

# RESONATE – Development of Professional Courses in Sustainable Water Management

## Summary

Climate change and extreme events have disrupted the natural water cycle, increasing in some regions the frequency and severity of the droughts and in others increasing the floods episodes. Protecting the water at the source and the ecosystems associated is of paramount importance and it is addressed in the European Union (EU) Water Framework Directive. On the other hand, the Floods Directive is focused on the prevention, protection, and preparedness of areas at risk of flooding. All challenges must be tackled comprehensively, as we need to feed cities and water supply without neglecting the water needs of ecosystems. The professional training of technicians, decision-makers, and agents who can make decisions that affect this resource is essential.

The aim of the RESONATE Project is to provide comprehensive engineering knowledge and develop professionals' scientific, communication and problem solving skills through a combination of hands-on courses, industry projects and theoretical background. The professional courses were developed in consultation with industry, to equip engineering professionals with advanced technical expertise, critical thinking and professional skills required to remain competitive in the global workforce and succeed in their future careers. The overall objective of RESONATE is education of engineering professionals in sustainable water management pursuant to national and EU policies and long-term contribution to the development and management of water resources on both local and global scales.

The project includes seven activities relating to intellectual outputs (Figure 1):

- O1: GAP analysis of competences of engineering professionals in sustainable water management.
- O2: benchmarking of educational programs; O3- analysis of European trends and policies in engineering and sustainability (regulations, standards, technology, innovation).
- O4: curriculum development of professional courses in sustainable water management.
- O5: development of an ICT learning platform (Figure 2).
- O6: development of learning materials and development of professional courses in sustainable water management.
- O7: engineering practicum with case studies (Figure 3).

Eleven topics were selected for courses in sustainable water management:

1. Water Framework Directive, River Basin Management Plan and the Program of Measures.
2. Sustainable water use and available water resource.
3. Standards and boundaries used in status assessment.
4. Identification and delineation of surface water and groundwater bodies.
5. GIS for water resources assessment and management.
6. Numerical modeling of water balance.
7. Statistical analysis: quantitative status, qualitative status and trends.
8. Flood risk assessment and management plans.
9. Recycling water.
10. SMART (digital) water management technologies in water resources planning, monitoring and management.
11. Water in the context of circular economy – multiple use and multiple users of water.



Figure 1. Intellectual outputs (O1, O2, O3, O4 and O7).

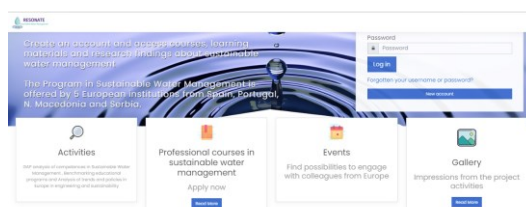


Figure 2. RESONATE learning platform ([Resonate Water Management Platform](https://iege.edu.mk/project/resonate/)).



## Project Reference

2019-1-MK01-KA202-060311

## Leading Institution

IECE – Institute for Research in Environment, Civil Engineering and Energy (Macedonia)

## Partners

CEIM – Civil Engineering Institute Macedonia (North Macedonia), UL – Universidade de Lisboa (Portugal), UNIR – International University of La Rioja (Spain), University of Belgrade (Serbia), National Agency for European Educational Programmes and Mobility

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## CERIS Research Team

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## Period

2019-2021

## Total

142 834.00€

## CERIS

25 612.00€

## Project Website

<https://iege.edu.mk/project/resonate/>



*Figure 3. Field trip at Pirot region, Serbia.*