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Constructed wetlands (CWs) are engineered systems, considered a nature-based solution (NBS), that are inspired and mimic many processes (physical, biological, and chemical) and functions that occur in natural wetlands. CIRQUA-Integrated Approaches at Local Scale for Enhancing Water Reuse Efficiency and Sustainable Soil Fertilization from Wastewater's Recovered Nutrients is a project that aims to improve NBS, focusing on CWs for wastewater treatment and water recovery in rural areas. The aim is to upgrade CWs using technological achievements, such as innovative nanostructured filters and photocatalytic modules, sensors and automation in operation, precision irrigation principles, and the integration of advanced artificial intelligence (AI) tools. These innovative technological achievements are being implemented in a case study in Portugal through the upgrading of an existing polyculture horizontal subsurface flow CW, in a rural area for the wastewater treatment of a tourism house. The CW was designed to act as secondary biological treatment, being placed after a previously installed septic tank. Wastewater quality assessment and biodiversity characterization are being carried out in order to evaluate the upgrading of the system. Acknowledgments: This study integrates the project entitled "Integrated Approaches at Local Scale for Enhancing Water Reuse Efficiency and Sustainable Soil Fertilization from Wastewater's Recovered Nutrients", grant agreement No. 2321, Call 2023 Section 1 Management of Water IA, part of the PRIMA programme supported by the European Union. The PRIMA programme is supported under Horizon 2020, the European Union's Framework Programme for Research and Innovation. Authors affiliated with CIIMAR are thankful for the Strategic Funding UIDB/04423/2020, UIDP/04423/2020, and LA/P/0101/2020 through national funds provided by FCT.



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