



Middle to Late Holocene palaeoenvironmental change and anthropogenic impact in tropical Southeast Asia: a multi-proxy lacustrine record from Tasik Chini, Malaysia

Jack Lacey (1), John Boyle (2), Charlotte Briddon (3), Stefan Engels (4), Mushrifah Idris (5), Melanie Leng (1), Melody Li (6), Suzanne McGowan (3), Keely Mills (1), Virginia Panizzo (3), David Ryves (6), Muhammad Shafiq (5), Christopher Vane (1), and Lara Winter (6)

(1) British Geological Survey, Nottingham, United Kingdom, (2) Department of Geography and Planning, University of Liverpool, Liverpool, UK, (3) School of Geography, University of Nottingham, Nottingham, UK, (4) Department of Geography, Birkbeck, University of London, London, UK, (5) Tasik Chini Research Centre, Faculty of Science and Technology, Universiti Kebangsaan, (6) Centre for Ecological and Hydrological Science, Department of Geography, Loughborough University, Loughborough, UK

Tropical areas are currently experiencing rapid environmental change due to the combined effects of climate change and human impact on the landscape. Climate variations in Southeast Asia play a key role in the global hydrological cycle, but past changes in the Asian monsoon system and its effects on local ecosystems are poorly constrained due to a shortage of well-dated palaeoenvironmental records that can provide a longer-term perspective on environmental change. This study investigates sediment cores from Tasik (Lake) Chini situated on the Malaysian Peninsular and provides the first lacustrine record of palaeoenvironmental change from the area. The flood pulse wetland is one of the few lake basins in the lowlands of this region and is of great ecological importance, contributing to the site's UNESCO designation. Tasik Chini comprises twelve interconnected basins with a hydrology dependent on monsoonal rainfall, therefore the lake is highly sensitive to variations in hydroclimate. Here, we provide new information on past environmental changes at Tasik Chini using the carbon isotope composition ($\delta^{13}\text{C}_{\text{org}}$) and Rock-Eval pyrolysis of sedimentary organic matter, diatom assemblage, elemental analysis, and chlorophyll and carotenoid pigments. An established chronology based on ^{14}C and ^{210}Pb dating shows that the cores span the last ca. 4.8 ka, covering the lakes inception as a permanent water body as well as a transition to higher sedimentation rates since the late 19th century. The multi-proxy record indicates large changes in organic matter production and preservation, hydrology, and water quality over the lake's history with the most pronounced variations occurring during the past 150 years, especially since the 1950s. Together, these proxies demonstrate major shifts in the Tasik Chini ecosystem that were most likely driven by a dynamic monsoonal system during the Middle to Late Holocene, and more recently initiated by anthropogenic catchment land use changes. This rare wetland record offers the potential to better understand past hydroclimate development in Southeast Asia and provide context for the human impact-related changes that have occurred, and are likely to continue, in this rapidly developing region.