

## Paleoecological changes in Lake Funda (Flores Island, Azores): tracking human impacts in a remote island lake throughout the past millennium

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Previous studies on lacustrine sedimentary sequences in the Azores show that climate variability and volcanism along with the arrival of humans played a significant role in the recent development of these insular Azorean ecosystems. However, the timing and rate of anthropogenic impacts on these lakes is poorly constrained. Paleoecological research allows us to reconstruct ecological conditions prior to and after human settlement, thereby contributing to our understanding of how species and island ecosystems responded to both natural and anthropogenic disturbances. To assess both types of impacts over the last 1000 years, we analysed the elemental geochemistry on bulk organic matter, diatoms, and chironomid remains in a 994 cm-long sediment core recovered from Lake Funda (Flores Island, Azores) in 2017. Preliminary results from Lake Funda show that human colonization was the main driver of ecological changes. We identified three major ecological phases: (1) 950-1350 yr AD, a pristine lake ecosystem with mesotrophic diatom taxa, including benthic and tycho planktonic life-forms, and free-living chironomids species representing an undisturbed environment; 2) 1350-1450 yr AD, the release of cattle and gradual forest clearance lead to an increase in nutrient inputs and the start of the human-impacted phase; and, (3) after Portuguese settlement, from 1450 yr AD to present, a second human-impacted phase resulted in lake eutrophication and the development of an anoxic hypolimnion due to an increase of nutrient loading. The first anthropogenic phase resulted in a drastic 50% decline of the overall biodiversity with a shift to planktonic diatom species and free-living chironomids, while the second was characterised by a substantial reduction in the density of chironomids and diatom assemblage shifts towards the dominance of *Aulacoseira granulata* and *A. ambigua* suggesting a shift in lake trophic. Other external drivers like major climate oscillations likely play a role within these phases as well. Our study demonstrates the sensitivity of aquatic ecosystems in remote islands to anthropogenic impacts that have the ability to overtake natural forces of variability (i.e., climate). This research

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