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Life cycle of a moat: A detailed micromorphological examination and broader geoarchaeological survey at the late Neolithic Wadian site, Central China

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ABSTRACT

Moats and rammed earth walls are two key criteria considered by many archaeologists as the universal characteristics of late Neolithic 'cities' in China. However, archaeological evidence of their construction and maintenance remains ambiguous. We investigate the taphonomical and functional issues of the moat excavated at Wadian in Central China by conducting a detailed micromorphological examination of soil samples. The construction of this moat coincided with high groundwater table and the initial stage of its use benefited from this favorable hydrological condition while it was still connected with natural water bodies. However, the moat gradually silted up due to increased cultural activities, changing sedimentary processes, and fluctuating hydrological conditions at the site. The frequent alternations between wet and dry conditions dominated the last stage of the life cycle of the moat and it probably lost its original functions at this stage before it was completely silted up. Such changing sedimentary regime and fluctuating hydrology were confirmed by our geoarchaeological survey in the region. Our research provides crucial information concerning the construction, maintenance and abandonment of this moat and how these processes were related to subsistence strategies and local environmental changes.

1. Introduction

Moats, or causewayed enclosures, were a prevailing monumental feature in prehistoric Europe and China. Moats fundamentally separate human settlements from their natural environments and their construction marks a profound development in human history in terms of territoriality and cultural landscapes (Albrecht, 2014; Whittle et al., 2011). Many studies in the UK and across Europe have demonstrated that, moats, once constructed, became the central venue and focal point for economic and cultural activities in prehistoric settlements (e.g., De Valera, 2014). Such research, in turn, has prompted the development of excavation methods for finding detailed information regarding the construction, maintenance and abandonment of moats, in which geoarchaeology has played a leading role (e.g., Boyd et al., 1999). The earliest known moats or ditches in China were dug at Xinglongwa in what is now the Western Liao River (Shelach and Teng, 2013) and at Bashidang in the Middle Yangtze River (Pei, 2004), both dated to around 8000–7000 cal. BP. Represented by the settlement plan unearthed at the site of Jiangzhai, where several groups of houses formed a circle and were surrounded by a moat, moats became a prominent characteristic of the Yangshao period settlements (ca.7000–5000 cal. BP) (Institute of Archaeology, 1963). By the late Neolithic period (ca. 5000–4000 cal. BP), much larger moats were being built. They encircled rammed-earth walls which was a new development in the settlement structure of the time (Liu and Chen, 2012). This new phenomenon of larger moats would suggest greater labor investment. These large moats formed part of new cultural landscapes, one that was characterised by expanding territories, increasing spatial divisions within the settlements and social stratification; trends which had already begun during the late Yangshao period as seen at the site of Xi'shan (Henan Provincial Institute of Cultural Relics and Archaeology and Xinmi Historical Association of Yan-Huang, 2002).

Whilst much scholarly efforts have been dedicated to researching the functions and significance of the late Neolithic moats and rammed-earth walls in China, other related issues have been left largely unexplored. For instance, very little is known regarding the taphonomy

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of the moats. How did the construction and use of the moats and walls fundamentally transform local and regional landscapes? How should this new type of cultural landscape be viewed within its wider ecological and environmental context? And are there functional differences amongst the moats discovered in different parts of China and if so, why? Through a detailed micromorphological examination of soil samples collected during the excavation of the moat at the Wadian site in central China and a geoarchaeological survey in the surrounding area, this article addresses the taphonomical and functional issues raised above. More specifically, this research provides crucial information concerning the life cycle, or in other words, the construction, maintenance and abandonment of the moat and how these processes were related to local environmental changes. This research will help to contextualize the subsistence strategies and domestic activities at the site and in the surrounding environment as informed by the archaeobotanical research.

1.1. Environmental and archaeological backgrounds

The late Holocene geomorphological process in the middle Ying River basin in the Henan Province (Fig. 1), where the Wadian site is located, is dominated by continuous eolian and colluvial activities,

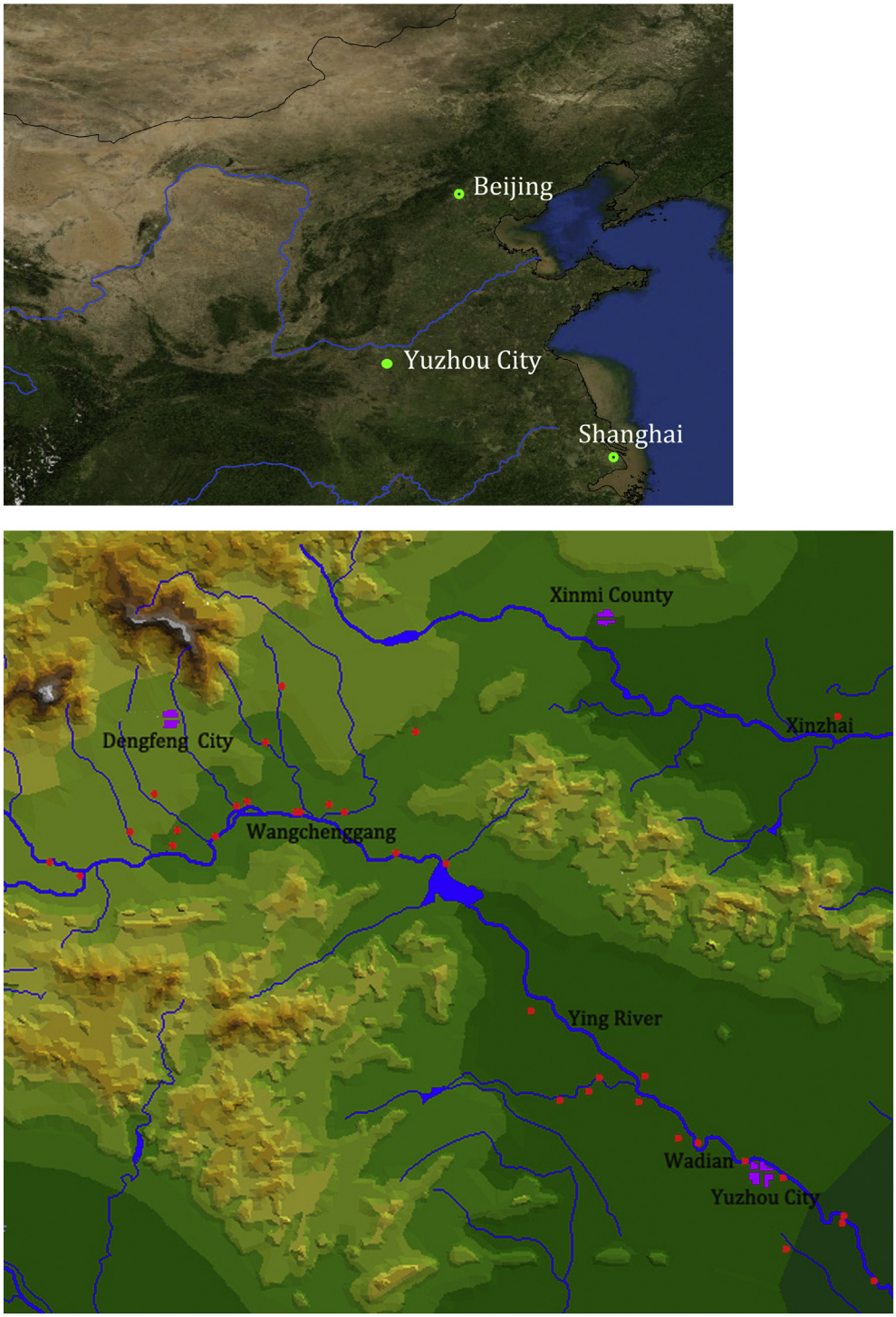

Fig. 1. Location of the Ying River and names of the sites mentioned in the text.