WATER RESOURCES MANAGEMENT IN SPAIN

What it is about

Despite the efforts conducted by Catalan authorities to manage water resources sustainably, the region regularly faces severe water shortages. The most recent crisis, one of the worst in decades, has caused significant societal and economic damages, increasing anxiety, social tensions, and economic losses, especially in agriculture.

To address future water shortages, innovative solutions using Sentinel data are now being implemented by the Catalan Water Agency (ACA) together with the Cartographic and Geological Institute of Catalonia (ICGC). This technology can detect ground subsidence caused by aquifer exploitation, providing insights into groundwater extraction levels and aiding in sustainable, fair, and efficient water management. Ultimately, such initiative helps ensuring economic viability and social cohesion of many communities and industries across the region.

What we found

- Catalonia relies heavily on groundwater (44% of water consumption in Catalan River Basin) while water stresses are worsened by overtourism, illegal groundwater extraction, agricultural activities and climate change. In 2024, it forced Catalan authorities to impose drastic emergency cuts on water for industries, citizens and farmers causing important damages and conflicts.
- Sentinel-1's SAR technology provides information on groundwater extraction levels by detecting ground deformation at millimetres precision. It helps detect illegal wells, redefine concession rights, and maintain aquifer levels above critical points to prevent saltwater intrusion and compaction, thus preserving long-term water capacity and quality.
- At the end of the value chain, citizens, industry and farmers benefit from a more sustainable and equitable water supply.

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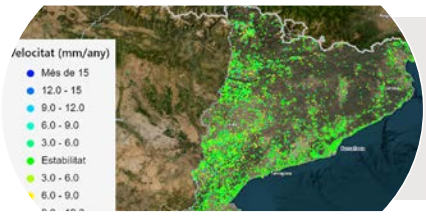
The Satellite Data

Copernicus Sentinel-1 provides free-of-charge, frequent, all-weather, day-and-night C-band radar images over Catalonia approximately every 6 days.



The Service Provider

The ICGC leverages Copernicus Sentinel-1 data to offer satellite-based services for ground deformation monitoring in Catalonia.

The Primary User

The ACA utilizes ICGC's services on ground deformation to improve aquifer monitoring and efficiently manage groundwater resources across Catalonia. This includes optimizing wells concession rights, detection of illegal extraction and mitigating issues such as aquifer salinization and subsidence.

Catalonia: €25K - €75K pa; Spain: €155K - €465K pa

Secondary Beneficiaries

Municipalities and water utilities benefit from such services by mitigating damage from subsidence due to excessive groundwater extraction while improving their own management of water resources.

Society & Citizens' Benefits

Local communities benefit from sustainable water management practices and improved water allocation. It leads to reduced inequalities and water stresses, especially during drought periods. The agricultural sector particularly benefits from better crop yields.

Catalonia: €1,75m - €3,50m pa; Spain: €10,85m - €21,70m pa

Total benefits

Economic | Environmental | Innovation | Regulatory | Science & Tech | Societal

Anticipated benefits: €1,78m - €3,58m pa in Catalonia, extrapolation of €11m - €22,17m across Spain

About the project

Through a series of case studies, EARSC aims to gather quantitative evidence that the usage of Copernicus Sentinel data provides an effective and convenient support to various market applications. These studies are undertaken in the frame of the project "Showcasing the benefits brought by the usage of Sentinels data to society, environment and economy: a bottom-up assessment based on traceable impacts along selected value chains", under an assignment from the European Space Agency (ESA) funded by the European Union as part of the Copernicus Programme.

Download the full report from the project website

http://earsc.org/sebs