



SCARCE: Assessing and predicting effects on water quantity and quality in Iberian rivers caused by global change (2009-2014)



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INTRODUCTION

Water has been a major driver of socio-economic development in the entire Mediterranean basin, despite of its typical temporal variability. The increasing anthropogenic manipulation of hydrology and the exacerbation of climate change have resulted in an even larger temporal variability. In particular, Mediterranean streams are undergoing severe alterations in the flow regime because of a decrease in the number of precipitation days, and an increase in days with heavy rains. The imbalance between the available water resources during extended droughts and the increasing anthropogenic water demand results in major ecological and economical problems. In consequence, water availability has become a major issue for all governments in Mediterranean regions. However, the consequences of global change will not only be on water availability but also on water quality and ecosystem services.

CASES OF STUDY

A cross-scale approximation will be applied, with data mining and field based research in four representative watersheds in Spain: Llobregat, Ebro, Júcar, and Guadalquivir.

Ebro: intensive agricultural activity, largely regulated (200 dams and channels), decreasing of 30% of the mean annual flow

Llobregat: Heavily managed in its lower course, Barcelona's major drinking water resources, extensive urban and industrial waste water discharges



Guadalquivir: ecological value of the Doñana National Park, many inputs (natural and anthropogenic origin), navigable up as far as Seville (serious environmental problem)

Júcar: designated as a European Pilot River Basin for the implementation of the WFD, over extraction of groundwater, water quality problems in the medium and lower parts

PROJECT DESCRIPTION

SCARCE is a multipurpose project that aims to describe and predict the relevance of global change impacts on water availability, water quality and ecosystem services in Mediterranean river basins of the Iberian Peninsula, as well as their impacts on the human society and economy. Hence, the project has assembled a multidisciplinary team of leading scientists in the fields of hydrology, geomorphology, chemistry, ecology, ecotoxicology, economy, engineering and modelling, in an unknown effort in the CONSOLIDER framework. The project also has the active involvement of Water Authorities and other relevant agents as stakeholders. The project has started on 17th December 2009 and will last **5 years**.

SCARCE has two complementary objectives:

1. The first and largest tackles basic research questions that will define the long-term patterns and actual mechanisms that operate in the hydrology, water quality, habitat dynamics, and ecosystem structure and function of Mediterranean watersheds.
2. The second objective of the project, or its corollary, is related to the effects of climate and human footprint (taken both as key elements of global change) on the freshwater ecosystem services, as well as the urgent need to finalize, implement, and eventually refine the River Basin Management Plans (RBMP) demanded by the EU Water Framework Directive.

PARTNERS

Coordinator:

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Spanish Council for Scientific Research
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www.idaea.csic.es



ICMAN-CSIC



Institute of Marine Sciences of Andalucía-CSIC; www.icman.csic.es

UV



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UB



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UPV



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UPC



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UdL



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EHU



University of the Basque Country; www.ehu.es

UPM



Technical University of Madrid; www.upm.es

URV



University of Rovira i Virgili; www.tecnatox.cat

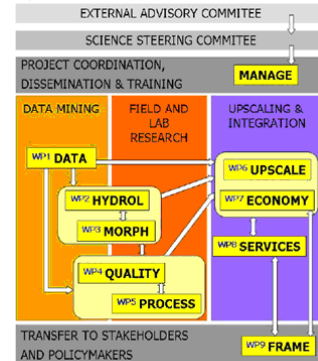
ICRA



Catalan Institute for Water Research in collaboration with University of Girona and German Federal Institute of Hydrology (Koblenz); www.icra.cat

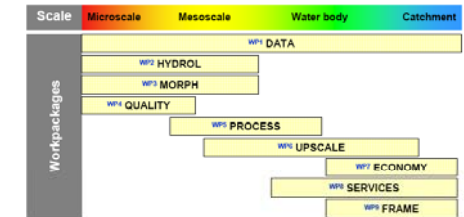
WORK PACKAGES

SCARCE will be structured across a series of Horizontal and Thematic Work Packages that will coordinate the various scientific goals, as well as ensure their interactions. These blocks, and their leaders, are presented in the following figure:



1. **DATA**-Data collection and attribution of global change effects. I. Muñoz (UB)
2. **HYDROL**-Surface and groundwater hydrology. Associated processes at different scales. X. Sánchez-Vila (UPC)
3. **MORPH**-Impacts of changing hydrology on sediment transport, channel morphology and physical habitat. R.J. Batalla (UdL-CTFC)
4. **QUALITY**-Linking the effects of chemical quality with environmental stressors on biodiversity and human risks. Mira Petrovic (IDAECSIC)
5. **PROCESS**-Effects of global change in ecosystem processes. A. Elosegi (EHU)
6. **UPSCALE**-Building and testing integrative models. Upscaling to the Iberian Mediterranean area. F. Francés (UPV)
7. **ECONOMY**-Generation of socioeconomic scenarios. F. La Roca (UVEG)
8. **SERVICES**-Assessment of current freshwater ecosystem services, and susceptibility to global climate change. V. Acuña (ICRA-UdG)
9. **FRAME**-Integration of results at the watershed scale and implications for generation of EU WFD River Basin Management Plans. J. Blasco (ICMAN-CSIC)
10. **MANAGE**-General management of the project, including dissemination and training. D. Barceló (IDAEA-CSIC)

SCALE INTEGRATION



The necessary knowledge will be filled by using multidisciplinary, cross-scale research to give a comprehensive assessment and prediction of the potential modification in resources and ecosystem services arising from climate change and human pressure in the Mediterranean Peninsula.

SCARCE will work in four different spatial scales: microscale, mesoscale, water body, and catchment. The work in the workpackages lies in one or several of these scales. Workpackages collecting new data (HYDROL, MORPH, QUALITY, PROCESS) mostly operate at lower and medium scales. Other workpackages (UPSCALE, ECONOMY, SERVICES and FRAME) provide responses at higher scales (water body - catchment).

MORE INFORMATION

<http://www.idaea.csic.es/scarceconsolider>

ACKNOWLEDGMENTS

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