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Rich fen development in SE Poland and its response to climate changes and human impacts in the late Holocene

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Rich fens are one of the most important wetland ecosystems due to their high species-richness and unique species composition. They are occupied by endangered, vulnerable and protected plants, such as Cladium mariscus and Schoenus ferrugineus. For this reason knowledge of the history of rich fens is important for the development of effective management strategies to protect or restore these widely threatened habitats. Our palaeoecological study reconstructs the development of Bagno Serebryskie rich fen (ca. 376 ha), a site with the largest population of Cladium mariscus in CE Europe, and its response to climate changes and human impacts during the last 3500 years. For this we analyse two peat profiles at this site, at a high resolution (1 and 2 cm) using multi-aspect palaeoecological analyses (plant macrofossils, pollen, molluscs, geochemistry, charcoal and AMS 14C radiocarbon) to assess the impact of climate changes, human activity, and fires on local vegetation.

Local plant succession in our two coring points followed parallel trajectories; after a lake stage, ca. 1800 cal yr BP (core I) and 3300 cal yr BP (core II), fen species e.g. Menyanthes trifoliata, Mentha aquatic, Carex lasiocarpa appeared, followed at ca. 500 cal. yr BP by Cladium mariscus, which is currently the dominant plant species in the Bagno Serebryskie peatland. In one peat profile (core II) we found abundant macrocharcoal particles at 1050, 700, 400 cal yr BP and the present, but fires had no significant impact on the development of the mire. In the other peat profile (core I) we noted four stages (at 2300, 1350, 400, 100 cal yr BP) with an increasing diversity of mollusc species typical of overgrown, but permanent water bodies. Their increased abundance and diversity can be linked to a rise in mire water table at these times.

Our studies indicate that rich fens can provide reliable sites for palaeoecological reconstruction of the late Holocene providing valuable information that can be applied to enhance such sites and maintain their important biodiversity in addition to ecosystem services such as C storage.

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