

# Potential impacts of Water Framework Directive on the environmental services associated with historical irrigation systems: A case study from Southern Spain



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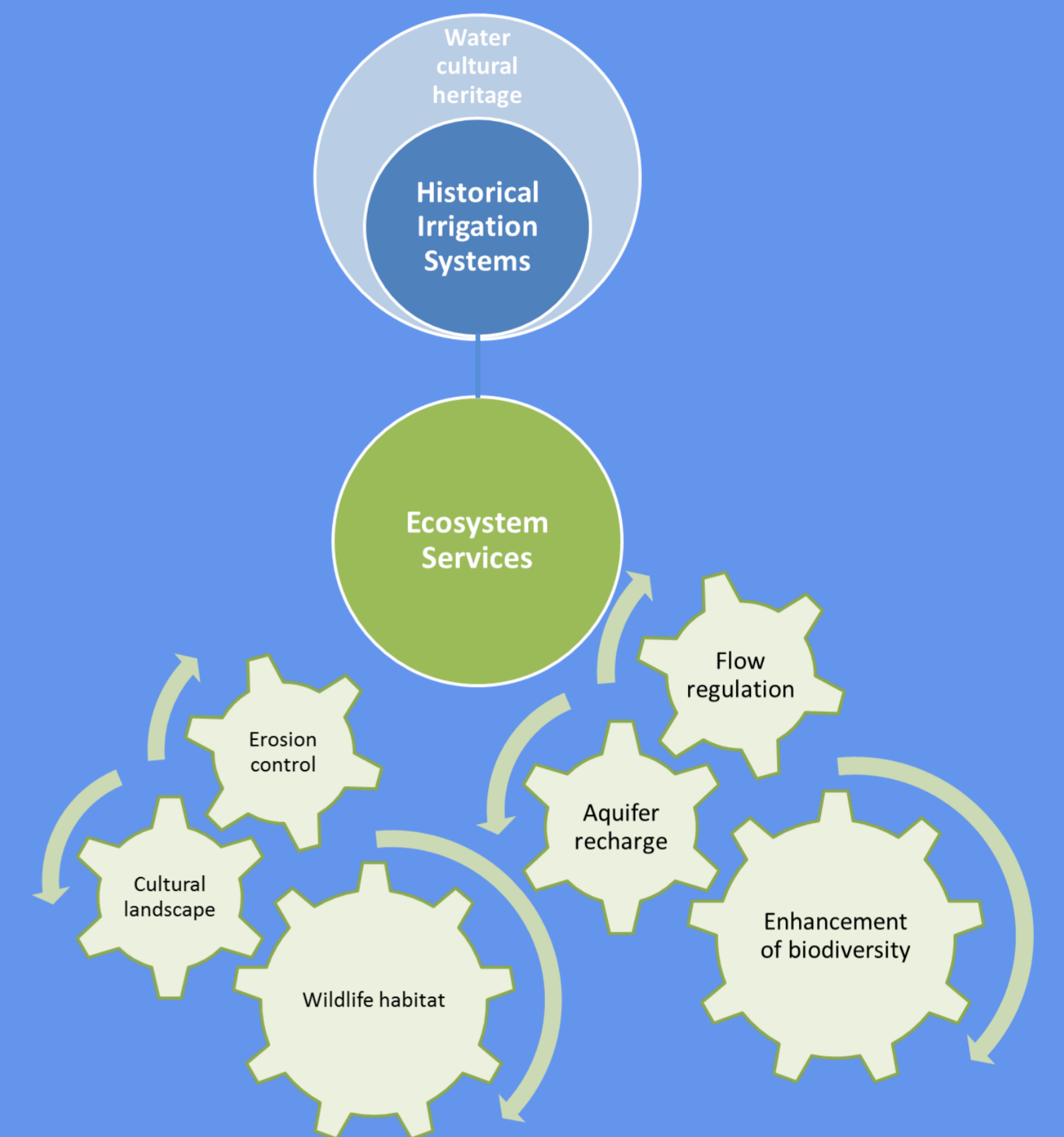
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## Introduction

*- Historical irrigation systems at risk: effects on the cultural and environmental heritage -*

The 'historical irrigation systems' (HIS) have played a particular role in the ecological history of landscape, not only in southern Europe, but also in very different environmental regions across Europe. **These systems, which are still operational in many places, provide important ecosystem services** (see Figure 1), especially those that are located in mountain areas. However, the singularities of HIS are not addressed by the Water Framework Directive (WFD). WFD proposes mechanisms for sectorial and territorial integration (principle of subsidiarity), such as the River Basin Management Plans (RBMPs). Unfortunately, **the implementation of RBMPs is threatening the HIS located in some river basins across Europe**, such as those located in the 'Sierra Nevada' region (Southern Spain), **due to the adoption of measures aimed at increasing the water use efficiency of these systems.**



## Objective

The goal of this work was **to analyze the potential impacts related to the WFD implementation** on the HIS located in 'Sierra Nevada' region (Southern Spain), as well as on the environmental services provided by them.

This work was developed under the framework of the European research project MEMOLA (FP7)



## Activities carried out

### Analysis of the environmental services associated with these HIS

Literature review

Hydraulic surveys

Ethnographic studies

Characterization of crop, soil and water management

### Identification of potential impacts of WFD implementation on the environmental services of HIS

Assessment of EU water policy and the RBMP

Meetings & workshops with farmers and sectorial organizations

Meetings with local and regional policy makers

## Results and discussion



### Multifunctionality of the HIS

In the RBMP of the study area, the water allocation to HIS is classified only as agricultural water use. Therefore, **the non-recognition of the multifunctionality** of the HIS (extra-agricultural services) **has led to a non-suitable water resources allocation** and the lack of assessment of the impacts of these activities.

### Water use restrictions - Ecological flows

The implementation of the ecological flow (e-flow) as a tool to avoid the over-exploitation of the water resources is a **challenging task** in these systems due to their **complex hydrology**. The oversimplification in the current methodology used for determining e-flows reduces drastically the water allocation to the HIS. Therefore, **the assumed natural flow regime of some rivers in the area is being put at risk since this flow is maintained** at certain times of the year **by the recharge function of HIS.**

### Between conservation and modernization

Driven by the WFD, the RBMPs promote **modernization of irrigation systems as a priority action for increasing efficiency** of irrigation water use. However, these measures would have **significant adverse effects on the environmental services provided** by the HIS due to a change in the local hydrology. Currently, irrigation modernization plans are **threatening many HIS in the area without an adequate assessment of other alternatives** that could provide better environmental, social, employment, and economic options.

## Conclusions

Following the WFD guidelines developed to fill the gaps in water quantity and efficiency, most RBMPs that have HIS associated with their water bodies cannot safeguard the ecosystem services provided by these systems and the water management in line with their functions.

On the basis of these results, a **Policy Brief was generated** in order to present suggestions for policy interventions to establish the mechanisms and criteria for the protection of the values of the HIS systems.

Available at:



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