



1 **Smart monitoring of constructed wetlands to improve**
2 **efficiency and water quality**

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14 **Abstract.** The Smart monitoring of constructed wetlands to improve efficiency
15 and water quality (SmarterCW) project aims to monitor biological wastewater
16 treatment processes by gathering continuous data from remote water and envi-
17 ronmental sensors. The acquired data can be processed and analysed through
18 data science tools to better understand the complex and coupled phenomena un-
19 derneath wastewater treatment, as well as, to monitor and optimize the system
20 performance. The results will improve the efficiency and control of nature-
21 based wastewater treatment technologies.

22 The methodology comprises the following tasks and activities: Implementation
23 of a set of electrochemical sensors in the input and output flow streams of pilot-
24 scale constructed wetlands; Acquisition of water quality parameters such as pH,
25 electrical conductivity, temperature, and ionic compounds; Acquisition of envi-
26 ronmental parameters, such as temperature and humidity; Application of data
27 analysis tools to design and optimize conceptual models to correlate pollutants
28 removal with operative parameters in green technologies for wastewater treat-
29 ment. This methodology was applied to a patent-protected pilot-scale modular
30 constructed wetland in which filling media consists of a mixture of solid waste.
31 The system is complemented by a high-level IoT communication layer structure
32 to support remote real-time water and environmental monitoring, system perfor-
33 mance, and data dissemination.

34 The project contributes to: Water and Environment through the efficient man-
35 agement and use of water resources and waste reduction, management, treat-
36 ment, and valorisation; Materials and raw-materials through efficient, secure,
37 and sustainable use of resources; and Environmental Education promoting envi-
38 ronmental awareness and best environmental practices through the dissemina-
39 tion of scientific data and results using Information and Communication Tech-
40 nologies (ICT) tools and IoT platforms. The project also contributes to give re-
41 sponse to Societal Challenges, such as Environment protection, sustainable

42	management of natural resources, water, biodiversity and ecosystems; Enabling the transition to a green society and economy through eco-innovation.
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