

What is the GOTHAM project?

GOTHAM stands for "Governance tool for sustainable water resources allocation in the Mediterranean through stakeholder's collaboration". It aims at shifting the paradigm in groundwater management by engaging end-users. The project is led by Cetaqua and gathers six partners from the Mediterranean area including private companies (GAC Group, Ingegneria Informatica), a university (Universidad de Córdoba), an international NGO (Istituto per la Cooperazione Universitaria), and a public institution (The National Agricultural Research Center in Jordan). Together, they aim at co-creating a user-driven tool that enables effective governance for the preservation of the quantity and quality of groundwater in the Mediterranean basin. The project is funded by the European Commission under the PRIMA (Partnership for Research and Innovation in the Mediterranean Area) programme and started on the 1st of April 2020.

The Mediterranean basin has been identified as one of the world's basins being the most at risk due to climate and anthropogenic changes. The population growth of the Mediterranean basin as well as the always growing water demand (through the strong urban expansion, the development of tourism resorts, the increased irrigation of crops, etc.) and the unappropriated distribution of resources has led some Mediterranean rims (in particular the eastern and southern rims) to face water stress and/ or water scarcity.

To overcome this water stress, GOTHAM has decided to tackle the issues regarding the **current groundwater governance models**. In fact, a lot of knowledge is generated at each decision-making level but few exchanges between those levels are taking place. This lack of transparency is creating doubts, uncertainty and mistrust which consequently leads to conflicts.



NEWSLETTER

FEBRUARY 2021

Therefore, there is a need for a **tool capable of allowing data exchange** between the different stakeholders and water users and for **integrating this highly valuable information in groundwater governance decisionsmaking.**

The GOTHAM project aims at providing such a tool, the GTool. The GTool is an innovative groundwater governance tool that is going to be **co-designed by all water stakeholders** (regulators, end-water users, water producers and suppliers). It will allow for a **new groundwater management framework** based on users (bottom-up approach) instead of the current top-to-down model in which the regulator establishes the enforcing rules on a (almost) single basis. This is considered to be the only way to reach **a long-term sustainable management of aquifers** tackling their complexity in terms of uncertainty (regarding resources, reservoirs or internal geometry, etc.) and of surveillance and control by administrations.



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GOTHAM's use cases

To design the GTool, the GOTHAM team will use a co-creation process. Three pilot cases have been designated: Campo de Dalías in Spain, laat Baalbeck-Hermel in Lebanon and Azrag Basin in Jordan. Moreover, the tool will be implemented in these areas for enabling users' feedback. These three use cases have been chosen because of the different types of challenges they aim to overcome through the GOTHAM project:



Baalbeck-Hermel Lebanon



Campo De Dalias in Spain

Campo de Dalías is located at the southeast of the Iberian Peninsula, specifically in the southwest of the province of Almeria. It is located in the Hydrological Subsystem III-4, within the Hydrographic Demarcation of the Andalusian Mediterranean Basins (DHCMA). Known as the "Plastic Sea", this peninsula hosts intensive agriculture in Spain, under green houses. Intensive pumping of groundwater has led to changes in the behaviour of aquifers and to their deterioration and in the overall quality of water. Moreover, the excessive agriculture on this site has led to a heavy pollution of the water due to their use of salts, nitrates, fertilizers, and phytosanitary substances.



laat Baalbeck-Hermel in Lebanon

laat is a town and municipality located in the Begaa Valley of Lebanon in the North eastern part of the country with an area of about 42 km². Administratively Baalbeck-Hermel related to Governorate (Baalbeck district), which the capital Baalbeck city comprises an impressive archaeological site designated a UNESCO world heritage site in 1984. The excessive underground water pumping in this area has engendered a decline in the water table level. As a consequence, the springs dry out which results in disappearances of the natural sites. Moreover, there are issues related to pollution: leaks of polluted water in the southern water basin coming from wastewater treatment plants and an increased pollution ratio in underground water.



Azraq Basin-Zarqa in Jordan

The Azraq area includes eight districts: South Azraq; North Azraq; Omari; Ein Al Baida; Eastern Farms area; Um Al Mathayel; Degaileh; and the air force base. The total population of Azraq district is estimated at around 18,000 inhabitants. The Azrag Basin is located in the Northeastern part of the country with an area of 12,710 km². In this area, there is a mismanagement of the groundwater due to the lack of control of the government regarding water use and due to the illegal drilling of water by private users. This results in a deterioration of water quality and quantity.



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Our progress

In Campo de Dalías in Spain

In Spain, GOTHAM team supported the mapping of the local stakeholders. In addition, sensors were installed on the field, to start collecting the data for the GTooL At the end of November, the GOTHAM team have installed 4 multi-parameter sensors



(CTD-Diver) in four wells all around Campo de Dalías. In **a first well** we have installed a groundwater telemetry system, composed of one CTD-Diver, which is a sensor for extremely accurate measurement of level, temperature and electrical conductivity of water. Also, this sensor is connected to a

"VanWalt DataHub" which performs as a hub to collect data from the CTD-Diver telemetry. **A second well** was equipped the same monitoring system. It also received the accessory "Dataslave" to send the data by radiofrequency as the data logger is located far further away from the well.

The aim of installing all this equipment is to observe the quantity and quality variation of groundwater by monitoring the piezometric level and electrical conductivity of each sector of the deep aquifers of Campo de Dalías. All this information could provide us the enough knowledge about Groundwater response to rainfall recharge and Water quantity and quality dynamics. The data collected (timestamp between each measurement is 1h) will also feed the forecasting module.

In laat, Baalbeck-Hermel in Lebanon

The project team advanced on the Mapping of the stakeholders in this case study. A list of 25 stakeholders was prepared in collaboration with laat Municipality. This list includes 9 water producers, 9 end-users, 4 water suppliers, 1 regulator, 2 organisations.

The Interviews with stakeholders were started beginning of November and were finalised at the beginning of February. Questionnaires were translated into Arabic to ensure that all stakeholders would have their voice heard. Unfortunately,



the slowness in the implementation of these interviews was caused by COVID-19 pandemic, in addition to the lockdown of the country during the last two weeks of November. To date, 100% of the stakeholders' interviews were carried out, and therefore a previously prepared questionnaires were filled.

In Azraq Basin in Jordan

The project team has advanced on the stakeholder Mapping in the case study area. Indeed, 45 stakeholders have been interviewed including water producers, water suppliers, end-users, regulators and relevant organisations. Currently, agricultural and economic data for the Agro-Economic model are collected.

Stay tuned on the project website and social media accounts to have more information on the use cases' outcomes!

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