

Vegetation and landscape changes in the Danube Delta area (Romania) during Mid- to Late Holocene

Diana HANGANU^{1,2*}, Alfred VESPREMEANU STROE², Angelica FEURDEAN³, Antony BROWN⁴, Laurențiu ȚUȚUIANU^{1,2}, Sabin ROTARU^{2,5}, Tiberiu SAVA⁶

¹ ICUB Research Institute of the University of Bucharest, Romania

² GEODAR Research Center for Geomorphology, Geoarchaeology and Paleo-Environments, University of Bucharest Faculty of Geography, Romania

³ Department of Physical Geography, Goethe University, Frankfurt am Main, Germany

⁴ Natural Sciences, The University Museum, Arctic University of Tromsø, Norway and Palaeoenvironmental Laboratory, Department of Geography and Environmental Science, University of Southampton, UK

⁵ GeoEcoMar National Institute for Marine Geology and Geo-ecology, Bucharest, Romania

⁶ RoAMS Laboratory, Horia Hulubei National Institute of Physics and Nuclear Engineering, 30 Reactorului, 077125, Măgurele, Romania

* Corresponding author: Diana Hanganu. E-mail: hanganudiana@yahoo.com

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A Mid- to Late Holocene record from the Danube Delta shows a series of well-defined environmental changes, based on sediment data (grain size and geochemistry), pollen, spores and ostracods. Our results indicate that significant landscape transformations took place during the last 7500 yr. The study site had been being part of a channel-levee system connected with brackish coastal lagoons nearby, until c. 6200 cal yr BP and then transitioning to a largely disconnected lacustrine environment after 5700 cal yr BP.

We show that these changes had a major effect on the pollen spectra. During the first 2 zones of the pollen record (between c. 6800 and 5700 cal yr BP) the drainage from the Danube basin was high, causing mixed pollen and lower pollen concentrations. However, the pollen spectra may reflect the early presence of *Carpinus betulus* and *Fagus* in the forest composition in the surrounding region, prior to its spread along the Carpathians Mountains.

After the Mid Holocene shift, favored by the Black Sea relative sea level slowdown, when peat started to accumulate in the shallow lake, airborne pollen becomes the dominate source. The pollen data shows a remarkable expansion of the herbaceous, particularly Poaceae, as well as aquatic pollen of high diversity. The tree cover became dominated by *Quercus* (30%), alongside with low percentages of other tree taxa such as *Carpinus*, *Betula*, *Ulmus*, and *Tilia*. In terms of human impact, agricultural practices, mainly crop cultivation, probably in the fertile flood plain that developed around this time in the area, are visible from the late part of the Eneolithic (6440-5600 cal yr BP), which will slightly increase throughout the Early and Mid- Bronze Age (5250 – 3450 cal yr BP).

From 3200 cal yr BP, the decline in *Quercus* is synchronous with a more significant human activity suggesting an opening of the landscape by forest clearance and enlargement of arable areas during the Late Bronze Age and Iron Age, especially during Hallstatt, locally corresponding to the Babadag culture (1100-500 BC) which triggered a net increase in population and settlement density.