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A diachronic reconstruction of the Northern Mesopotamian landscape (4th to 2nd millennia BCE) from three separate sources of evidence

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ABSTRACT

This diachronic study spatially reconstructs the land cover of Northern Mesopotamia using a bottom-up approach that brings together three separate strands of research conducted independently by each of the authors examining three independent lines of evidence: seed/grain, charcoal, and isotope data. The results nonetheless provide a unified picture of a diverse and changing landscape with different types of steppe and riverine forests across Northern Mesopotamia from the fourth through second millennia BCE.

1. Introduction

Previous written interpretations regarding natural land cover in Northern Mesopotamia, particularly during the Late Chalcolithic period (4400–3100 BCE), range in their interpretations from dwarf shrubland through grassy open oak woodland (Bottema and Cappers, 2000, 38; Deckers, 2011a, 94–95; Wilkinson and Tucker, 1995, 37; Wossnik, 2009, 19; van Zeist and Bottema, 1982). The only spatial reconstructions of past land cover that include northern Mesopotamia are by van Zeist and Bottema (1991, Fig. 8) and Moore et al. (2000, Figs. 3.18a-d). van Zeist and Bottema (1991, Fig. 8) present a 1:4,000,000 scale map for 8000 BP (a mid-point of the palynological data sources it draws upon, which date between 10,000 and 5000 BP) that shows dwarf shrubland across the North Jazira with cold-deciduous broad-leaved montane woodland on the hills (van Zeist and Bottema, 1991, Fig. 8). Moore et al. (2000, Figs. 3.18a-d) present spatial reconstructions for time slices at 13,000 BP, 11,000 BP, 10,500 BP, and 9000 BP, which also indicate the presence of various types of steppe and woodland. The possibility of woodland may seem surprising, but the seminal geobotanical study of Iraq, hypothesizes that the modern natural land cover of the North Jazira, even in the relatively dry climate of the present-day, could be open oak park-woodland (termed steppe forest), if not for modern human impact on the environment (Zohary, 1973, 651–653). A spatial reconstruction of the modern natural landscape by Hillman in Moore et al. (2000, Fig. 3.7) agrees, placing the North Jazira at the boundary between a band of oak-*Rosaceae* park woodland to the north and a region of terebinth-almond woodland steppe to the south. Alongside climatic models, these studies and their varied conclusions have been used to understand the natural environment within which people operated in and the potential for agriculture, pastoralism/grazing land, and the presence or absence of wood in different locales; as well as for providing a partial explanation for cultural expansions and collapses (see, for example, Clarke et al., 2016; Kalaycı, 2013; Lawrence, 2012; Ur, 2010, 5–8; Algaze, 2008; Wilkinson, 2003, 15–17, 100–105; but also Fyfe et al., 2010, 156–157).

The limitation of these descriptive reconstructions is that they are necessarily broad in nature, not allowing for internal variation beyond perhaps mention of some riverine woodland along the waterways or another land cover type on the hills. This becomes particularly problematic for landscape archaeology studies that wish to factor land cover into their calculations, whether for route analyses, site catchment analysis,

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optimal foraging theory models, or any other type of analysis that involves movement across space. The spatial reconstruction by van Zeist and Bottema (1991), which pre-dates the time periods presented here, is based exclusively on pollen cores and appears to map the data like a meterologist might draw isohyets: by drawing lines between groups of point values to create zones (van Zeist and Bottema, 1991, Fig. 8). This is probably why the map is such a small scale (1:4,000,000). The reconstructions by Moore et al. (2000, Figs. 3.18 a-d) are similarly small-scaled (though the precise scale is unstated) based on four sample locations: Lake Hula in modern Israel, Ghab Valley in modern Syria to the west, and Lakes Zeribar and Mirabad in the Zagros Mountains to the east. By contrast, the maps presented here use relatively local archaeobotanical and anthracological data (within 100 km of the study area) and isotope values to reconstruct the land cover at a mixed scale of 1:500,000 and 1:1,000,000 for four different time periods: the Late Chalcolithic (LC, 4400–3100 BCE), the early Early Bronze Age contemporary with Ninevite V material culture corresponding to the Early Jazira periods 0-3a (EJZ0-3a, 3100–2500 BCE), the Middle Bronze Age (MBA, 1900–1600 BCE), and the Late Bronze Age (LBA, 1600–1200 BCE).

Methodologically, this paper provides a bottom-up alternative to the recent top-down reconstruction of land cover presented by Soto-Berelov et al. (2015) for the Levant, which makes use of machine learning techniques to predict where modern vegetation types would be located given historic climatic data. Similarly, this paper differs from the spatial reconstruction of land cover by van Zeist and Bottema (1991, Fig. 8), which relies on generalized modern vegetation types from Frey and Kürschner (1989) for its interpretations of land cover. Rather, this paper's approach is based, in part, on the Muir Web method by the Mannahatta Project (Sanderson, 2009) is significant, because it enables the reconstruction of land cover types not presently represented in the modern landscape, which is particularly important for reconstructions of periods pre-dating the present climate and avoids the assumption that the present range of ecozones is representative of the full range of possible ecozones that have ever existed.

2. Background

2.1. Physical setting

The Jazira is located between the Tigris and Euphrates rivers (Fig. 1). It is bound to the north by the Taurus mountain foothills and to the south by the southern limit for rain-fed agriculture, marked approximately by a band of hills, most notably, the Jebel Sinjar and Jebel Abd al-Aziz (Wilkinson, 2003, 100–101). Between the foothills and the jebels/hills, the area is extremely flat and forms only a very shallow basin (Wilkinson and Tucker, 1995, 3). Since the third millennium BCE, this flat landscape has become punctuated by tell sites, mounded settlements, whose heights increased over time with continued habitation, sometimes reaching dozens of meters in height (Wilkinson, 2003, 108–109; Wilkinson and Tucker, 1995, Appendix C).

Two major rivers flow in the modern Jazira, the Balikh and the Khabur, but evidence suggests the Wadi Jaghjagh and Wadi Jarrah, which currently run dry during the summer, were perennial waterways with increased discharge during the mid-fourth to mid-third millennia BCE (Deckers, 2011a; Deckers and Riehl, 2007; Wilkinson, 2003, 101). Additionally, numerous wadis (non-perennial waterways) channel water during the wet season towards either the Euphrates or Tigris (Wilkinson, 2003, 101). The exact locations of the waterways, including the rivers, have shifted over the last several thousand years (Jotheri et al., in press; Deckers, 2011a; Heyvaert and Baeteman, 2008; Deckers and Riehl, 2007; Wilkinson, 2003, 103; Verhoeven, 1998; Wilkinson and Tucker, 1995, 4–5). In addition to the waterways, there are some springs in the North Jazira in the south near the band of hills, including Jebel Sinjar, and towards the north, nearer the Taurus foothills; but, historically, water is obtained from hand dug wells (Wilkinson and Tucker, 1995, 10–11).

Hollow ways, route features formed by erosion through repeated use, radiate from mounded tell sites and sometimes string together to form long-distance routes across the Jazira, have also captured and directed rainfall and water run-off since their formation in the third

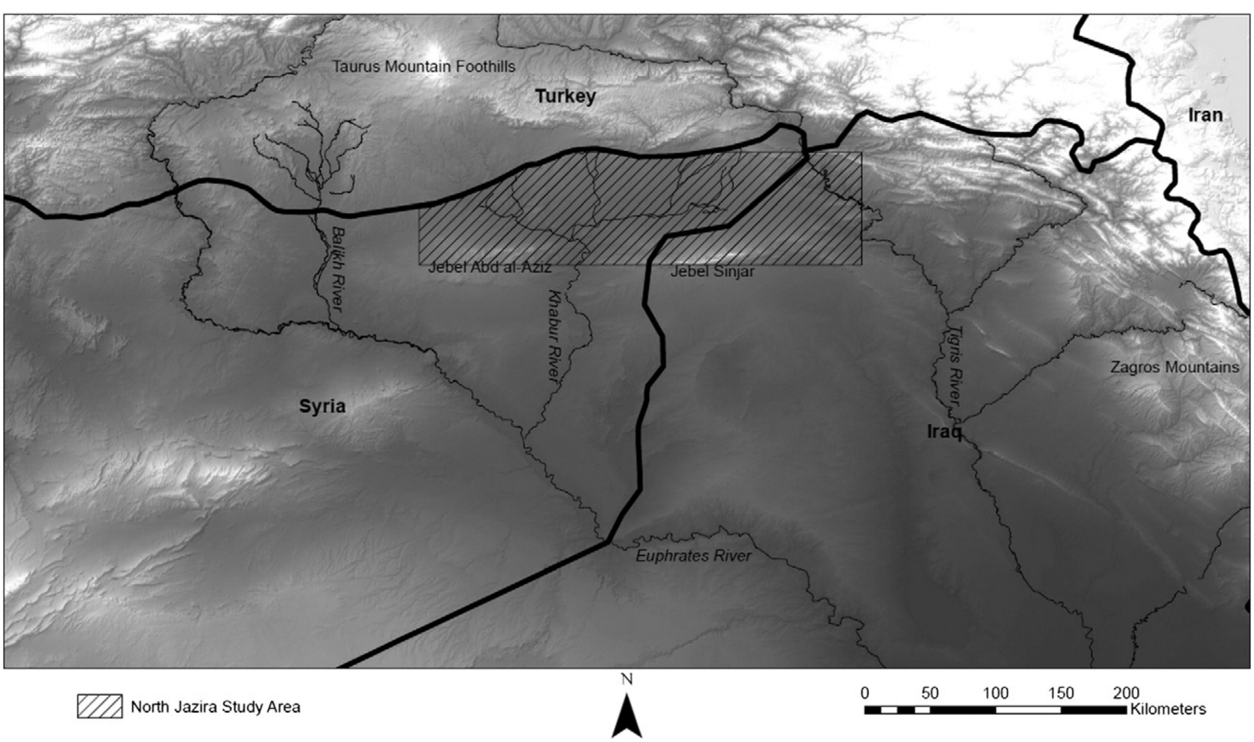

Fig. 1. The Jazira is located in northern Syria and north Iraq, bounded by the Euphrates River in the west, the Tigris river in the west, the Taurus Mountain foothills in the north, and to the south by the southern limit for rain-fed agriculture.