CERIS Civil Engineering Research and Innovation for Sustainability

Evaluating water scarcity in the Tagus River basin

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Summary

The Tagus River basin faces a growing water management challenge, as water allocation issues and river regulation by large multi-purpose reservoirs lead to situations of water scarcity and mediocre conditions in some water bodies that will likely be aggravated by climate change. An integrated analysis of water resources management and water allocation and strong cooperation among stakeholders are vital to overcoming those challenges.

This thesis aims to provide a complete picture of water allocation and use in the entire Tagus River basin to evaluate current and future vulnerabilities. It also aims to discuss the effectiveness of different water management and allocation strategies to promote the sustainable use of resources. To make it possible, a detailed water allocation model is developed using the software AQUATOOL. The modelling results provide quantitative information to support the assessment of water scarcity.

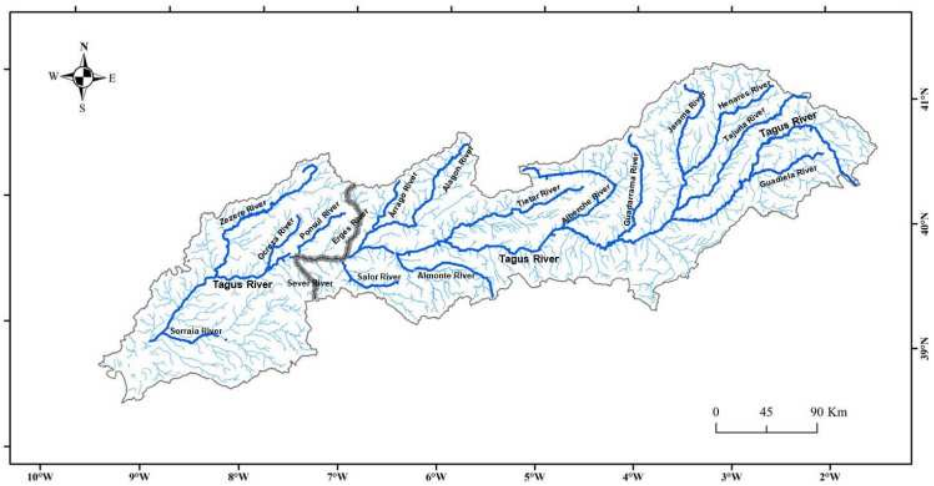
Results show that current hydraulic infrastructure and water management practices have significantly altered the natural river flow conditions in the entire Tagus River basin. Water managers struggle to satisfy existing water uses and increasing water demands will further accentuate these problems. The enforcement of new environmental flow requirements may alleviate the conditions of some water bodies but will decrease the level of satisfaction of nonpriority water demands.

The assessment of water scarcity in the Tagus River basin shows that high values of WEI+ are reached during the summer months in regions with intensive agriculture, denoting severe water stress conditions in most sub-basins.

In the future, climate change is expected to significantly modify water availability and aggravate water scarcity conditions, but the existing reservoir infrastructure will alleviate some of these impacts, especially in the dry half-year. A reduction of water consumption for irrigation by 25% to 40% will significantly improve the Tagus River system performance and maintain the current scarcity situation in the future.

Keywords

Tagus River transboundary basin, water allocation model, water scarcity, water use, reservoir regulation, climate change.



Main surface water bodies in the Tagus River basin.