

LONG-TERM STUDIES OF FRESHWATERS  
IN THE IBERIAN PENINSULA: A PREFACE

Guest editor

**Miguel Álvarez Cobelas**

Museo Nacional de Ciencias Naturales (CSIC), Serrano 115 dpdo., E-28006 Madrid, Spain

malvarez@mncn.csic.es



## PREFACE

The maturity of Iberian Limnology is beyond any reasonable doubt and has resulted from the initiative of many Portuguese and Spanish researchers and also from collective efforts encouraged by the Iberian Limnological Association (AIL) for forty years now. The geographical, climatic, environmental and socio-economic constraints of Spain and Portugal and their interactions have been responsible for long-term changes in our inland water environments. Eutrophication, increasing water use and global warming and its effects are usually the main causes of those changes. Warming is also producing a rise in air temperatures on our largely semi-arid territory, which triggers evaporation increases, thus diminishing water availability for freshwaters and groundwaters. Purely natural effects on long-term dynamics of Iberian limnosystems appear to be of minor significance. Anyway, studies are badly needed to ascertain those facts unequivocally.

Two years ago the American Society for Limnology and Oceanography promoted a special issue of its main journal devoted to long-term changes in aquatic environments (2019, *Limnology and Oceanography*, 64, S1), where an Iberian Peninsula study was published (Arroita *et al.*, 2019). We then felt that there was time to encourage our limnologists to publish studies on their long-term datasets. Sixteen Portuguese and Spanish researchers were contacted for the task and the outcome is what you have in your hands, oh friendly reader!

The founder of long-term limnology of Iberia was Antonio Vidal Celma, a disciple of Ramon Margalef who worked since the early sixties at *Agua de Barcelona*, the company supplying water for Barcelona city. His studies on Sau reservoir (Girona, NE Spain) were seminal to promote the interest in long-term Iberian limnology (e.g. Vidal & Om, 1993). Another important Iberian personality is Josep Pascual i Massaguer, who privately started recording water temperature in the sea coupled with meteorological observations at L'Estartit (Girona, NE Spain) for more than five decades, later also performing long-term temperature measurements of Ter river and Banyoles lake.

In addition to long-term records of stream discharge, surface- and groundwater quality, groundwater levels and reservoir storage recorded by Portuguese and Spanish Water Authorities (e.g. snirh.apambiente.pt, www.chtajo.es, www.chj.es), whose data could be used for long-term limnological studies, some managers and scientists have been recording long-term limnological data of Barcelona, Madrid and Sevilla water supply reservoirs, Redon lake (Lleida, Pyrenees), Sanabria lake (Zamora, NW Spain, aulaestudiolagosanabria.info/indicadores-limnologicos), La Caldera lake (Granada, Southern Spain) and the Western Asturias brown trout and eel. Long-term records of Atlantic salmon as game fishing are also compiled by Northern Spanish Counties (Galicia, Asturias).

The studies included in this section encompass a wide array of limnological interests. To start with, a sketchy autobiography of Josep Pascual opens the issue. The vagaries of intermittent discharge and their significance for biogeochemical processes in a stream (Fuirosos, NE Spain) are dealt with by Andrea Butturini. The changing salinity of Albufera de Valencia is analyzed by Juan Soria *et al.*, who clearly state that freshwater inputs are diminishing as a result of human use, a process that may also be impairing along with global warming effects. Nutrient loadings to a Central Spanish wetland are report-

ed by Salvador Sánchez-Carrillo *et al.*, showing that biogeochemical responses have not experienced a repetitive pattern throughout the last 38 years. Álvarez Cobelas & Rojo demonstrate that processes other than global warming and eutrophication can affect long-term limnology of a Central Spanish, gravel-pit lake. Finally, long-term NW salmon captures after recovery programs are the core of a study undertaken by a Galician research group, led by Fernando Cobo (Saavedra-Nieves *et al.*), emphasizing the need for river connectivity to enhance densities of their populations in Northern Spanish streams.

Anyway, these studies are only an appetizer. We dare encourage Iberian limnologists to publish their long-term data in the very near future. Surely, we will get to know interesting surprises. Long-term limnology has been devoted to cold temperate environments up to date. It is time to add other geographies and climates, such as the warmer and mostly Mediterranean Iberian Peninsula, to foster our knowledge of limnological changes in the long-term worldwide.

And last but not least, I am very grateful to Isabel Muñoz, chief-editor of *LIMNETICA*, for having invited me to be guest editor of this section. The skills of Jaime Ordóñez as technical editor have made my task much easier than I suspected. My warmest thanks go also to all referees who have contributed with their expertise to the final outcome of these works.

## REFERENCES

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