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# INNOVATIVE SERVICE FOR WATER GOVERNANCE AND CLIMATE RESILIENCE

**Adrien Pain, Gael Nicolas, Benjamin Tardy, Jérôme Maxant, Emeric Lavergne, Bastien Richard**
CS Group | ICube-SERTIT | CNES | Agence de l'eau Adour-Garonne | France




**Natural landscape of Ganguise Lake around Toulouse city in France.** Credit: Gael Fontaine (Getty Images)

CS GROUP and SERTIT provide a digital platform tracking water surface and volume variations since 2017, with a guaranteed weekly data delivery on 5,000 artificial and natural lakes in France, with improved accuracy.

# THE CHALLENGE

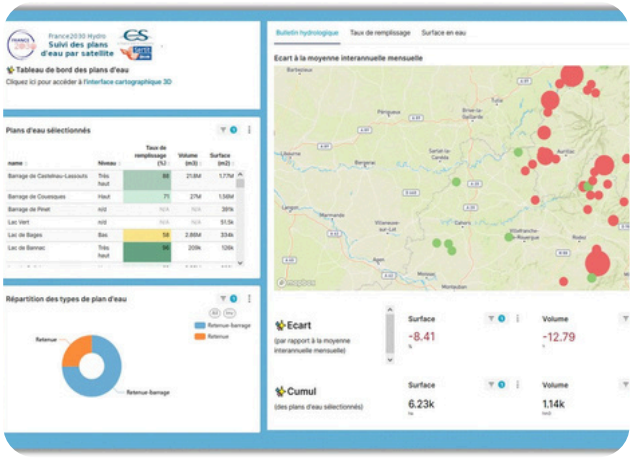
In 2022, 35% of France soil experienced drought conditions. The drought lasted for 10 months and was likely the most severe in half a century, combining a lack of rainfall with record temperatures.
Hindsight on this water crisis outlined that efforts had to be accelerated towards improving anticipation and multi-year management of drought episodes, monitoring impacts in real-time and reducing them, and objectively addressing water-sharing issues to prevent conflicts over its use.
In this context, CS GROUP and SERTIT have been selected to design "Innovative products and services for public water policies dedicated to quantitative water management" jointly supported by the French Ministry of Ecological Transition (MTE) and the French Space Agency (CNES) and financed by the French government through the France2030 programme .
This project aims to enhance water quantity management capabilities through advanced satellite-based monitoring over artificial and natural lakes larger than 1ha.

# THE SPACE SOLUTIONS

The consortium employs Sentinel-1 (radar) and Sentinel-2 (optical) high resolution imagery to estimate water reservoir surface and volume using machine learning and statistical models. The methodology integrates CNES's Surfwater and Dem4water processing chains, ensuring the development of value-added products.

Large-scale data processing is supported by an optimized Cloud architecture, aligning our activities with sustainable development goals through reduced resource consumption. Key outputs include time series for water surface area, volume, and fill rate, as well as occurrences of high and low water levels, tidal and dam drawdown, since 2017. Emphasis is placed on qualitative assessment and uncertainty estimation, calculated for observations.

These space-based solutions are crucial for providing timely and accurate information, essential for effective water resource management and addressing water crises (droughts, water overflows...). These solutions are are the most relevant approach to monitor all 5,000 critical water bodies on such a scattered geography that includes France's mainland and overseas territories (Mayotte, La Réunion, Martinique, Guadeloupe).




**IInteractive Dashboard** for Multiscale Data Analysis showcasing automated hydrological bulleting over key water bodies in Aveyron area, subject to water scarcity in summer 2025 (Screenshot)

**THEMATIC AREA**
Climate, Water and Energy

**REGION OF APPLICATION**
Occitanie region

**SENTINEL MISSION USED**
S1, S2

**COPERNICUS SERVICE USED**
-

# THE BENEFITS AND THE BENEFICIARIES

Water management entities, including government agencies supervised by the French Ministry of the Ecological Transition and the Ministry of Agriculture, can now benefit from improved water resource management indicators through accurate and timely delivery of water surface and volume estimations.

The solution culminates in the development of an operational online decision-support service, offering geospatial visualisation and customizable dashboards. These tools enable officials to explore data at various spatial and temporal scales and integrate external datasets for comprehensive analysis.

The project integrates user feedback from officials from public agencies, tasked with enforcing environmental policies. This approach ensures that solutions developed are user-centric and properly address concrete challenges arising from water management.

Updated in near-real-time (weekly data update for each water body) the service supports both rapid decision-making during water crises such as droughts or floods and long-term public policy planning.

In drought times, enhanced water governance (through finer informed decisions) is key to mitigate abrupt water disruptions for all water end users including the industry, agriculture, river transport sectors and the citizens.

Concretely, in summer 2025, weekly hydrological bulletins were generated through the solution to help 10 local authorities (5 DREAL and 5 DDT in Lot, Cantal, Vendée, Aveyron and Loire-Atlantique) to actively track water stocks on their perimeter. This lead to adapted restrictions over water usage such as garden watering, carwash, etc.

| | TIER 1<br>SERVICE PROVIDER | TIER 2<br>PRIMARY USER | TIER 3<br>SECONDARY USER | TIER 4<br>END USER BENEFICIARIES |
|---|---|---|---|---|
| SERVICES AND BENEFITS | Sentinel-1<br>Sentinel-2 | On-line decision-support service, offering geospatial visualization and customizable tracking dashboards | Water syndicates and hydroelectric dams operators can subscribe to dashboards similar to those used by public agencies | Better water usage governance across all water users in drought conditions. Urban areas saved from floods thanks to retention basins |
| BENEFICIARIES | CS GROUP and SERTIT | DREAL, DDTM, DRAAF, DDT, VNF, Agences de l'eau, IGN, OFB, Chambres d'Agriculture | Water managing companies, water syndicates, Hydroelectric dams operators | The application will benefit the general public, farmers, fluvial transport, industry players |

**EU POLICY / DIRECTIVE**

EU Water Framework Directive

**TYPE OF SERVICE PROVIDER**

Commercial Service

**TYPE OF FUNDING SOURCE**

National or regional non Space Programme

**USAGE MATURITY LEVEL**

5



## A FUTURE WITH COPERNICUS

While multi-mission Sentinel data play a crucial role in the project's success, challenges remain in analyzing small and numerous water bodies or those lacking bathymetric data for volume calculations. Future integration of Sentinel-3 data will help address these limitations by enabling direct measurements of surface and volume variations through altimetry. These advancements align with practical and strategic applications, further reinforcing the capacity of satellite products in supporting hazard forecasting and mitigation, thus enhancing users' decision-making.



## DID YOU KNOW?

CS GROUP and SERTIT water surface and volume monitoring solution aims to facilitate water resources management more effectively in relation to anthropogenic activities with regards to water crises (droughts and floods). Official users can track water volume variations of one or several water bodies simultaneously, allowing a better understanding of watershed hydrological mechanisms.

### Acknowledgements

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### Contacts

**Adrien Pain |** adrien.pain@cs-soprasteria.com
**Gael Nicolas |** gael.nicolas@cs-soprasteria.com
**Benjamin Tardy |** benjamin.tardy@cs-soprasteria.com
**Jérôme Maxant |** maxant@unistra.fr
**Emeric Lavergne |** emeric.lavergne@cnes.fr
**Bastien Richard |** bastien.richard@eau-adour-garonne.fr

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