

Searching unique signatures of (pre-)historical land use in East Africa: carbon- and nitrogen-isotope variation in organic matter from a 3800-year lake-sediment record in western Uganda

General uncertainty of whether global warming will cause a drier or wetter climate in tropical regions increases the urgency to understand the relative impacts of climate change and local human activities on the functioning of natural tropical ecosystems, and the resultant carbon-cycle effects. This is particularly challenging in tropical regions such as equatorial East Africa, where large natural rainfall variability at decadal and longer time scales has driven major long-term ecosystem changes independent of human activity even within the last millennium. This evidently complicates assessment of how much of the massive ecosystem changes which are occurring today are in fact due to human activities. Assessing the relative magnitude of modern (i.e., post-independence), historical (i.e., during the colonial period) and ancient (i.e., pre-colonial) human impacts on East African ecosystems requires high-quality paleoenvironmental records sufficiently long and detailed to document local ecosystem response to natural climate variability, upon which the successive phases of human impact were superimposed. Also essential are a toolkit of paleoenvironmental proxies which can reliably identify and quantify the unique fingerprint of human activities such as land-cover change. This study will analyze the carbon- and nitrogen-isotope composition and C/N ratio of bulk organic sediments from Lake Katinda, a crater lake in western Uganda, to trace human impact on the aquatic system's nutrient regime and on the terrestrial vegetation immediately surrounding the lake over the past 3800 years. The recorded temporal patterns are compared with independent reconstructions of regional climate and vegetation change to discern natural from anthropogenic processes of vegetation change and to place the intensity of modern-day land use in a solid long-term perspective.

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