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Geoarchaeological interpretation of abandoned irrigation networks in the Anuradhapura hinterland, Sri Lanka

K. Gilliland (1), I. A. Simpson (1), C. I. Burbidge (2), D. C. W. Sanderson (2), G. Cook (2), W.P. Adderley (1), J. T. McKenzie (1), P. Gunawardhana (3), C. Batt (4), and R. Coningham (5)

(1) School of Biological and Environmental Sciences, University of Stirling, Stirling, Scotland, UK, (2) Scottish Universities Environmental Research Centre, East Kilbride, Glasgow, Scotland, UK, (3) Department of Archaeology, University of Kelaniya, Kelaniya, Sri Lanka, (4) Department of Archaeological Sciences, University of Bradford, Bradford, West Yorkshire, UK, (5) Department of Archaeology, Durham University, Durham, UK

(k.m.gilliland@stir.ac.uk / Fax: +44 01786 467843 / Phone: +44 01786 466544)

Anuradhapura is a UNESCO World Heritage Site and was the capital of Sri Lanka from the 4^{th} century B.C. until its abandonment in the 11^{th} century A.D. The Anuradhapura region experiences a semi-arid climate within the island's monsoonal regime, with most of the area's annual precipitation falling between October and January. Management of water resources for drinking and agriculture is therefore of vital importance. Despite this, the ancient capital hosted a sizeable urban population, including secular, royal and monastic communities, throughout its 1500-year tenure. The substantial water and subsistence requirements of Anuradhapura's urban occupants were met through the construction of extensive irrigation networks, consisting of large tanks, embankments (bunds) and channels. These structures, which were constructed around the city and throughout its hinterland, allowed water storage and enabled irrigated staple rice agriculture, both of which were integral for the survival and sustainability of the city. Beyond this, however, little is known about the human-environmental interactions that created the Anuradhapura hinterland landscape.

In this paper, stratigraphic sequences from abandoned tanks, bunds, channels and settlement sites provide the foundation for a chronology of the Anuradhapura hinterland using optically stimulated luminescence (OSL) and radiocarbon measurements. Our findings suggest that irrigation networks were initiated in the hinterland during the early years of the city's urban period and abandoned collectively in the 11^{th} century A.D. However, occupation of the hinterland landscape may have continued until as late as the 17^{th} or 18^{th} century A.D. We both challenge and support aspects of the traditional historic narrative of the Anuradhapura hinterland, indicate the relative applicabilities of OSL and radiocarbon measurement in tropical cultural landscape contexts and offer insight into the analyses and interpretation of historical irrigation based communities