

Abstract

Drought may not be as visible as flooding but, as a natural hazard, it contributes to several risks that persist over long periods of time affecting social and economic development and causing profound environmental changes. This project addresses droughts as a current and an emerging challenge, from the hydrological, environmental and governance perspectives.

The concept of the project TREASURE is to minimize the effect of water scarcity under drought conditions by properly allocating groundwater and reclaimed water resources. Allocation will be determined by a sound hydrological knowledge of the system that will serve to test adaptation actions deriving from participated and inclusive governance activities. Artificial Intelligence (AI) models are proposed as promising tools to inform agents, stakeholders, and general citizenship on the actual state of the system and test the suitability of the proposed actions.

Our goal is to evaluate the potential of groundwater and reclaimed water sources as management alternatives to minimize drought impacts on both human water supply and environmental functions. It intends to fully incorporate both water sources into the water cycle while considering the hydrological idiosyncrasy of each basin, their drought record (past and future) and their overall water needs, whether human or environmental, managed through a well-documented governance project. In this sense, it proposes drought management based on data-driven models (AI) that value these alternative water sources and interrelate all the aquatic compartments: rivers, aquifers, wetlands, plus treated wastewater resources while reducing the effects of droughts and increasing water security.

As its relevance to the call, our project will deliver knowledge, models, and social involvement to efficiently face the challenge of managing water resources under drought or water scarcity scenarios. Adaptation actions will emphasize the potential of groundwater and reclaimed water to achieve a sustainable development (Topic 1). Also relevant, governance will be explored as a means to enhance the society capability to fulfil its water demand in the context of future drought events (Topic 3), yet the final decision-making capacity must rely on a sound knowledge on the overall water cycle. Data-driven models, developed by AI, contribute to this understanding, and they will be fostered as a computing technology and a digital solution to support decision-making processes (Topic 2). The novelty of this proposal lies then in the recognition of the critical role that groundwater and reclaimed water can play on mitigating the effects of droughts, and in the use of AI methods to solve the puzzle of water management under water scarcity conditions.

Transnationality among partners from Spain, Italy, Portugal and Brazil includes diverse hydrological and socio-economic idiosyncrasies under similar hydro-climatic event threats. This is taken as an opportunity to compare data and experiences, and to test the expertise of each partner to contribute to the management of water resources and its adaptation to the future critical scenarios.



► **Project coordinator:** **Josep MAS-PLA**
FUNDACIO INSTITUT CATALA DE RECERCA
DE L'AIGUA - SPAIN

► Project partners

- FUNDACAO UNIVERSIDADE DO ESTADO DE SANTA CATARINA - BRAZIL
- UNIVERSITAT DE GIRONA - SPAIN
- UNIVERSITÀ POLITECNICA DELLE MARCHE - ITALY

► Funding organisations

AEI (SPAIN) / FAPESC (BRAZIL) / MUR (ITALY)

► Duration

3 years

► Contact

Josep MAS-PLA
jmas@icra.cat



Water cycle,
Water management,
Artificial intelligence,
Environmental stressors

KEYWORDS