



# Limnología

XVII CONGRESS OF THE IBERIAN ASSOCIATION OF LIMNOLOGY  
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### A HUMAN TWIST OF MESOZOOPANKTON COMMUNITIES: THE GUADALQUIVIR ESTUARY

In the last decades the Guadalquivir estuary has been object of several studies concerning the physical and biogeochemical features as well as the hyperbenthos, decapods and small fish's communities. Nevertheless, very little is known about the mesozooplankton community and even fewer about the temporal shift in the settlement of the available ecological niches by its different species. The current status of the community is possibly the results of the cumulative effects of the anthropogenic activities that have been modifying the ecosystem across many decades.

The scarce information about the mesozooplanktonic community suggests that its structure has undergone changes in the species composition and quantitative distribution, especially in the last two decades. In the late 80's *Acartia clausi* was described as dominant species along a broad salinity range, whereas the occurrence, and in some cases the dominance, of several other species were occasional and related to specific conditions. The current structure of the mesozooplanktonic community instead is characterized by considerably high abundance of *Calanipeda aquaedulcis* and lower number of *A. clausi* and cyclopoids copepods. The colonization of the ecological niche by those species has occurred in such way that they do not overlap frequently. Also has to be pointed out that some of the species described in the past as stable or occasional component of the community are now absent or really minor.

The strong presence of *C. aquaedulcis* seems to be a neat indicator of changes occurred in the Guadalquivir estuary. This is an extreme habitat, being one of the rivers with the highest concentration of total suspended matter and turbidity in the world; these conditions inhibit almost completely the primary production of phytoplankton. The estuary is also a eutrophic and hypoxic water body for most of the mesozooplanktonic taxa. Few species can maintain stable populations in such environments. *C. aquaedulcis* is one of those species, having a considerably high degree of tolerance to environmental stresses. We hypothesize that this species has become dominant as human pressure on the estuary increased across the years bringing extreme conditions where few species can develop stable populations.

### IMPACTS ON AQUATIC ECOSYSTEM INTEGRITY OF PORTELO STREAM (DOURO BASIN, NE PORTUGAL) AFTER A LARGE SPILL OF MINING WASTES

During December 2009, after a period of intense precipitation, several millions of cubic meters of wastes from an abandoned mine were spilled into Portelo stream, a tributary of Rio Sabor (Douro basin) in the northeastern Montesinho Natural Park (NE Portugal). The large amount of wastes covered the riverbed with a layer of fine sediments, reaching more than half a meter in areas close to the mine. Both riparian and agricultural areas were also affected by these sediments from the mine. Wastes were spilled downstream until the main watercourse, River Sabor, by several strong rain events. This study, developed from 2010 to 2013, evaluated the impact of this event on ecosystem integrity, namely in the water chemistry, channel and riparian habitats and on macroinvertebrate communities. Samples were collected from eight different stations distributed along the hydric system. Toxicity experiments were developed in laboratory for one fish species, the barbel (*Luciobarbus bocagei*), an endemic cyprinid present in River Sabor. The results showed a substantial increase of conductivity ( $>300 \mu\text{S}\cdot\text{cm}^{-1}$ ), total suspended solids ( $>100 \text{mg}\cdot\text{L}^{-1}$ ) and a decrease of pH ( $<5$ ) in the water analyses. From the 52 elements analyzed, including different heavy metals, it was detected a higher concentration of copper, aluminium and cobalt in the water. Aquatic habitats were severely disturbed and important changes occurred in riparian zone. Temporal and spatial differences were found and several metrics (e.g. taxonomic richness, diversity, evenness) confirming the disturbance detected on macroinvertebrate assemblages. As expected, the stations located near the mine showed the highest levels of contamination and disturbance. Biochemical indicators ( $\text{Na}^+$  and  $\text{K}^+$  plasmatic concentrations) used in laboratory tests were sensitive, under acute copper exposure of barbel populations (different copper concentrations, 0.06-0.48 ppm were used), and can help to justify the disappearance and/or reduction of fish species in the affected area.

### RECONSTRUCCIÓN DE UN ANTIGUO HUMEDAL EN LA CUENCA DEL DUERO: LAS LAGUNAS DE VALCABADILLO.

Las lagunas de Valcabadillo constituyen un pequeño complejo lagunar (18406 m<sup>2</sup>) compuesto por 3 cubetas de distinto tamaño, situadas en el municipio de Tubilla del Lago, al sureste de la provincia de Burgos. Se construyeron en el año 2007, con la intención de recuperar un antiguo humedal, sobre una antigua turbera calcárea desecada debido a los drenajes agrícolas de la zona.

Tres años después de su llenado, con objeto de realizar una descripción limnológica de las mismas en base a características hidrogeológicas, composición físico-química de sus aguas y a la identificación de las comunidades de zooplancton y zoobentos, se realizaron 5 campañas de muestro desde octubre (2010) a agosto (2011) que nos permiten recoger la variabilidad estacional y su influencia en la dinámica del sistema. Las cubetas se asientan mayoritariamente sobre materiales calizos, margocalizas y calcretas del Terciario Superior, rozando una región de arcillas y gravas carbonatadas del Cuaternario. La alimentación hídrica dominante es debida a la descarga de aguas subterráneas. Respecto a la fauna, tras los muestreos semicuantitativos realizados, se encontraron 67 taxones, siendo Cyclopoida, Anomopoda y Rotifera los grupos más abundantes de la fauna planctónica, y los órdenes Diptera y Ephemeroptera de la bentónica. Se realizó un PCA con el que se pretendía observar patrones de variación en los parámetros físico-químicos entre las lagunas y a lo largo del ciclo estacional estudiado. También se llevó a cabo un NMDS con objeto de relacionar la variación en la composición de las comunidades biológicas con las variables ambientales tanto a lo largo del tiempo, como entre las lagunas. Así, se observó que las lagunas en febrero presentaban cierta homogeneidad entre ellas respecto a las variables ambientales debido al deshielo y la alta concentración de fosfatos, mientras que en el resto de fechas, las lagunas mostraban mayores diferencias entre sí. La laguna "Mediana" resultó ser la más estable de las tres. Las lagunas "Grande" y "Chica" presentaron un mayor patrón de variabilidad a lo largo de los muestreos, viéndose la "Chica" más afectada por las variaciones externas debido a su menor volumen de agua.



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