17th INTERNATIONAL CONGRESS of the Geological Society of Greece

BULLETIN OF THE GEOLOGICAL SOCIETY OF GREECE, SP. PUBL.

EXTENDED ABSTRACT 225

Ostracod-based environmental reconstruction of Lake Koronia, (Central Greece) during the Holocene

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Introduction

Lake Koronia is located in the western lowland area of the Mygdonia Basin, northeast of the city of Thessaloniki in northern Greece (40° 41′ N, 23° 09′ E, 75 m a.s.l.). It is the remnant of a once larger lake in the region (Psilovikos, 1977), but is now a shallow, hypertrophic and heavily polluted water body (Moustaka-Gouni *et al.*, 2012). It has experienced substantial degradation over time due to human activities, but has also dried up several times in the past two decades (2002, 2007, 2009 and 2014), resulting in its current state, formerly the fourth largest lake in Greece (Demertzioglou *et al.*, 2022). Despite its current ecological challenges, Lake Koronia is recognized as a protected wetland under international and national legislation, highlighting its importance (Malamataris *et al.*, 2017).

The aim of the present study was to investigate the paleoenvironmental evolution of Lake Koronia and the distribution of ostracod assemblages through time using a combination of core and recent surface sediment samples.

Methods

The KOR core (40°41'45.4" N, 23°11'08.8"E; Fig. 1) was drilled at 71 m b.s.l. and reached a depth of 368 cm. A total of 36 sediment samples were studied in order to reconstruct the paleoenvironmental evolution of the lake. In addition, two sediment samples were collected by boat, using an Ekman grabber from the upper 1 cm of the lake bottom for the analysis of the recent ostracod fauna. For ostracod analysis, 50 ml of each surface bottom sediment sample was wet sieved with tap water through a 125 μm pore size standard sieve. For core samples, 10 g of dried sediment was treated with hydrogen peroxide (H_2O_2) and wet sieved as described above. The residue was oven dried at 60°C and all ostracod valves over the >125 μm fraction were hand-picked under a Zeiss Stemi 305 binocular stereoscope. Species were identified, counted, and stored in microslides. Taxonomic identification of the species was based on the morphological features of the carapace using several published works, ostracod atlases and ostracod databases. In addition, radiocarbon dating was performed using accelerator mass spectrometry (AMS ^{14}C; Beta Analytic USA laboratory). Finally, a Q-mode cluster analysis was performed for the sediment samples of the core.

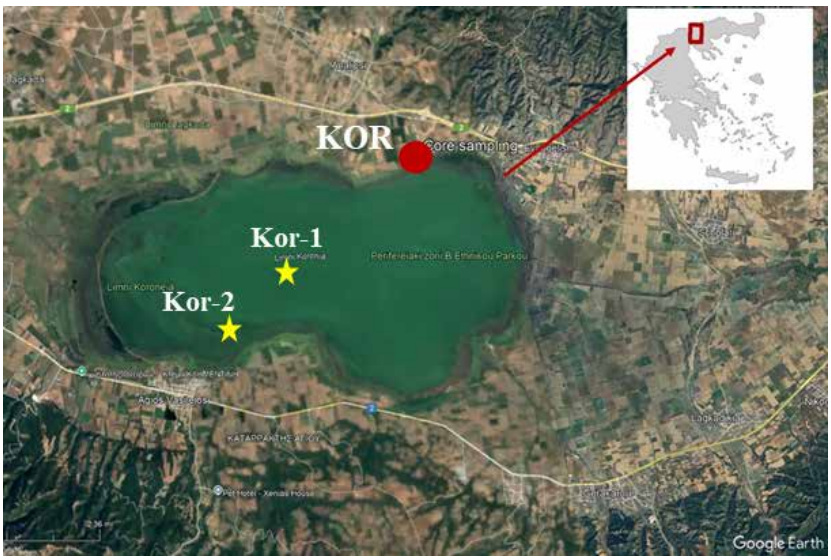

Figure 1. Sampling stations of surface sediments and the location of KOR core in Lake Koronia (modified from Google Earth).

Results and conclusions

The ostracod assemblage of Lake Koronia, both in the surface sediments and in the KOR sedimentary sequence, consisted of five taxa: ex gr. *Candona* juveniles, *Cyprideis torosa*, *Darwinula stevensoni*, *Heterocypris salina* and *Limnocythere inopinata*. In the recent surface sediments, station Kor-1 had a significantly higher abundance compared to station Kor-2. The *Candona* species dominated the assemblage, while *L. inopinata* was the second most abundant species of the total ostracod fauna recorded in the lake, with all other taxa showing relatively low abundances.

The ostracod valves obtained from the core (KOR) were well preserved and relatively abundant, with the number of valves/g reaching high values in some intervals, while the diversity indices showed relatively low values. The species *L. inopinata* dominated the assemblages, reaching even 100% in several intervals, followed by ex gr. *Candona* juveniles and *H. salina*. The species *D. stevensoni* and *C. torosa* accompanied the assemblage with lower but significant values.

The resulting dendrogram of the Q-mode cluster analysis performed on the KOR core sedimentary sequence, pointed out three distinct groups of samples associated with different assemblages and thus different paleoenvironmental conditions. The paleoenvironmental record of Lake Koronia revealed conditions of slightly elevated salinity between 2752-1437 cal. yr BP, occurring in a shallow environment with clear water and the absence of benthic macrophytes. The presence of *Cyprideis torosa*, a true brackish species (Meisch, 2000), further confirmed the elevated salinity during this period. After 1437 cal. yr BP, the fauna diverged significantly, and the environment transitioned to a purely lacustrine system, extremely shallow and with extensive macrophyte vegetation. At the top of the sedimentary sequence, the environment undergoes a further change, characterized by a significant increase in diversity, a deepening of the environment, and the establishment of well-oxygenated water conditions. This interval is comparable with the recent surface sediments in terms of faunal composition and diversity, but not in terms of abundance which was significantly higher at the recent stations.

Lake Koronia is a severely impacted lake that has faced significant degradation over the past few decades. Over the last 20 years, the lake has experienced a dramatic decrease in volume, surface area, and maximum depth (currently almost 2 meters) due to unsustainable water resource management. Further investigation of the benthic conditions and biota, coupled with the paleoenvironmental record of the lake, will be invaluable in this important biotope ecological assessment.

Acknowledgements

Sampling support for the recent sediment samples was provided by the Greek Biotope Wetland Centre.

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