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## Holocene fluvial and anthropogenic processes in the region of Uruk in southern Mesopotamia



Jaafar Jotheri <sup>a,\*</sup>, Mark Altaweel <sup>b</sup>, Akihiro Tuji <sup>c</sup>, Ryo Anma <sup>d</sup>, Benjamin Pennington <sup>e</sup>,  
Stephanie Rost <sup>f</sup>, Chikako Watanabe <sup>g</sup>

<sup>a</sup> Department of Archaeology, University of Al-Qadisiyah, Al-Diwaniyah, Iraq

<sup>b</sup> University College London, Institute of Archaeology, 31-34, Gordon Square, London WC1H 0PY, UK

<sup>c</sup> Department of Botany, National Museum of Nature and Science, 4-1-1, Amakubo, Tsukuba-shi, Ibaraki 305-0005, Japan

<sup>d</sup> Faculty of Life and Environmental Sciences, Tsukuba University, 1-1-1, Tennoudai, Tsukuba, Ibaraki 305-8572, Japan

<sup>e</sup> Geography & Environment, University of Southampton, University Road, Southampton SO17 1BJ, UK

<sup>f</sup> Oriental Institute, University of Chicago, 1155 E 58th St, Chicago, IL 60637, USA

<sup>g</sup> Faculty of International Studies, Osaka Gakuin University, 2-36-1 Kishibe-Minami, Suita-shi, Osaka 564-8511, Japan

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### ABSTRACT

For decades, it has been unclear as to how the world's first cities, in southern Mesopotamia, not only arose in a fluvial environment but also how this environment changed. This paper seeks to understand the long-term fluvial history of the region around Uruk, a major early city, in relation to water-human interactions. This paper applies geomorphological, historical and archaeological approaches and reveals that the Uruk region in southern Mesopotamia had been under the influence of freshwater fluvial environment since the early Holocene. It further demonstrates how canals and long-term human activities since the mid Holocene have been superimposed on the natural river channel patterns. Fieldwork has been conducted to ground-truth features identified applying remote sensing techniques. Five sediment cores were analysed to elucidate palaeoenvironmental changes. Radiocarbon ages for organic samples suggest that the oldest sediment layers, at a depth of 12.5 m, are from the Early Holocene, while results from diatom analyses imply that the whole sediment column was deposited in a freshwater environment. Intensive networks of palaeochannels and archaeological sites within the study area have been reconstructed and these networks have been divided into four different time intervals based on changes in channel courses. The first is from the early 4th to the late 1st millennium BCE; the second is from the late 1st millennium BCE to the middle 2nd millennium CE; the third lasted from after the Islamic period until the 1980s; the fourth is from the 1980s until the present. Key results include evidence for freshwater environments and favourable settlement conditions had already formed by the 8th millennium BCE. The favourable settlement environment resulted in stable (long-lived) canals between the 4th millennium BCE and 1st millennium CE. A significant settlement and irrigation expansion occurred in the early 1st millennium CE. Major abandonment ensued in the late 1st millennium CE and lasted until the mid 2nd millennium CE.

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### 1. Introduction

In the present study, we discuss changes in the riverine landscape in an area around the archaeological site of Uruk, often considered the world's first city, established in the 4th millennium BCE (Adams, 1981). The site and region are located in southern

Mesopotamia, modern-day southern Iraq (Fig. 1). Despite the significance of this site, very little is known about the long-term hydrology of the area and the interactions between societies and their environment in the region that helped shape the rise and continuity of the city. This work shows how human impact has played a leading role in governing both the ancient and more recent geomorphology of the region around Uruk. The results are also used to show how the landscape has imposed changing conditions on the development of a major urban centre in southern Mesopotamia. The data collected also provide a perspective on the nature and

\* Corresponding author.

E-mail address: [jaafar.jotheri@qu.edu.iq](mailto:jaafar.jotheri@qu.edu.iq) (J. Jotheri).