

## Abstract

EcoTwin is dedicated to strengthening the integration of ecosystem services within the realm of water resource management, with a specific emphasis on lake ecosystems. Lakes, as crucial components of our natural environment, contribute invaluable to society by offering a diverse array of ecosystem services, ranging from flood and drought regulation to recreation, habitat provision, and drinking water supply.

However, the escalating impacts of climate change pose an imminent and severe threat to the resilience of lake ecosystems, compelling the need for the adoption of advanced technology and methodologies to fortify our understanding, management, and long-term preservation efforts.

In response to this critical challenge, EcoTwin leverages the power of Digital Twins as a transformative tool. Digital Twins represent virtual replicas of physical systems, continuously updated in real-time, enabling sophisticated simulations and in-depth analysis. Their distinctive advantage lies in their capacity to amalgamate a wide array of data sources, including Earth Observation, in-situ observations, and various models, to generate precise simulations of aquatic ecosystems.

Digital Twins enable us to explore how lakes respond to changing environmental conditions, human influences, and management strategies. Beyond that, they promote enhanced communication and engagement with stakeholders by providing visualizations and scenarios that underpin informed decision-making.

EcoTwin is committed to harnessing the potential of Digital Twins to radically enhance the integration of Ecosystem Services in water resource management, with a primary focus on flood and drought regulation, habitat provisioning, recreation, water supply, and carbon and nutrient management.

The core objectives of this project encompass the co-design of an adaptable Digital Twin framework in collaboration with key stakeholders, the seamless integration of diverse data sources, the enabling of short-term forecasting, and the facilitation of long-term scenario assessments, all while enhancing public engagement. Moreover, by integrating an adaptable Ecosystem Service module within a Digital Twin framework, EcoTwin seeks to instigate a paradigm shift in the management of aquatic ecosystems, thereby securing the sustainability and resilience of lakes while optimizing the delivery of essential ecosystem services.

Our project aligns harmoniously with the overarching themes and topics delineated in the call, effectively addressing the multifaceted challenges and pressures that affect ecosystem services. Furthermore, it lends robust support to informed decision-making and adaptation in the face of global change.

EcoTwin demonstrates our firm dedication to addressing the specific requirements outlined in the Water4All Strategic Research and Innovation Agenda (SRIA), with a particular emphasis on enhancing ecosystem resilience, mitigating challenges, promoting adaptation, and facilitating the smooth integration of ecosystem services into water resource management.



### ▶ Project coordinator

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### ▶ Project partners

- UNIVERSITÀ DEGLI STUDI DI BRESCIA - ITALY
- DUBLIN CITY UNIVERSITY - IRELAND
- ALKAMAZOTT VÍZTUDOMÁNYI INTÉZET - HUNGARY
- UPPSALA UNIVERSITY - SWEDEN
- KONINKLIJKE NEDERLANDSE AKADEMIE VAN WETENSCHAPPEN - THE NETHERLANDS

### ▶ Funding organisations

EPSRC UKRI (UNITED KINGDOM) / MUR (ITALY) / EPA (IRELAND) / NKFIH (HUNGARY) / FORMAS (SWEDEN) / NWO (THE NETHERLANDS)

### ▶ Duration

3 years

### ▶ Contact

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## KEYWORDS

hydrology (water science)  
water management  
political systems and institutions  
governance  
water system modelling