Archaeological Research in Asia xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Archaeological Research in Asia

journal homepage: www.elsevier.com/locate/ara

Case report

A re-appraisal of the spatial distribution of single and multi-moat prehistoric sites in Northeast Thailand

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ARTICLE INFO

Keywords:
Northeast Thailand
Archaeology
Moated sites
Iron Age
Landscape

ABSTRACT

The circular, moated sites of Northeast Thailand are among the most readily distinguished archaeological features in prehistoric Southeast Asia via aerial survey. Seminal work analysing the distribution of these sites was undertaken by Moore, Welch and McNeill in the late 1980s and early 1990s. These studies sought to analyse spatial clustering and the relationship between elevation with site size and density. Recent research by the authors has led to the discovery of further moated sites in Northeast Thailand thereby potentially affecting the conclusions reached by Moore, Welch and McNeill. This paper revisits Moore's original nearest neighbor analysis, including newly identified sites. Moore had concluded there was a random distribution of moated sites in her study area but the updated research clearly demonstrates clustering of moated sites in the Khorat Basin. The elevation at which settlements are located is also revealed to be correlated to the size of the sites and the density of distribution of sites in the study area. The authors argue that these results may be due to the reduced availability of water at higher elevations a finding which correlates strongly with recent evidence which links patterns of precipitation to the distribution and density of sites on the Khorat Plateau. These findings may also have implications for the interpretation of socio-political organisation of Iron Age sites in Northeast Thailand.

1. Introduction

The landscape of the Khorat Plateau in Northeast Thailand is scattered with numerous historic and prehistoric locations stretching back into the Paleolithic (e.g. Anderson, 1990). One of the most easily identifiable of these is the circular moated sites of the mid-late Iron Age. These archaeological sites are recognised both on the ground and in aerial survey by a central raised occupation mound of surrounded by a single or multiple (up to five) concentric moats and embankments (Moore, 1988; Parry, 1992). The sites were first discovered over a century ago (Rajanubhap, 1995) and continue to attract interest. The methods employed in the study of these sites have been multi-faceted including examination of over 5000 aerial photographs compiled by Williams-Hunt during and after World War II and more modern satellite imagery, ground surveys, excavations and test pits (Williams-Hunt, 1950; Moore, 1988; Scott, 2013; Higham, 2011; Welch, 1989; O'Reilly and Scott, 2015). In this paper the authors use recently published data on site locations in Northeast Thailand to re-visit and refresh models for circular moated site distribution.

2. Previous research

The seminal research into the distribution of these sites in Northeast Thailand demonstrated no statistically noticeable pattern in the spatial layout of sites (Moore, 1988). A later analysis, conducted by Welch and McNeill (1991), indicates that elevation may be a factor in site distribution and diachronic formation. Recently O'Reilly and Scott (2015) presented close to 150 previously undocumented single and multi-moat archaeological sites in Northeast Thailand, increasing the number of known sites to 297 (Fig. 1). Using satellite imagery from Google Earth, the authors surveyed the entirety of the Khorat Plateau identifying sites by the distinctive moat and embankment sequence and raised elevation over the central mound (O'Reilly and Scott, 2015). Given that the dataset used by the previous researchers has been considerably augmented, the authors here revisit the issue of site distribution to evaluate whether the results presented by Moore and Welch and McNeill remain valid.

The majority of sites identified by Moore, Welch and McNeill were identified based on their morphology and most were not dated. Providing absolute dates for the majority of the newly identified moated sites is difficult as it would require hundreds of excavations. McGrath and Boyd, however, have undertaken direct AMS dating along

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http://dx.doi.org/10.1016/j.ara.2017.05.005
Received 23 November 2016; Received in revised form 5 May 2017; Accepted 24 May 2017

Fig. 1. South East Asia. Colored section marks North East Thailand.

transects of moats at several sites including Ban Non Wat, Noen U-Loke, Ban Non Khrua Chut, and Ban Makham Thae (McGrath and Boyd, 2001). Their research places the construction of the moat and embankment earthworks between c. 1–600 CE.

Several potential functions for the earthworks have been theorized over the last half a century of research. Explanations have included defence (Vallibhotama, 1984; Nitta, 1991), aquaculture (Vallibhotama, 1984; Higham and Thosarat, 1998), flood protection (McGrath et al., 2008), symbolism or ritual (O'Reilly, 2008), and water storage for domestic consumption as well as providing some mitigation for drought conditions (O'Reilly, 2014; Scott and O'Reilly, 2015). Scott and O'Reilly (2015) recently examined a wide range of aspects of site characteristics including soil permeability, annual rainfall, density of sites, elevation, and number of moats per site. Based on this work a correlation appears to exist between site locations and number of moats, with the availability of water. The results are strengthened by concurrent climatic shifts of the mid-late Iron Age.

A growing body of research since the beginning of the 21st century continues to reveal hydrological and environmental changes occurring in the region roughly 2000 years ago (Wohlfarth et al., 2016; Boyd and McGrath, 2001; Boyd and Habberfield-Short, 2007; McGrath et al., 2008; King et al., 2013). Paleoenvironmental reconstructions illustrate a shift in the water regime in Northeast Thailand away from one centred on a system of ever-present deep, single-channelled water ways fed by year round rainfall. In its place the present monsoonal system came into effect in which the majority of annual rainfall is deposited over a small window of just a few months (Boyd and McGrath, 2001; McGrath et al., 2008). Given the lack of constant replenishing rainwater runoff to feed the large river systems, the hydrology shifted to one of multiple shallow, short lived channels.

3. Geography of Khorat Plateau

The Khorat Plateau spans 170,226 km2 and is separated from northern and central Thailand on the west by the Phetchabun mountain range while its southern border with Cambodia is marked by the Dangrek mountain range (O'Reilly and Scott, 2015). The remaining northern and eastern boundaries are formed by the natural barrier of