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# AQUAFARM 2.0

## Extension Final Report

AQUAFARM

**EUROPEAN SPACE AGENCY CONTRACT REPORT**

The work described in this report was done under ESA contract.
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# Acronyms

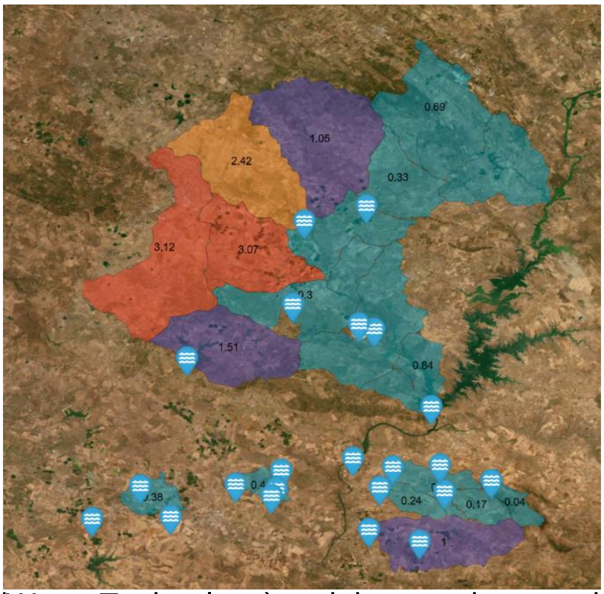
| Tag | Description |
|---|---|
| AI | Artificial Intelligence |
| API | Application Programming Interface |
| CCN | Contract Change Notice |
| DPE | New South Wales Department of Planning and Environment (Australia) |
| EDIA | Empresa de Desenvolvimento e Infraestruturas do Alqueva (Alqueva Development and Infrastructure Company) |
| EO | Earth Observation |
| ESA | European Space Agency |
| GIS | Geographic Information System |
| IFAP | Instituto de Financiamento da Agricultura e Pescas (Institute for the Financing of Agriculture and Fisheries) |
| NDVI | Normalized Difference Vegetation Index |
| NDWI | Normalized Difference Water Index |
| NSW | New South Wales |
| SAR | Synthetic Aperture Radar |

# 1 INTRODUCTION

Water resource management is facing growing challenges due to climate change, increasing agricultural demands, and the need for sustainable water allocation strategies. Traditional monitoring approaches, which rely on in-situ measurements and historical records, often fail to provide the spatial and temporal resolution necessary for real-time decision-making. AquaFarm was developed to address these limitations by integrating Earth Observation (EO) data, artificial intelligence (AI), and hydrological modeling into a comprehensive decision-support system. The platform focuses on water availability assessment, forecasting, digital twin development, and anomaly detection related to crop water use and hydrological conditions at the parcel scale.

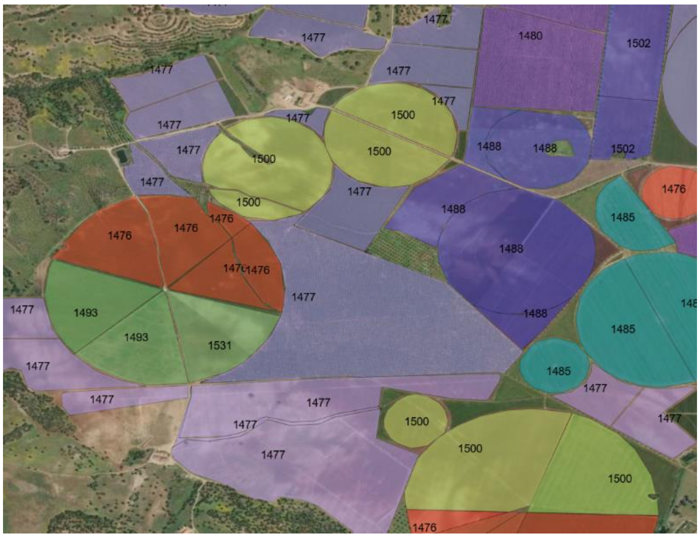

AquaFarm began as a feasibility study supported by the European Space Agency (ESA), where it explored the potential of using EO data and numerical modeling to improve agricultural water management. Following the initial feasibility phase, the project advanced into a demonstration stage, where AquaFarm's functionalities were validated through pilot deployments with key stakeholders such as IFAP, EDIA, and Wisecrop. These pilots provided critical feedback, allowing the platform to refine its capabilities in monitoring crop development, estimating water consumption, and assessing irrigation efficiency. The demonstration stage proved AquaFarm's operational potential, attracting multiple users interested in integrating its services into their workflows.

Building on these achievements, AquaFarm has transitioned into the CCN (Contract Change Notice) phase, expanding its reach and operational scope. Throughout this process, the platform has steadily gained users, with key partners adopting AquaFarm's solutions to optimize water management. Organizations such as EDIA in Portugal and the NSW Department of Planning and Environment (DPE) in Australia have successfully implemented the system for large-scale agricultural monitoring and regulatory enforcement. This continuous evolution demonstrates AquaFarm's ability to adapt to user needs, enhance decision-making capabilities, and provide a scalable, data-driven approach to sustainable water management.




The pilot phase of AquaFarm was successful, demonstrating the reliability and accuracy of the platform's models across different regions. The interaction with water managers, regulatory agencies, and agricultural stakeholders was crucial in refining the system to better address real-world challenges in water allocation and usage monitoring. Through direct engagement with users in Portugal (EDIA) and Australia (DPE/Water Technology), training sessions, and iterative improvements, AquaFarm ensured a user-friendly experience while maintaining scientific rigor in its hydrological and agricultural assessments. The pilot validated key functionalities such as water balance forecasting, anomaly detection, and digital twin simulations, paving the way for a smooth commercial transition and broader adoption by international stakeholders.

AquaFarm's commercial expansion to Australia made possible by a strong European consortium working alongside AquaFarm and Water Technology (Australia). This strategic collaboration ensures market penetration in Australia and enhances the platform's ability to serve international water managers. Additionally, a strong partnership with Digifarm extends AquaFarm's global reach, leveraging its expertise in EO-driven agricultural analytics. The recent acquisition of Hidromod by ABL further reinforces AquaFarm's positioning as a global leader in water management solutions, enabling the platform to scale operations, strengthen commercial outreach, and support sustainable water governance worldwide.



# 2 BACKGROUND AND PROJECT OBJECTIVES

## 2.1 Context and Motivation

Water resource management is becoming increasingly complex due to climate variability, growing agricultural water demand, and the need for more efficient allocation of water resources. Traditional water monitoring methods are often limited in spatial coverage and temporal resolution, making it difficult for water managers and regulatory bodies to make informed decisions. AquaFarm was developed to address these challenges by leveraging Earth Observation (EO) data, AI-powered analytics (Figure 1), and hydrological models to provide high-resolution insights into water availability, consumption, and forecasting. The system enables real-time and predictive water balance assessments, helping decision-makers optimize water use and prevent inefficiencies at the parcel and watershed scales.

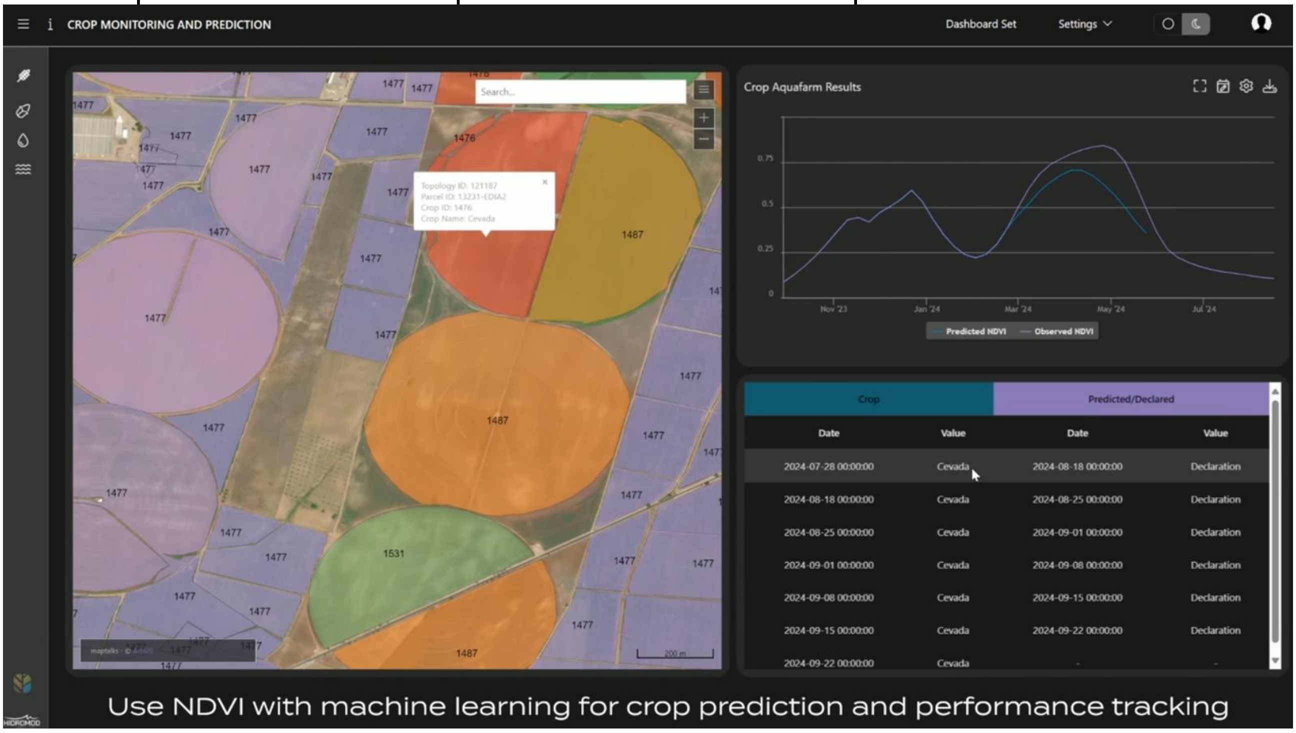



Figure 1 - Crop Monitoring and Prediction Using NDVI and Machine Learning

## 2.2 Project History and Evolution

AquaFarm originated as a feasibility study assessing market interest in water monitoring capabilities through satellite data and numerical modeling. The initial iterations of the platform focused on hydrological modeling, evapotranspiration estimation, and crop monitoring, developed in collaboration with IFAP, Portugal's national paying agency for agriculture and other customers. Over time, AquaFarm evolved into a comprehensive digital twin solution for water resources, integrating real-time Earth Observation (EO) data, AI-driven analytics, and operational hydrological models.

Key milestones in its development include the integration of the HydroAquaFarm model, strategic partnerships with major stakeholders such as EDIA in Portugal and the NSW Department of Planning and Environment (DPE) in Australia, and successful pilot implementations across multiple regions. More recently, the platform has expanded its capabilities with watershed-scale modeling, advanced anomaly detection for unauthorized water use, and seamless integration with national water databases, further enhancing AquaFarm's role as a critical decision-support tool for sustainable water management.

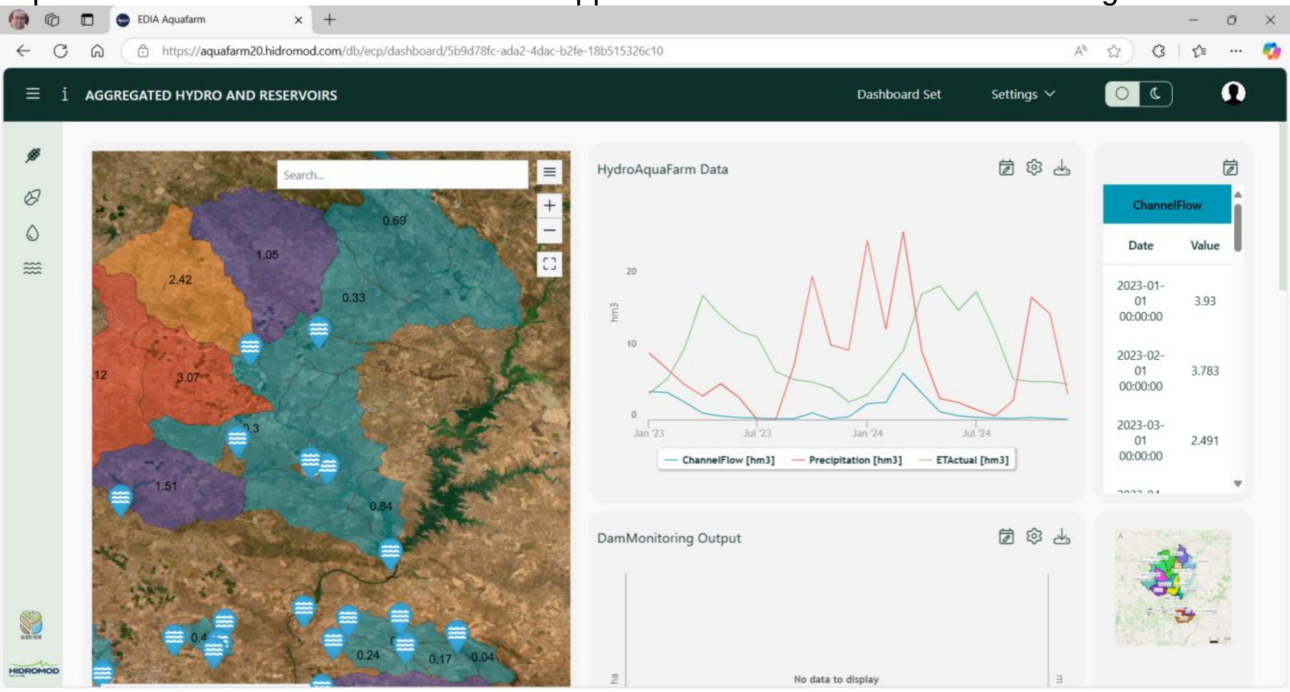


Figure 2 - Watershed-Scale Modeling of Reservoir Inflows Using HydroAquaFarm

## 2.3 Objectives of the AquaFarm Project

The primary objective of AquaFarm is to support water managers and agricultural stakeholders by providing high-resolution, data-driven insights into water availability, forecasting, allocation, and crop water dynamics. By integrating crop monitoring alongside hydrological modeling, AquaFarm enhances decision-making for both water distribution and agricultural productivity. Specifically, the system aims to:

- Enable real-time water balance assessments at the parcel and watershed levels, incorporating crop conditions to improve water allocation efficiency.
- Develop a predictive framework for water use, availability, and crop water demand, integrating multiple EO and in-situ data sources to support informed decision-making.
- Detect anomalies in both water usage and crop development, assisting regulatory bodies in compliance enforcement and identifying potential irrigation inefficiencies.
- Provide an interactive Web GIS interface that facilitates efficient visualization of water dynamics, crop health, and irrigation needs, ensuring actionable insights for users.
- Support sustainable water and agricultural management strategies by integrating digital twin models, simulating various water allocation scenarios and their impact on crop production.

## 2.4 Key Innovations and Technical Approach

AquaFarm introduces several technical innovations, making it a scalable and versatile solution for water resource management and sustainable agriculture. A key advancement is the HydroAquaFarm model (Figure 3), which efficiently simulates water availability at the parcel scale while being optimized to run at regional, national, or even continental levels. To support this, a dedicated Web GIS interface allows users to visualize both detailed parcel-level insights and aggregated data at broader scales. CropAquaFarm further enhances the platform by predicting crop development, helping optimize water use and agricultural planning. AquaFarm's modular structure enables tailored services for different stakeholders, including water managers, regulatory agencies, and agricultural enterprises. Additionally, the system integrates multiple data sources, such as optical Earth Observation (EO) imagery, radar-based precipitation, and meteorological data, ensuring accurate and reliable assessments. By combining hydrological modeling, predictive crop analytics, and multi-source data integration, AquaFarm provides a comprehensive decision-support tool for efficient water and agricultural management.

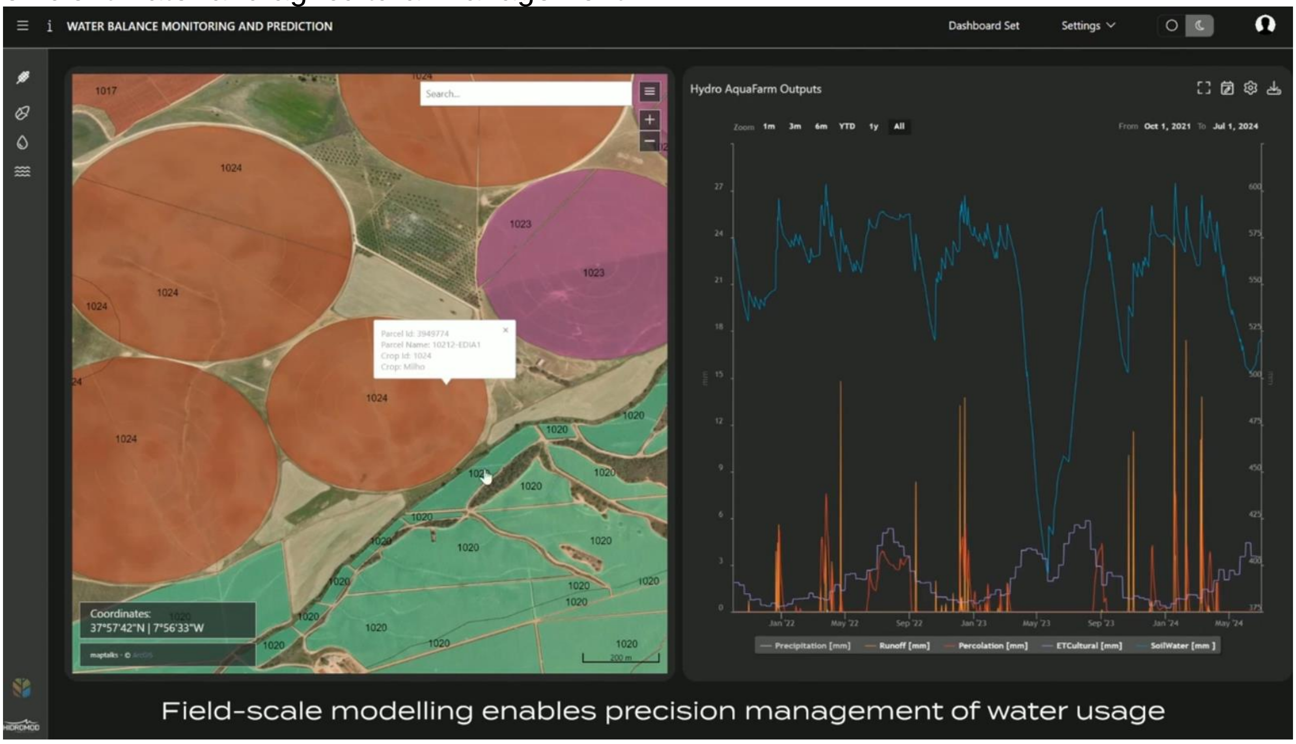



**Figure 3 - HydroAquaFarm Water Balance Monitoring and Prediction in Portugal**

## 2.5 Expected Impact and Benefits

AquaFarm's implementation is expected to have a transformative impact on water resource management, enhancing operational efficiency, regulatory compliance, and sustainability. By providing accurate and timely information on water availability and use, the system enables water managers to optimize resource distribution, prevent waste, and mitigate the effects of droughts and climate variability. Additionally, the anomaly detection feature allows for proactive enforcement of water regulations, ensuring that water use remains within sustainable limits. The digital twin capability further enhances long-term planning efforts, reducing uncertainty in water policy decisions. As a result, AquaFarm not only benefits individual stakeholders such as farmers and irrigation operators but also contributes to national and international efforts in sustainable water management and climate adaptation.

# 3 SERVICES DEVELOPED, USERS AND CUSTOMERS

## 3.1 Overview of the Developed Service(s)

The AquaFarm 2.0 project has developed a suite of advanced services aimed at enhancing water resource management, agricultural monitoring, and environmental data processing. These services integrate satellite Earth Observation (EO) data, numerical modeling, and artificial intelligence (AI) algorithms to provide stakeholders with real-time insights into water availability, crop development, and irrigation. The core functionalities include HydroAquaFarm for water balance assessments, CropAquaFarm for NDVI-based crop monitoring, and DamMonitoring for real-time reservoir tracking. By consolidating hydrological, meteorological, and remote sensing datasets, AquaFarm empowers water authorities, farmers, and agribusinesses with data-driven tools that improve decision-making and sustainability in agriculture and water management.

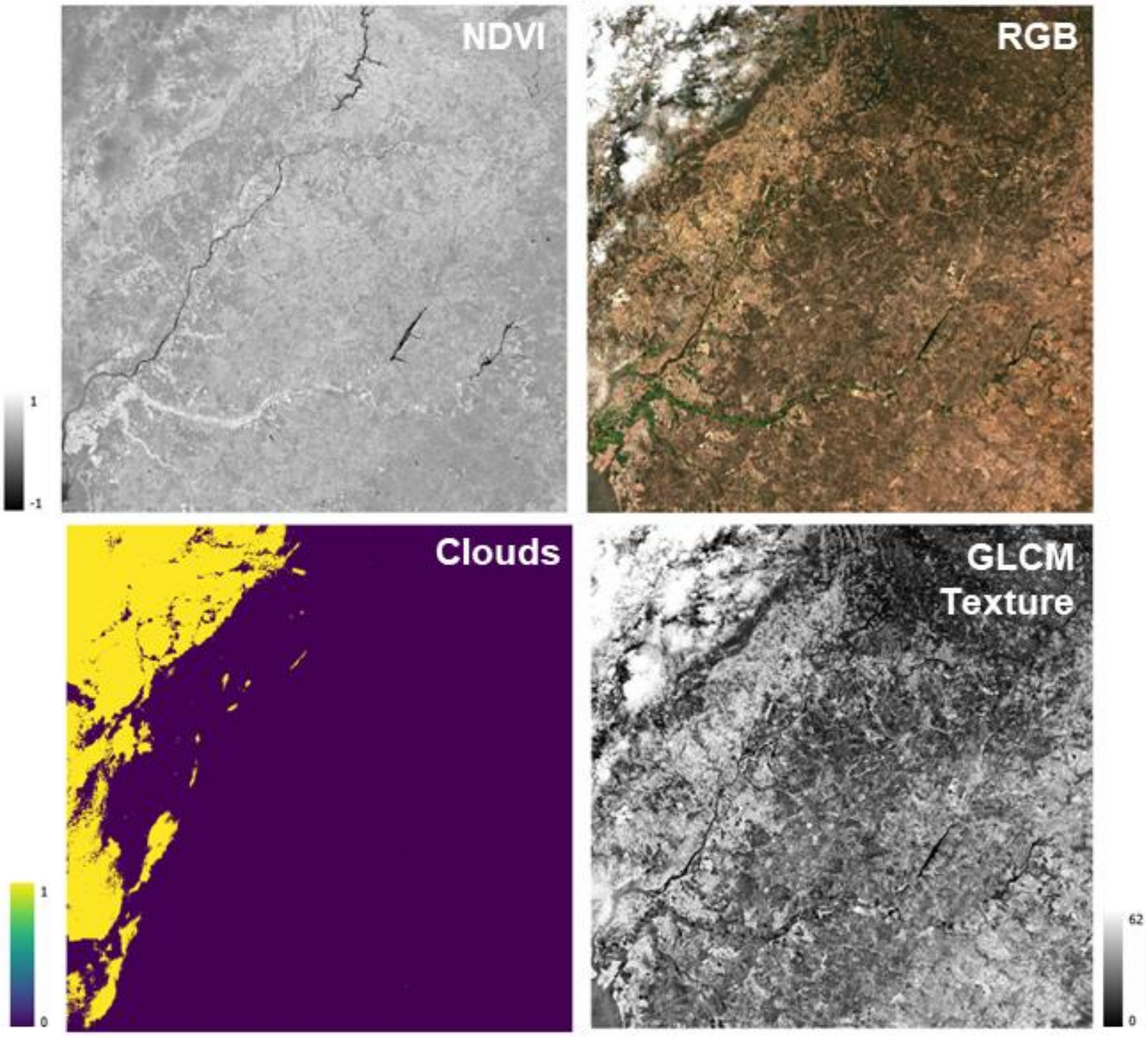



Figure 4 - Sentinel-2 Data Analysis Over Portugal on September 1, 2023

## 3.2 Target Users and Customer Segments

AquaFarm provides services to a diverse group of stakeholders, including public agencies, agricultural enterprises, water management authorities, and environmental organizations. Key users include EDIA, which manages irrigation infrastructure and reservoir operations in Portugal, Digifarm, an agricultural technology provider specializing in crop monitoring, and DPE, which focuses on hydrological forecasting for watershed management. These customers require high-resolution, real-time data analytics to optimize water distribution, detect anomalies in irrigation patterns, and forecast agricultural yields. The service could also be extended to policy regulators and research institutions, enabling them to track compliance with water use regulations and conduct climate resilience studies.

Figure 5 - Agricultural field delineation in Namoi, Australia

## 3.3 Service Architecture and Implementation

The AquaFarm platform is built on a modular architecture that integrates cloud-based Earth Observation (EO) data processing, AI-powered analytics, and interactive dashboards. The two core components, HydroAquaFarm and CropAquaFarm, drive its water resource and crop monitoring capabilities. HydroAquaFarm provides detailed hydrological modeling at the parcel scale, efficiently scaling up to regional, national, or continental levels, allowing for accurate water balance assessments, runoff estimation, and anomaly detection. CropAquaFarm enables real-time crop monitoring and development prediction, leveraging machine learning and NDVI-based analysis to assess crop conditions and forecast agricultural trends.

The system is designed to ingest and process multispectral imagery from sources such as Sentinel-2, meteorological data from CHIRPS and ECMWF, and hydrological datasets from SNIRH and HydroNet. AquaFarm's API-based structure ensures seamless integration with external platforms, such as EDIA's irrigation monitoring system and Digifarm's crop intelligence tools, enhancing interoperability and facilitating data exchange for sustainable water and agricultural management.

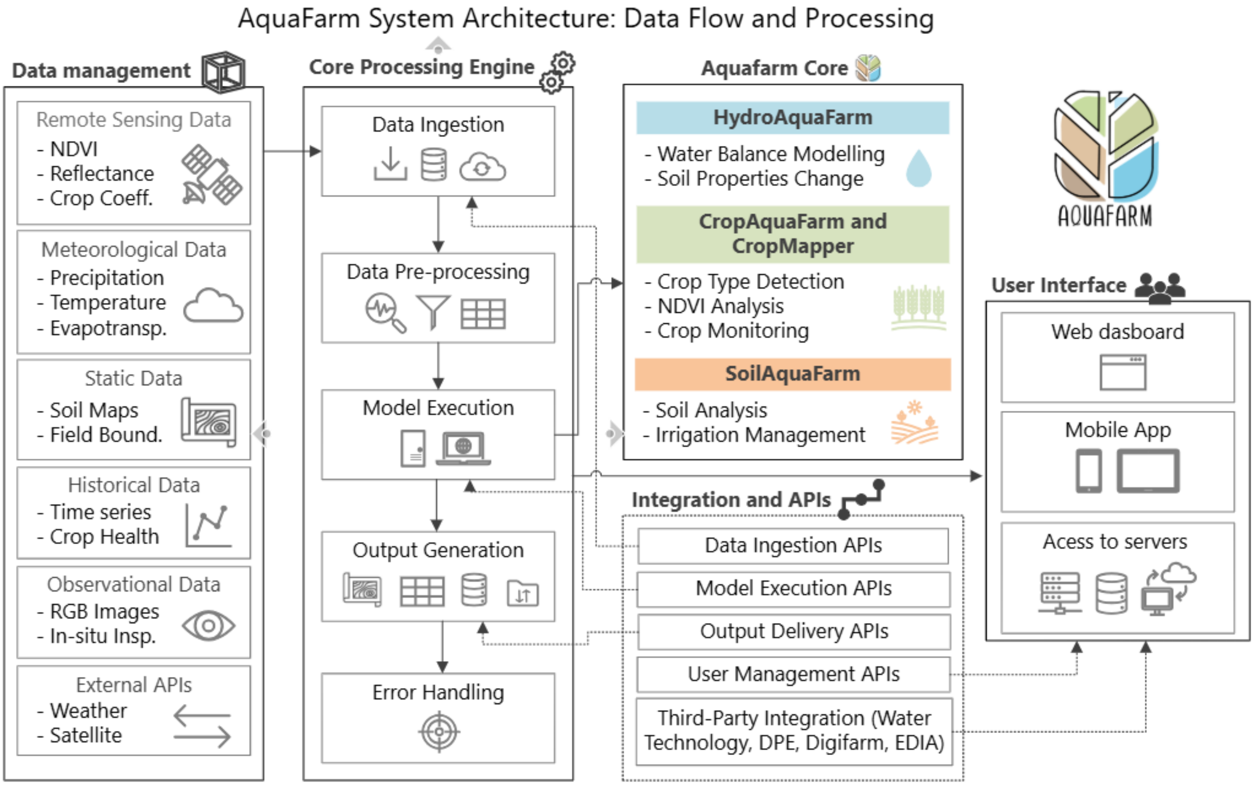


Figure 6 – Aquafarm System Architecture: Data Flow and Processing

## 3.4 Key Features and Capabilities

AquaFarm delivers a range of advanced functionalities, including automated crop classification, real-time farm water balance monitoring, predictive irrigation analytics, and anomaly detection. The CropAquaFarm tool leverages NDVI time-series analysis to track crop development, identify growth anomalies, and forecast agricultural trends, enabling improved farm management. HydroAquaFarm models precipitation-runoff relationships to estimate water availability, integrating percolation, soil moisture, and evapotranspiration assessments at both parcel and watershed scales.

Other standout features include reservoir volume estimation from EO-derived surface water area measurements, integration of multiple EO and in-situ datasets, and scalability to different geographic levels, from individual farms to entire regions. The platform also supports multi-source data fusion, incorporating satellite imagery, meteorological datasets, and water usage records to improve decision-making. AquaFarm's dynamic dashboards provide interactive visualizations of agricultural and hydrological trends, enabling water managers, farmers, and policymakers to access critical insights for sustainable water management.

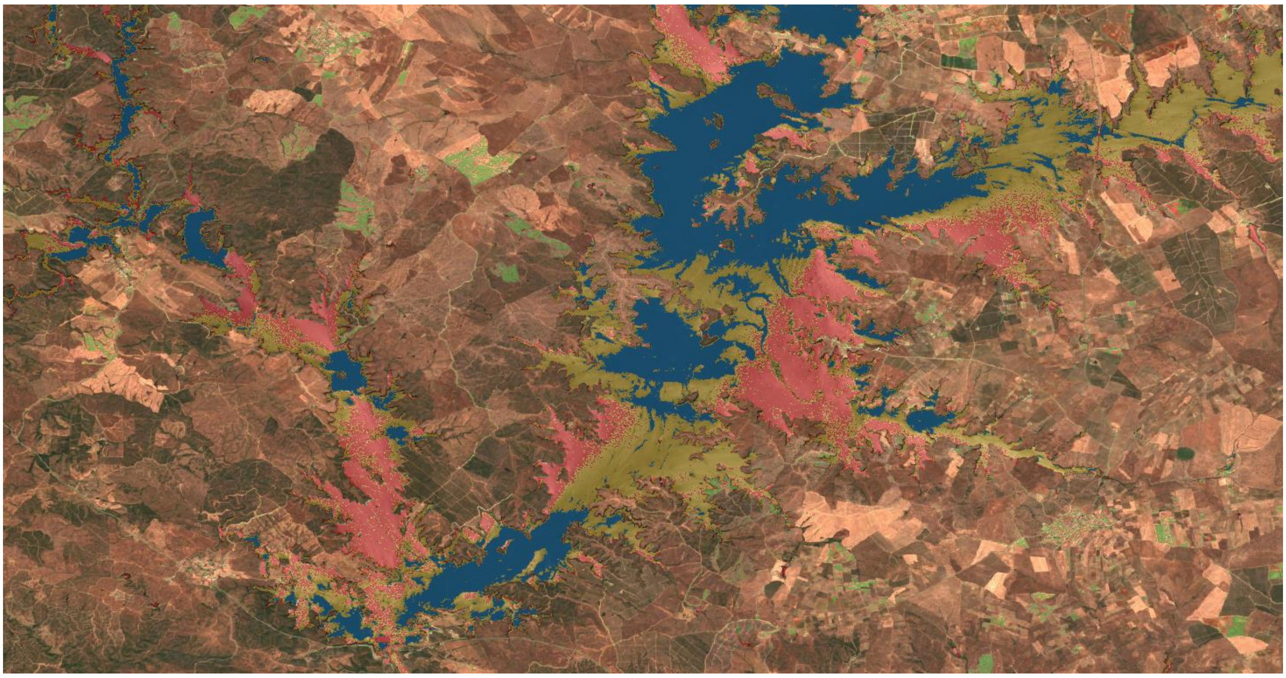


Figure 7 - Surface Water Analysis of Alqueva Reservoir – June 2, 2024

## 3.5 User Interaction and Experience

AquaFarm prioritizes user accessibility through interactive dashboards, intuitive mapping tools, and automated reports. Users can visualize key variables such as crop health, water stress levels, and reservoir storage trends in real-time. The platform supports custom queries, time-series comparisons, and geospatial overlays, making it easy for farmers, water managers, and researchers to interpret and apply the data in their workflows. Feedback collected during the pilot phase emphasized the need for simplified data visualization, seamless integration with existing water governance systems, and multilingual support to enhance usability across diverse user groups.

The AquaFarm login portal (Figure 8), enables users to access the platform through external authentication providers, including Google, Microsoft, and LinkedIn. This authentication system ensures secure and seamless access to AquaFarm's dashboards and analytical tools, for water managers, agricultural stakeholders, and regulatory authorities.

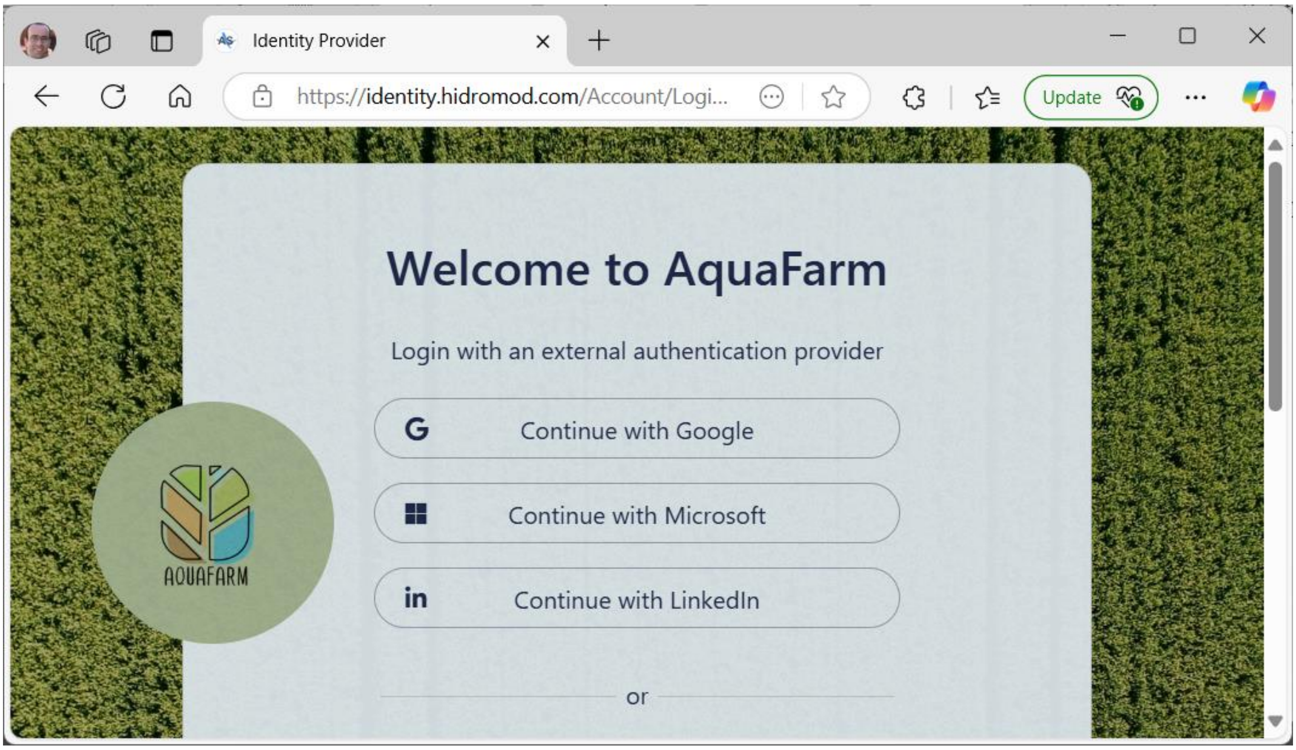



Figure 8 - AquaFarm User Authentication Interface

## 3.6 Technical and Operational Aspects

AquaFarm is designed to scale efficiently across different regions and operational environments, leveraging cloud computing, AI-driven analytics, and remote sensing technologies (Figure 9). The platform ensures data reliability through continuous validation efforts, comparing EO-derived metrics with in-situ field observations and historical benchmarks. To maintain accuracy in predictions, AquaFarm incorporates machine learning models that refine crop classification and hydrological forecasts based on seasonal variations. The API-based structure facilitates integration with third-party platforms, while automated processing pipelines ensure near-real-time data availability for critical decision-making.

Figure 9 – AI-driven analytics, and remote sensing applied to cotton detection in Australia

## 3.7 Validation and Early Adoption

The validation of AquaFarm's services was conducted through pilot implementations in EDIA (Portugal), Digifarm (Romenia), and DPE (Australia), where the system was tested for crop detection accuracy, reservoir monitoring efficiency, and irrigation anomaly identification. The NDVI-based crop classification models achieved an 83% accuracy rate in vineyard detection, while water balance simulations successfully identified irrigation misuses and reservoir inflows. Early adopters, including EDIA and national water authorities, have expressed interest in expanding the system's deployment, citing its ability to streamline agricultural planning, optimize water resources, and support regulatory compliance.

# 4 PREPARATION, EXECUTION AND OUTCOMES OF THE PILOT STAGE

## 4.1 Pilot Preparation and Planning

The preparation phase of the AquaFarm 2.0 pilot involved defining key objectives, selecting test locations, and engaging stakeholders. The primary focus was to integrate and validate satellite-based Earth Observation (EO) data, artificial intelligence-driven models, and numerical simulations to enhance agricultural monitoring and water resource management. Key pilot sites included EDIA (Portugal), DPE (Australia), and Digifarm, each bringing specific use cases such as crop detection, water balance modeling, and irrigation anomaly identification. Extensive data collection efforts were made, including NDVI datasets, precipitation time series, and hydrological records, ensuring a robust foundation for testing the developed tools. Stakeholders from government agencies, agricultural technology firms, and research institutions were engaged to tailor the platform to real-world operational needs.

## 4.2 Execution of the Pilot Stage

The pilot implementation phase involved deploying **AquaFarm dashboards and analytical tools** across the selected pilot sites. These tools were integrated with **real-time and historical EO datasets**, allowing users to monitor crop conditions, reservoir water area (Figure 10), and water balance fluctuations. **CropAquaFarm and HydroAquaFarm** were tested for NDVI-based crop monitoring and water balance estimations, respectively, while **DamMonitoring** provided automated analysis of water storage conditions. The system was successfully linked to existing data platforms such as Digifarm for crop classification and EDIA's water distribution network for irrigation assessments. Challenges encountered included uncertainties in ungauged river sections, the need for higher-resolution EO data, and optimizing computational efficiency for large-scale processing, which were progressively addressed through iterative refinements.

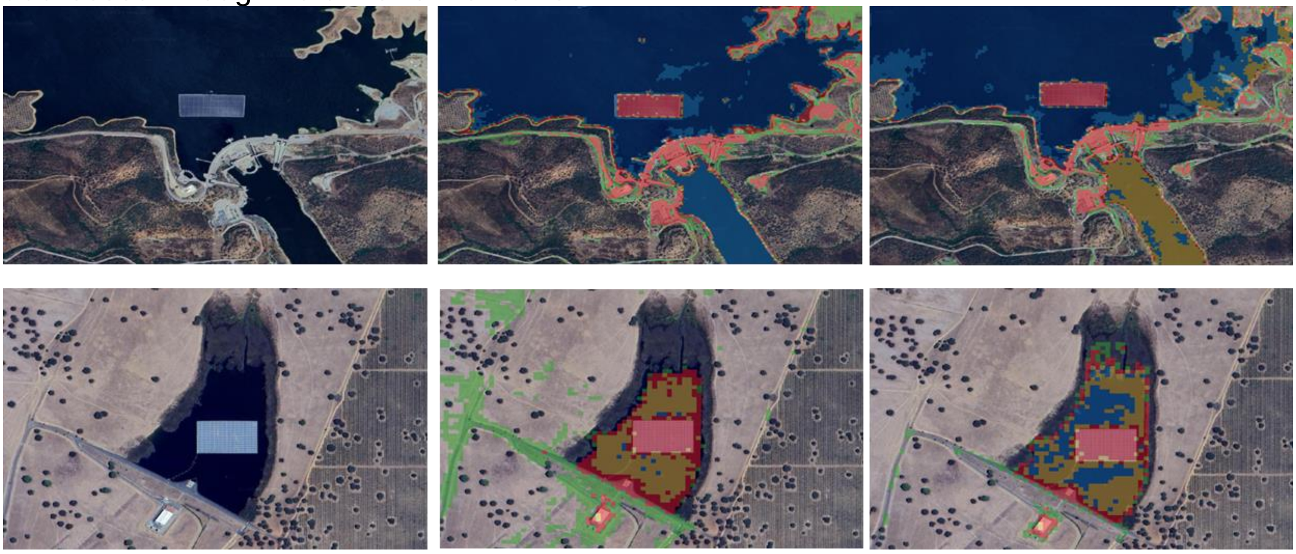


Figure 10 – EO based surface water analysis in Portugal

## 4.3 User Engagement and System Validation

A significant aspect of the pilot was direct engagement with end-customers, including, water managers, water authorities, agricultural authorities, and service providers, who provided feedback on system usability and accuracy. Training sessions were held to familiarize stakeholders with AquaFarm's dashboards and predictive modeling tools, ensuring they could leverage real-time analytics for decision-making. The validation phase focused on assessing the accuracy of crop detection models and water balance simulations. Additionally, the system was tested for anomaly detection, identifying unexpected events that were used by customers to enhance regulatory compliance, optimize irrigation planning, and detect potential unauthorized water usage. The anomaly detection capabilities allowed water managers to identify deviations in expected water consumption patterns, triggering alerts for further investigation. Additionally, the platform's predictive analytics helped agricultural authorities anticipate drought impacts and adjust water distribution strategies proactively. Feedback from end-users highlighted the value of AquaFarm's user-friendly dashboards and automated reporting tools, which facilitated data-driven decision-making and improved resource efficiency. The insights gained from the pilot stage contributed to further refinements in model calibration, enhancing the system's overall accuracy and operational effectiveness for large-scale deployment.

## 4.4 Data Analysis and Key Performance Indicators (KPIs)

AquaFarm's evaluation focused on three key areas: crop classification accuracy, water balance simulations, and anomaly detection, leveraging a combination of remote sensing data, field observations, and user feedback. The HydroAquaFarm model was rigorously validated at both parcel and watershed scales, with river gauge station comparisons confirming its high accuracy. Key hydrological validation metrics included an $R^2$ of up to 0.94, a Nash-Sutcliffe Efficiency (NSE) of 0.93, and a percent bias (PBIAS) as low as -8.2%, demonstrating the model's robustness in simulating real-world water balance dynamics.

The CropAquaFarm module was assessed for its crop classification accuracy, using a random forest method applied to extensive training datasets. The validation results demonstrated F1-scores exceeding 90% for key crop classes, confirming the reliability of AquaFarm in large-scale agricultural monitoring. User feedback further reinforced the platform's ability to detect misreported crop declarations, irrigation inefficiencies, and unexpected land-use changes, making it a valuable tool for regulators and water managers.

Key operational insights from users included detections of crop anomalies, excessive water use, water scarcity, and polygon inconsistencies, which contributed to refining agricultural planning and improving regulatory compliance. Moving forward, the focus will be on refining irrigation mapping, enhancing precipitation data integration, expanding training datasets for crop classification, and strengthening real-time reservoir monitoring dashboards. The success of AquaFarm's analytics and anomaly detection capabilities continues to enhance sustainable water management and optimize agricultural practices across diverse regions.

## 4.5 Key Findings and Lessons Learned

The pilot stage demonstrated AquaFarm's capacity to integrate diverse datasets into an operational decision-support system for water and agricultural management. Key takeaways included the need for continuous data validation, improvements in crop detection algorithms, and refinement of predictive models for water balance estimations. The engagement with EDIA and Digifarm highlighted the importance of user-friendly dashboards and automated reporting tools to streamline adoption among non-technical users. Additionally, collaborations with water regulatory authorities reinforced the potential for policy-driven implementations, such as monitoring unauthorized water usage and enhancing regional water governance. Moving forward, further optimizations in data processing pipelines and model calibration will be pursued to improve scalability and operational efficiency across broader geographic regions.

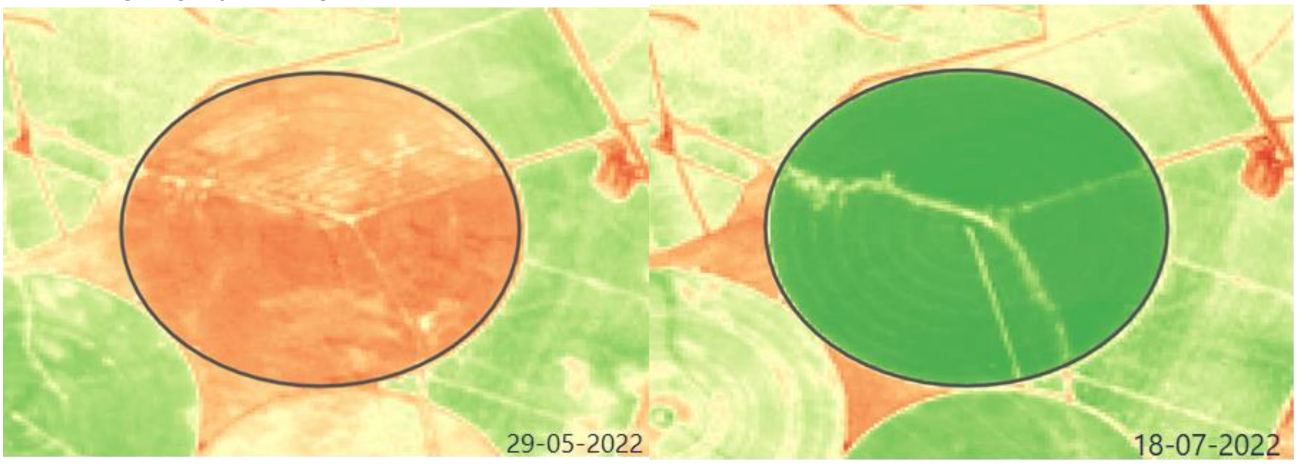



Figure 11 – Corn Field in Portugal

# 5 PRELIMINARY STRATEGY FOR THE COMMERCIAL ROLL-OUT

## 5.1 Market Positioning and Value Proposition

AquaFarm 2.0 is positioned as an exclusive, high-value software solution designed primarily for water resource managers, regulatory agencies, and environmental monitoring authorities. The platform focuses on water availability assessment, forecasting, digital twin development, and anomaly detection related to crop water use and hydrological conditions at the parcel scale. By integrating Earth Observation (EO) data, AI-driven analytics, and advanced hydrological modeling, AquaFarm provides a comprehensive decision-support system that enables real-time water balance assessments, early warning for water anomalies, and predictive analytics for water allocation. Unlike traditional monitoring approaches, AquaFarm delivers a parcel-level Web GIS interface with user-specific logins, allowing water managers to track water demand, detect unauthorized water use, and optimize regional water distribution. A key advantage of the platform is its ability to create digital twins for water resources using HydroAquaFarm for hydrological modeling and CropAquaFarm for agricultural water demand forecasting, providing an integrated solution for sustainable water governance.


## 5.2 Target Customers and Business Segments

The commercial focus of AquaFarm extends to water management authorities, agribusinesses, regulatory bodies, and research institutions. Key customers already engaged include IFAP (Portugal), EDIA, and the NSW Department of Planning and Environment (Australia), where the system is being actively used for crop monitoring, water balance forecasting, and compliance verification. The IFAP contract will continue with added value services, ensuring expanded functionalities for monitoring agricultural activities. AquaFarm's commercialization will target regions with high agricultural water demand and strong regulatory frameworks, such as Europe, Australia, South America, and North Africa, positioning itself as a mission-critical tool for water and agricultural governance.

## 5.3 Business Model and Revenue Streams

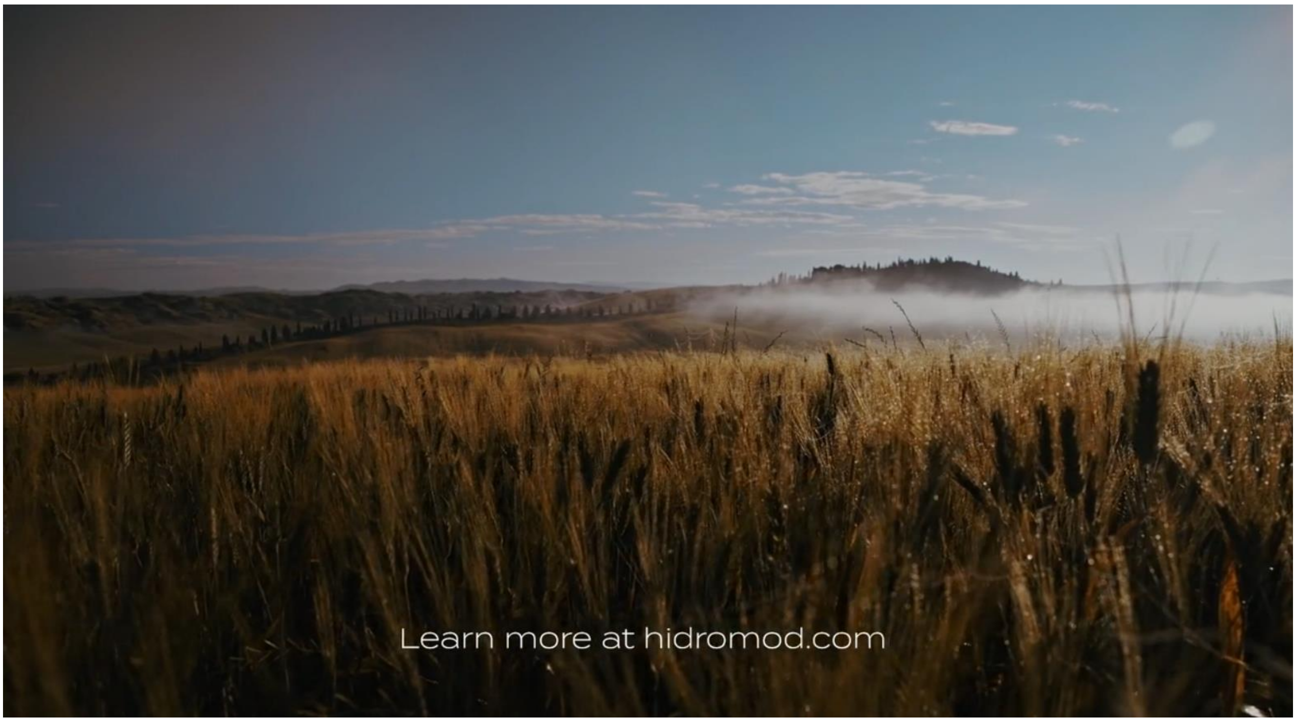
AquaFarm’s business model is centered around selling the software as an exclusive service, with subscription-based licensing, enterprise solutions for large-scale users, and additional revenue from consulting and custom integrations. AquaSafe and AquaFarm modules are proprietary solutions exclusively distributed by HIDROMOD, ensuring a competitive advantage in software-based water and agricultural management solutions. The platform will offer standard and premium subscription tiers, with options for API access, white-label customization, and on-demand analytical reports tailored to government agencies and agritech firms.

## 5.4 Commercialization Roadmap and Scaling Strategy

The commercialization strategy follows a phased approach, beginning with transitioning pilot projects into commercial contracts. The IFAP contract renewal and expansion will serve as a foundation for broader adoption among European regulatory agencies. Key expansion areas include Latin America and Africa, where water security and precision agriculture are becoming critical investment areas. AquaFarm’s digital twin technology for water management will be a significant driver for scalability, providing governments and private stakeholders with a predictive analytics platform for climate resilience and water efficiency.

## 5.5 Sales and Marketing Approach

The AquaFarm commercialization strategy will leverage industry partnerships, direct stakeholder engagement, and global EO data collaborations to enhance visibility and adoption. The professional Web GIS interface, which efficiently visualizes results at the parcel scale, will be a major selling point, appealing to both technical users and decision-makers. The platform will be showcased at international agritech and environmental conferences, to demonstrate its capabilities in real-time irrigation monitoring and regulatory compliance tracking.




## 5.6 Early Sales and Customer Adoption

AquaFarm's early sales strategy is driven by its success in existing pilot implementations, including EDIA, Digifarm, and the NSW Department of Planning and Environment. The continuation and expansion of the IFAP contract further validates its market demand. Feedback from early adopters highlights strong demand for automated anomaly detection in crop classification, and dynamic water balance reporting, reinforcing the need for scalable, cloud-based digital twin technology in water and agricultural management (Figure 12). Moving forward, the focus will be on improving user onboarding, refining predictive analytics, and strengthening interoperability with existing hydrological and agricultural databases to drive long-term customer engagement.

Figure 12 – Small size corn parcels in Romania

# 6 CONCLUSIONS

The AquaFarm project successfully met its initial objectives by developing a scalable, data-driven platform that integrates Earth Observation (EO) data, artificial intelligence (AI), and hydrological modeling for water resource management and crop monitoring. Originally conceptualized as a feasibility study funded by the European Space Agency (ESA), AquaFarm evolved into a comprehensive decision-support system through pilot implementations in Portugal, Australia, and Romania. The platform's core components, HydroAquaFarm and CropAquaFarm, demonstrated strong capabilities in water balance forecasting, anomaly detection, and predictive crop monitoring, enabling stakeholders such as EDIA, IFAP, and DPE to optimize water distribution and enhance agricultural productivity. The successful integration of digital twin models, real-time analytics, and interactive dashboards positioned AquaFarm as a powerful tool for regulatory compliance and sustainable water governance.

AquaFarm achieved several key milestones, including contracts with major agricultural and water management organizations. The validation of its crop classification models, using a random forest method, demonstrated high accuracy, with F1-scores exceeding 90% for key crop classes, confirming the Aquafarm reliability in large-scale agricultural monitoring. Furthermore, the HydroAquaFarm model's validation against river flow measurements showed strong performance, with $R^2$ values up to 0.94, Nash-Sutcliffe Efficiency (NSE) reaching 0.93, and percent bias (PBIAS) as low as -8.2%, demonstrating the model's capability to accurately simulate water balance dynamics at both the parcel and watershed scales. The platform proved instrumental in detecting irrigation inefficiencies, unauthorized water use, and crop anomalies, reinforcing its practical value for both governmental and private-sector stakeholders. Lessons from pilot deployments emphasized the need for user-friendly interfaces, continuous data validation, and seamless integration with national water databases, leading to iterative refinement and enhanced model precision. These achievements paved the way for expanding commercial partnerships, particularly with Digifarm and Water Technology, further strengthening AquaFarm's relevance in the global market.
The acquisition of Hidromod by ABL in October 2025 presents a major opportunity for AquaFarm's global expansion, leveraging ABL's extensive international presence with offices in over 30 countries. As highlighted in ABL's official press release, *"This software powers other Hidromod services including AquaFarm – a set of innovative solutions to enhance water and agricultural management"* (ABL Group, 2024). This acquisition positions AquaFarm for broader market penetration, enabling its innovative water and agricultural management solutions to reach new regions and industries worldwide, reinforcing its role as a leading tool for sustainable resource management. ABL Group operates in 43 countries across North America, Europe, Asia, Oceania, the Middle East, and Africa, covering major economic hubs such as the United States, China, Germany, and Japan, which collectively represent a significant portion of the global GDP. With offices in highly populated nations like India, Indonesia, and Nigeria, ABL's expansive reach enables it to serve a diverse client

base, leveraging local expertise and global capabilities to drive innovation in water management, energy, and infrastructure solutions.
With the foundation set, the next steps focus on scaling commercial adoption, improving predictive analytics, and expanding into new markets, including Latin America, Africa, and additional European regions. The continued collaboration with key stakeholders and regulatory bodies will drive further enhancements in irrigation monitoring, real-time reservoir management, and sustainable agricultural practices. The commercialization roadmap includes subscription-based licensing, API integrations, and premium analytical services, ensuring long-term financial sustainability and broader market penetration. More information about AquaFarm's capabilities, services, and commercial offerings can be accessed through Hidromod's official platform (Figure 13). There potential users and partners can explore its functionalities and request customized solutions.

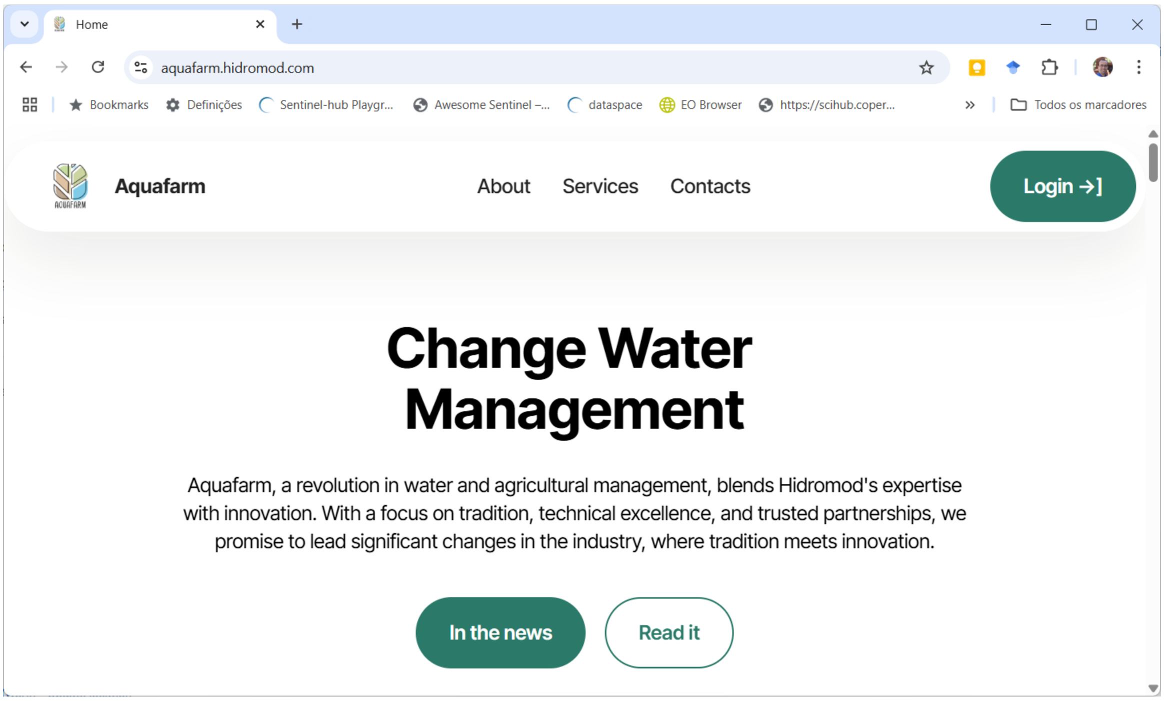


Figure 13 – Aquafarm webpage (https://aquafarm.hidromod.com/)

AQUAFARM

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