

## Article

# Integrated Management, Circular Economy and Reclaimed Water: Keys to Restoring the Long-Term Water Balance in *La Marina Alta* (Alicante, Spain)

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**Abstract:** This research is focused on water governance problems in *La Marina Alta* District, in the province of Alicante (southeastern Spain). The district has a public management body, Consorcio de Abastecimiento y Saneamiento de Aguas de los Municipios de *La Marina Alta* (CASAMA), which has been inoperative since its creation in 1987. Although *La Marina Alta* has sufficient water resources in situations of hydrological normality, they are significantly affected by the impacts of climate change, insufficient water treatment technology and the absence of storage and regulation infrastructure. As a consequence, periods of scarcity and overexploitation of aquifers, together with high-demand situations, have generated scenarios of a lack of drinking water with reputational damage and uncertainty for the future of agricultural operations. Thus, the aim of this work is to propose the adoption of integrated water resource management strategies that will increase the resilience of this sub-basin in *La Marina Alta*. To this end, the contribution of new non-conventional resources to the water pool, combined with an efficient network of infrastructure, and all this supported by effective governance structures, would be essential to achieve a sustainable balance between demand and supply, preserving the environmental values of the territory.



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**Keywords:** effective governance; integrated management; water balance; reclaimed water; circular economy; groundwater overexploitation; hydraulic infrastructure

## 1. Introduction and Area of Study

Water is a limited strategic resource whose sustainable management is a fundamental pillar for guaranteeing water security, environmental preservation and socioeconomic development. In Spain, water availability is affected by climate change, the overexploitation of aquifers and pollution of water resources, especially in the Mediterranean arc [1]. Water is important in all areas of life, from health to the economy, and the future of societies depends on it, despite its availability being taken for granted and wasted every day [2]. Thus, the lack of water has been a limiting factor for the growth and economic development of certain territories, such as the Spanish southeast [3], where this work is focused.

Spain faces significant challenges in relation to water resource management, given its scarcity and the unequal distribution of resources [4]. It is the leading country of water reuse in Europe, ranking fifth worldwide in terms of reuse capacity. Nevertheless, a sign of the potential to improve circularity in water management is the fact that Spain treats approximately 95% of its wastewater, but barely 7% to 13% of treated wastewater is reused [5].