWISE stands at the forefront of innovation, integrating advanced technologies like the Internet of Things, Big Data, Cloud Computing, AI/ ML, Remote Sensing, GeoSpatial, Batch Processing, Distributed Processing, Micro Services, API, Mobile Apps, genAI, etc, to monitor and manage water resources with unprecedented efficiency and precision.

01

Integration with IoT Sensors & Satellite

Enabled with inbuilt IoT and satellite stack to collect real-time data from various water sources. This integration ensures comprehensive monitoring and enables timely decision-making.

02

Data Analytics & Actionable Insights

Through advanced data analytics, it transforms raw data into actionable insights. Users gain access to real-time information and valuable predictions, empowering them to make informed decisions regarding water resource management.

03

User-Friendly Interface

Provides seamless data access and visualization via GIS, MIS, Mobile Apps, and Voice-enabled Co-Pilot. Users can easily navigate through the wealth of information available, facilitating efficient decision-making processes.

04

Scientific Models & Predictive Analytics

It integrates with large-scale scientific models and predictive analytics to offer robust forecasting and scenario analysis. This capability enables users to anticipate future trends and plan accordingly, mitigating potential risks and optimizing resource allocation.

05

Interoperability & Scalability

Designed for interoperability, it seamlessly integrates with existing systems and data sources. Moreover, the platform is highly scalable and capable of accommodating expanding geographical areas and increasing data volumes without compromising performance.

06

Security & Data Protection

Advanced encryption and data protection measures are implemented to ensure the integrity and confidentiality of sensitive information. Users can trust that their data is safeguarded against unauthorized access and breaches.

PRODUCT RANGE

Sitting on the top aquaWISE platform various user group-specific products are packaged and offered as SaaS or built to custom and deployed to customers' cloud or local infrastructure. Offering a comprehensive suite of over 20 advanced products designed to address diverse water management needs and solutions tailored for managing water resources across various scales and environments. Whether you're overseeing city water supplies, maintaining the ecological balance of lakes and rivers, managing reservoirs, river basins, and state or country-level water systems, or want to efficiently manage irrigation water supply to farms, or generate sustainable and safe hydropower, or need for climate resilient and responsible industrial water use, or adapt to climate water disasters like flood, drought, heatwave or monitor water development indicators for organizations, or enable water rights, entitlement and trading, etc, aquaWISE provides an integrated and one-stop shop for the digital product for sustainable water management.

PLATFORM VERSIONS

aquaWISE is a powerful digital water management platform for all and is packaged into 3 versions to fit into the diverse needs of the user groups and geographical scale. It's ideal for sectors needing high data integration, real-time processing, spatial analysis, and mobile access. Typical uses include smart city management, natural resource management, disaster response, environmental monitoring, and urban planning.

The Essential Version offers core features for water management, including user-role management, mobile access, and data integration, making it ideal for small organizations or communities.

The Expert Version builds on the Essential Version with query builder, dynamic data, e-library, workflows, and IOT engine making it suitable for medium-sized enterprises and municipalities that require detailed data insights and spatial analysis for improved decision-making.

The Enterprise Version provides a complete suite of features, including a 3D engine, model manager, remote sensing, and Gen AI Suite. It is designed for large enterprises and governmental organizations that need extensive, scalable, and highly integrated water management solutions.

Components	Essential	Expert	Enterprise
User-role & Access Management Manages authentication and authorization ensuring access control based on location, organizational policies, and user responsibilities. It is essential for maintaining data security and integrity.			
Front-end Provides a user-friendly and intuitive interface for users, compatible with various devices – Tabs, mobiles, and desktops, to seamlessly interact with the platform. It facilitates the data and information presentation in an actionable format and supports user interactions like data queries, visualization, and reporting.			
Cloud Package Provides cloud-agnostic integration that delivers scalable data storage, and efficient processing. It ensures enhanced performance and reliable data handling.			
Mobile Empowers users with the ability to access the platform on mobile devices online or offline, through lite-data allowing users to geo-tag and geo-fence with limited uncertainty.			
Communication Keeping the user on top of all real-time updates through various channels like push notifications, messages, and email alerts. Users can also configure communication protocols tailored to different use cases.			
GIS Engine The GIS engine enables advanced geo-spatial analytics for both VECTOR and RASTER data, allowing users to create, modify, and update maps with ease. Additionally, it supports a wide range of geometric operations, including interpolation, topological analysis, spatial analysis, geostatistical analysis, clustering, and regression, and it can publish maps in web-mapping service formats.			
Data Engine It offers seamless data integration and advanced analytics supporting comprehensive data processing capabilities, including batch processing of large volumes, real-time processing, and automated workflows. The data storage section features a versatile data lake capable of storing structured, semi-structured, and unstructured data. Additionally, it provides robust data governance and security measures.			
GEO DB Stores and manages spatial data for analysis and visualization of geographic features, supporting spatial data types, indexing, and queries. It integrates with GIS software and supports versioning, replication, multi-user editing, collaboration, and data sharing for efficient, collaborative workflows.			

Components	Essential	Expert	Enterprise
Power DB It is a distributed database with a highly scalable, fault-tolerant, and decentralized architecture. It offers a flexible schema, multi-data center replication, and handles real-time large-scale data across multiple nodes with highly efficient data retrieval and storage mechanisms. It also ensures balanced data distribution and allows easy node addition to the cluster with zero downtime.			
Query Builder It provides a graphical interface where users can select tables, fields, and conditions to construct queries visually, making it easier for those with non-technical backgrounds to retrieve, update, or manipulate data from the database efficiently. It includes features like drag-and-drop functionality, automatic syntax generation, and real-time query results, enhancing user productivity and accuracy in database interactions.			
Workflow It manages and automates business processes and workflows, streamlining operations with tools and functionalities. It defines task sequences, decision points, and conditional logic, automating repetitive tasks. It sends notifications, alerts on deadlines, and priority issues, offering real-time visibility, monitoring progress, identifying bottlenecks, and providing an audit trail for transparency and accountability.			
Dynamic Data It gathers IoT data from various frequencies, including SCADA, satellites, crowdsourcing, third-party systems, APIs, and web-scrapers. This integration offers a broad and real-time view, using diverse data sources to improve analysis and decision-making.			
E-Library A centralized platform for storing and accessing diverse documents, reports, research papers, water- laws, regulations, case studies, and literature on water resources. It eliminates physical storage, reduces printing costs, and allows field personnel to access resources on-site, enhancing flexibility and information sharing across departments.			
IOT Engine Enabled to connect with various IoT sensors installed across vast geographies to process real-time water management data such as water level, flow, storage, quality, precipitation, and other weather parameters. It also facilitates trend analysis and pattern recognition to detect abnormalities in these parameters.			
Sandbox A sandbox is a secure, isolated environment for testing software and applications without impacting the main system. It allows safe experimentation, debugging, and analysis of new			

Components	Essential	Expert	Enterprise
or untrusted code, enabling users to extract user-desired data from existing systems and create scripts for executing various tasks efficiently.			
3D Engine Our 3D engine provides a graphics environment to view flood inundation risks for facilities and properties in a three-dimensional visualized mode allowing users to assess and analyze flood risk with immersive and accurate visual representations.			
Model Manager It prioritizes collaboration, allowing teams to work simultaneously on creating, managing, and analyzing models. It supports AI/ML, hydrological, hydraulic, optimization, crop growth, demand, statistical, and stochastic models, enabling sharing and exporting of results. This tool streamlines diverse models' development, deployment, and maintenance in a unified environment.			
Gen AI Suite A smart co-pilot with advanced text and vernacular features. GenAI listens to conversations with appropriate permissions and provides inputs like a knowledgeable third party. It harnesses computational power to extract data from dashboards and other resources, delivering precise, targeted information to enhance your decision-making and operational efficiency.			
Remote Sensing Remote Sensing engine focussing on satellite image processing related to atmosphere and land interactions. It supports agriculture, meteorology, weather forecasting, hydrology, and water resource management applications, providing essential data and insights for informed decision-making in these areas.			

PRODUCT OVERVIEWS

Product	SaaS (Software as a Service)	CaaS (Container as a Service)	Both
aquaWRIMS A web-enabled solution for real-time monitoring, visualization, analysis, and management of large-scale water resources at country, state, and river basin levels. It tracks the entire water life cycle, including meteorological, hydrological, environmental water quality, and usage data, enabling real-time accounting and strategic planning of water resources.			
aquaWELL A comprehensive monitoring and management system for groundwater resources via data integration from IoT sensors and field observations to provide real-time insights into groundwater levels, recharge rates, and yield. It helps understand groundwater systems' dynamic behavior from a granular to a broader scale. It notifies exploitation status and identifies stressed areas due to over-extraction or droughts by analyzing multi-scale data aiding long-term water security. It provides groundwater recharge planning tools, regulates usage permits, forecasts aquifer dryout risks, addressing current and future water challenges.			
aquaLAKE Comprehensive monitoring of waterbodies and catchment areas, including real-time tracking of water levels and storage capacity, detection and assessment of encroachments, continuous water quality analysis, and detailed monitoring of changes in the waterbody over time using IOT, remote sensing, AI/ML, and GIS technologies.			
aquaCITY Monitors the entire water infrastructure, including distribution networks in real time. Gain insights into utilities' performance, oversee connections, and manage drinking water supply from the source to the end-user. A digital twin to measure, monitor, and manage urban water in real-time, leveraging IoT and Artificial Intelligence.			
aquaFLOOD Integrates weather, hydrological, and geospatial data sets along with storage structure and water conveyance characteristics to provide real-time flood early warnings, and inundation risk assessments at any control location and disseminate the information to facilitate strategic			

Product	SaaS (Software as a service)	CaaS (Container as a service)	Both
planning for flood mitigation efforts. The Technology is scalable from point to city to river basin ensuring comprehensive flood management and enhancing resilience against flood disasters.			
aquaIRRIGATION It optimizes the efficiency and comprehensive coverage of irrigation water usage in command areas. Utilizing data collected through IoT sensors, remote sensing technologies, soil, and crop growth models. It allows for precise water management tailored to the specific needs of crops and soil conditions, ensuring maximum crop productivity while optimizing water resources.			
aquaSHED Bringing a scientific approach to assessing watershed health ensures efficient site selection for water and soil conservation, recharge, and creating a sustainable master plan considering existing water needs and the impact of climate change scenarios.			
aquaLIFT A solution designed to optimize the usage of water lifting infrastructure ensuring efficient management of water resources by combining real-time data with sophisticated prediction and simulation models. aquaLIFT not only monitors the operational status and health of water lifting infrastructure but also provides actionable advisories. It helps in advising users to minimize power consumption while meeting water demands through optimal water-lift scheduling. This system helps reduce operational costs, extend the lifespan of equipment, and ensure a consistent water supply.			
aquaHYDRO A solution tailored for optimizing hydropower plant operations to enhance performance, maximize profitability, and ensure sustainable energy generation. The system manages cascading networks of power generation units, accounts for inflow uncertainties, and addresses the impacts of climate change, including cold waves and drought spells. Additionally, it ensures compliance with environmental requirements, facilitating a balanced approach to ecological requirements and hydropower production.			
aquaINDEX A benchmarking solution that evaluates and ranks water governance practices across versatile levels. It measures the adoption of sustainable water management policies by assessing water resource utilization, regulatory compliance, and conservation efforts. aquaINDEX fosters competition			

Product	SaaS (Software as a Service)	CaaS (Container as a Service)	Both
among jurisdictions, driving the implementation of best practices and evidence-based water policies.			
aquaASSET An asset management system designed to optimize the performance and reliability of water infrastructure. It utilizes modern technology to manage and maintain the water infrastructure-pumps, floodgates, treatment plants, and pipelines by tracking asset life thereby reducing potential downtime.			
aquaPROGRESS It offers a unified platform for monitoring large water infrastructure projects over wide spatial and temporal scales. The system enables near real-time monitoring by consistent data collection, processing, and analysis to provide actionable insights. This solution integrates data from various sources such as geo-enabled mobile apps, satellite data, and drones, supporting project tracking, management, and decision-making. It can monitor contractor performance, identify common project issues, and implement effective solutions.			
aquaDESIGN An advanced water management system is used to measure the impact of asset changes on the existing system and design a sustainable infrastructure.			
aquaSURVEY Enables large-scale remote data collection and ground truthing across extensive geographic areas. It leverages geo-tagging, geo-fencing, and crowdsourcing capabilities to collect water-related data from diverse sources. This data acquisition solution built on cohesive workflows supports objectives like mapping water resources, validating existing data, and gathering community-driven insights for informed decision-making.			
aquaRISK It assesses flood risk for facilities, reducing life-threatening and economic risks. It leverages cloud-based technology to generate flood scenarios and return periods instantly. With 3D visualization capabilities, aquaRISK provides comprehensive insights for informed decision-making in flood risk management.			
aquaMIND A GenAI-based smart co-pilot for real-time insights into weather and water status at multiple levels. It provides on-demand alerts, supports contextual and vernacular conversations in regional languages, delivering hourly updates.			

Product	**SaaS** (Software as a Service)	**CaaS** (Container as a Service)	**Both**
It engages in human-like interactions, offering real-time insights during group discussions. It transcribes meetings, creates reports, and sends comprehensive water management updates directly to users.			
aquaDROUGHT A comprehensive solution for drought forecasting, integrating hydrological, meteorological, and remote sensing datasets to assess various indices and understand the impact of drought. This tool assists in water resource planning, risk assessment, and mitigation efforts, and facilitates crop insurance, ensuring sustainable water management and resilience against drought conditions.			
aquaDRROP A web-enabled simulation tool that integrates data from various sources to run optimization models for Rivers and Reservoirs to minimize flood risks and maximize water system efficiency. It has what-if scenarios coupled to physics-driven simulations and economic optimization with actionable dashboards and daily schedules. Users can work collaboratively to build models, share results, and modify existing models and constraints based on real-time conditions and future estimates of supply and demand.			

IMPACTS

Stabilized Groundwater Levels:
Over the last five years, despite facing significant deficits in rainfall (-33%, -5%, -30%, -13% over the last four years), groundwater levels of a state adopted by aquaWISE platform remained stable, demonstrating the effectiveness in water resource management.

Critical Support to Interbasin Transfer System:
Optimized interbasin water transfer provided essential water to the entire delta region, positively impacting 1.1 Million acres of farmland.

Enhanced Agricultural Productivity:
Interventions helped 100k+ hectares of land with critical soil moisture stress, benefiting 4,540 farmers. They experienced a 23% increase in yield due to improved soil moisture management.

Water Conservation Structures:
Based on soil and water conservation planning, 17,000 water conservation structures were built, significantly contributing to groundwater stabilization.

Reservoir Management:
Saved 24 TMC of water through improved reservoir management and aligning sowing dates with the monsoon season, ensuring optimal water use.

1.5 M

Massive Conservation Efforts:
aquaWISE facilitated the construction of over 1.5 Million conservation structures, enhancing water retention and preventing soil erosion, thereby ensuring long-term sustainability for agriculture and the environment.

3.5K M.W

Boosted Renewable Energy:
Optimized 3.5K MW of hydro-power capacity through resource management and innovative technologies, accelerating renewable energy generation and contributing to energy security while reducing reliance on fossil fuels.

200K

Irrigation Tank Monitoring:
aquaWISE monitored over 200K irrigation tanks, advising on improvements for water body and catchment health.

43K

Groundwater Management:
Established over 43K groundwater level assessment units to effectively monitor and manage groundwater resources, providing critical data for sustainable extraction and recharge practices.

58.29 M

Energy Savings in Irrigation:
Saved 970 MW hours of energy for irrigation pumping, translating to a cost saving of approximately 58.29 Million USD.

66K KMSQ

Early Drought Declaration:
Covered 66,000 square KM for early drought declaration, providing timely financial benefits to farmers and mitigating the impact of drought.

Forbes - Sustainability Change-makers

Recognized by Forbes and Economic Times as a key player in solving India's water crisis, reflecting the startup's impact and commitment to sustainable water management solutions.

WPTO, Department of Energy, USA

“These innovators are helping define hydropower’s role in a more resilient energy system,”

Niti Aayog, Govt of India

APWRIMS featured in the Composite Water Management Index (June 2018, Pg 137), emphasizing its significance in national water management strategies.

World Bank - South Asia Water Initiative

Under theory of change Pillar 1 - Vassar Labs was contracted to develop a complementary Northeast water information portal.

Geospatial World

Indian organisations like Vassar Lbas have been able to leverage a combination of space and software to build products that cater not just to businesses, but also communities.

Asian Development Bank

Vassar Lab’s aquaWISE platform was featured in the Asian Development Bank’s “Catalyzing Innovations and Digitization for Safe Sustainable Resilient and Inclusive Water Management"

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