The CSIC analyses groundwater affected by the DANA in Valencia

- **A team composed of staff from IDAEA, IGME, CIDE, and the Experimental Station of Zaidín analyses samples from wells, springs, canals, and reservoirs.**

- **The results will help determine whether groundwater has been affected by contaminants and guide the design of future measures to protect aquifers from these climate events.**

Researchers from IDAEA-CSIC collect wàter samples from irrigation canals in the area affected by the DANA. / Alejandro Muñoz – IDAEA-CSIC | CSIC-FBBVA Scientific Communication Grant 2023

Madrid / Barcelona, February, 7th 2025. A team composed of staff from the **Institute of Environmental Assessment and Water Research** (IDAEA-CSIC), the **Spanish Geological and Mining Institute** (IGME-CSIC), the **Experimental Station of Zaidín** (EEZ-CSIC), and the **Desertification Research Centre** (CIDE, CSIC-UV-GVA) has begun analysing groundwater in the area affected by the **DANA in Valencia**.

The severe flooding last October caused damage or destruction to urban buildings and industrial facilities that housed various components and hazardous substances, including electronic devices, vehicles, hydrocarbons, oils, pesticides, and endocrine disruptors derived from pharmaceuticals. These substances may have been carried by the water and infiltrated into the aquifers. A preliminary assessment suggests that **groundwater may have been affected** both in its **hydrodynamics** and **quality**.

“The goal is to determine what types of contaminants may have entered. We don’t know yet, but they could range from car battery acid and industrial pollutants to pharmaceutical compounds. That’s why we collect different types of samples, to analyse a wide spectrum of contaminants in groundwater,” explains **Estanislao Pujades**, a researcher at IDAEA-CSIC.

The CSIC team has collected more than twenty water samples from wells, springs, and canals in the area most severely affected by the DANA, as well as in the vicinity of the Albufera Natural Park. The analyses include the detection of pesticides, PFAS, flame retardants, pharmaceuticals, metals, volatile compounds, and personal care products.

"With these analyses, we aim to establish a baseline to track changes in the concentrations of these contaminants over time in the Albufera Natural Park," explains **Julián Campo**, a researcher at the Desertification Research Centre (CIDE, CSIC-UV-GVA).

Given the scale of the disaster and the large volume of sludge and waste, the CSIC project will also assess the impact of the sites chosen for their accumulation and processing on groundwater quality. In this final phase, analysing the actual impact will help design recommendations and action protocols to minimise the effects on groundwater resources, so they can be incorporated into future flood and inundation response strategies.

This is the project's first sampling campaign, which is planned to be repeated every two months. The work has been coordinated with the CSIC's Disaster and Emergency Advisory Group (GADE, for its acronym in Spanish).

CSIC response to the DANA in Valencia

The Spanish National Research Council (CSIC, for its acronym in Spanish), an agency under the Ministry of Science, Innovation, and Universities, activated its Disaster and Emergency Advisory Group (GADE) on 30 October to provide scientific and technical support in the response and reconstruction efforts following the DANA that affected Valencia on 29 October. This was carried out through the creation of expert groups focused on different aspects of the emergency caused by the flooding.

Since then, the CSIC has mobilised more than 150 people from around 30 research centres and institutes (out of the 124 that make up the institution), organised into 15 specialised groups covering areas such as flooding, ground movements, water, health risks, social risks, waste management, marine impact, infrastructure, geographic information systems, remote sensing, hydrogeology, and pollution, among others.

The work carried out by CSIC researchers and technical staff includes both strict scientific advisory tasks (recommendations, analyses) and operational fieldwork. All these activities have been funded with the institution’s own resources.

Among the actions taken, a few days after the emergency began, the CSIC deployed the research vessel Ramón Margalef from the Spanish Institute of Oceanography (IEO-CSIC) to the affected area. The vessel is equipped with the Liropus 2000 underwater ROV, featuring articulated arms and high-resolution cameras, as well as multibeam echo sounders, reflectivity systems, and high-resolution acoustic cameras for the study of the seabed near the mouths of the Turia and Júcar rivers. In early January, the vessel Francisco de Paula Navarro (IEO-CSIC) launched the CON-DANA24 oceanographic campaign to assess sediment contamination caused by the extraordinary influx of terrestrial materials due to the DANA.

Additionally, a fleet of drones and sensors from the Field Operational Unit (OPECAM) at the Institute of Marine Sciences of Andalusia (ICMAN-CSIC) was deployed. This unit includes an aerial operations service (SEADRON) with expertise in natural disaster

response. As a result of this work, an innovative image viewer has been developed, providing precise visualisation of the flood's impact from the town of Torrent to the surroundings of Albufera. The viewer is available at%20https:/www.icman.csic.es/gade/ and is open to the public, experts, and authorities.

The ICMAN-CSIC team also collaborated with researchers from the Eduardo Torroja Institute for Construction Science (IETcc-CSIC) to advise the Military Emergency Unit (UME) of the Ministry of Defence on potential damage to buildings and infrastructure in the affected areas. Additionally, the IETcc-CSIC Mobile Laboratory was deployed to collect samples from concrete and masonry structures, using non-destructive testing equipment to assess key properties of the materials.

In addition to these efforts, the CSIC has provided guidance on identifying suitable locations for sludge storage areas based on the best geological conditions. It is also conducting physicochemical and pathogen analyses of sludge and dust samples from dried mud. Furthermore, the institution has deployed a mobile air quality unit to support the response.

The CSIC successfully tested thickening materials in flooded garages in Massanassa and Sedaví. The National Centre for Metallurgical Research (CENIM) and the Eduardo Torroja Institute for Construction Science (IETcc) conducted trials using absorbent polymers mixed with modified clay to facilitate sludge removal. These thickening compounds, which absorb large amounts of water, increased the sludge's viscosity, enabling its mechanical extraction and preventing its discharge into rivers and ravines.

In addition to these initiatives, on 9 November, the CSIC joined the Integrated Operational Coordination Centre (CECOPI), the command centre managing the emergency response to the DANA in the Valencian Community. This measure aims to coordinate the scientific and technical advisory work that CSIC specialists are already providing in various areas and to offer support for any new needs that may arise.

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