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Settlement ecology in Bronze Age Messenia

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ABSTRACT

In this paper, we model patterns of expansion and contraction of settlement in Bronze Age Messenia (ca. 3100–1050 BCE) using the ideal free distribution (IFD). We rank potential settlement locations on the landscape using environmental and cultural variables, including watershed size, which is a proxy for fresh water availability, net primary productivity, and the distance to the location of the Palace of Nestor at Pylos, a central site of political importance throughout most of the Bronze Age. The settlement chronology for the region is derived from an existing database of survey data and conforms to the predictions of the IFD. The highest-ranked habitats were settled first and the population expanded to lower-ranked habitats as population density increased. The data also conforms to the IFD prediction that important political centers should follow the same pattern, expanding from higher- to lower-ranked habitats. This model helps to provide an understanding of the effects of the unique environmental and cultural landscape of the region on settlement prior to the rise of the major Mycenaean centers in mainland Greece. The application of the IFD to a sociopolitically complex case demonstrates its broad potential for understanding historical trajectories in settlement patterns throughout the world.

1. Introduction

Largely because of disparate research traditions within archaeology, the Classical world has been investigated through the prism of Human Behavioral Ecology (HBE) to a lesser degree than many parts of the New World. Although HBE was initially applied primarily to mobile hunter-gatherer populations, more complex societies have increasingly become the subject of similar models in the past several decades (e.g., Smith and Winterhalder, 1992; Winterhalder and Smith, 2000; Kennett and Winterhalder, 2006; Codding and Bird, 2015). One HBE model that has received increasing attention by archaeologists has been the ideal free distribution or IFD (Åström, 1994; Fretwell and Lucas, 1969; Fretwell, 1972; Sutherland, 1983, 1996; Treganza, 1995), which is well-suited for understanding the effects of a range of environmental and socioeconomic factors on human settlement and broader patterns of decision-making and culture change (e.g., Kennett, 2005; Kennett et al., 2006, 2009; Kennett and Winterhalder, 2008; McClure et al., 2009; Winterhalder et al., 2010; Culleton, 2012; O'Connell and Allen, 2012; Jazwa et al., 2013, 2016b; Codding and Jones, 2013; Giovas and Fitzpatrick, 2014; Moritz et al., 2014; Codding and Bird, 2015; Jazwa, 2015). In this paper, we expand the reach of this model to test predictions about patterns in the expansion and contraction in the number and distribution of settlement sites in Bronze Age (ca. 3100–1050 BCE) Messenia, a region in the southwestern Peloponnese, Greece (Fig. 1).

One of the reasons that the IFD has gained traction among archaeologists and anthropologists is that it is readily scalable, both geographically and in terms of sociopolitical complexity (see Jazwa et al., 2016b). In general, the IFD uses measures of habitat suitability to generate testable predictions about population distributions and movement (Fig. 2). This can be done on large (e.g., Kennett et al., 2006; Allen and O'Connell, 2008; Fitzhugh and Kennett, 2010) and small (e.g., Culleton, 2012; Jazwa et al., 2013, 2016b) scales. The IFD has been used to understand settlement on an island-wide scale (Winterhalder et al., 2010; Jazwa et al., 2016b) and within an individual Maya polity (Culleton, 2012), but also larger scales like the initial settlement of California (Codding and Jones, 2013), the Pacific Islands (Kennett et al., 2006; Kennett and Winterhalder, 2008), and the Caribbean (Giovas and Fitzpatrick, 2014).

To establish a particular IFD model, the relative suitability of different habitats is calculated using the spatial distribution of a chosen set of environmental resources and the cultural factors which influence their value. The IFD predicts that people will first settle the habitat with the highest overall initial (prior to human

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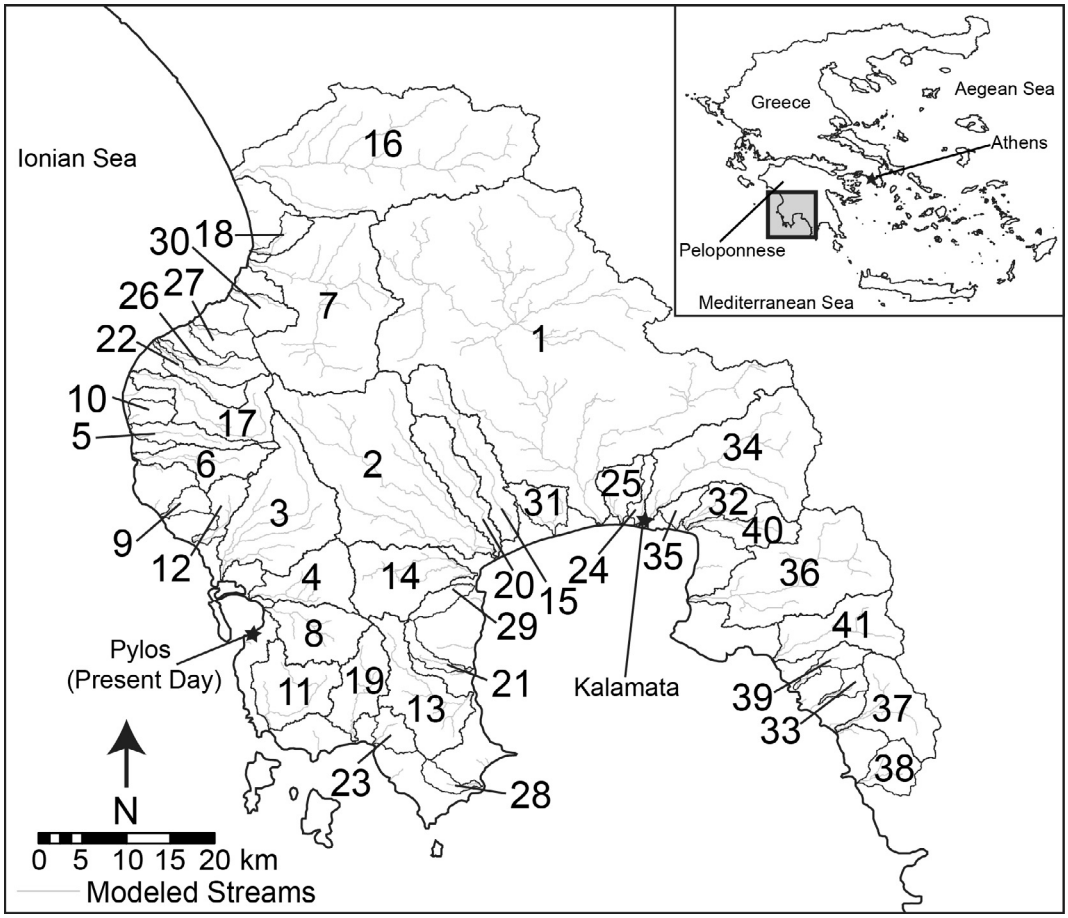

Fig. 1. Messenia, with modeled streams and the outlines of all watersheds considered in this study. Numbers are the overall rank of each drainage within the IFD. These ranks are the labels used to distinguish each watershed throughout this paper.

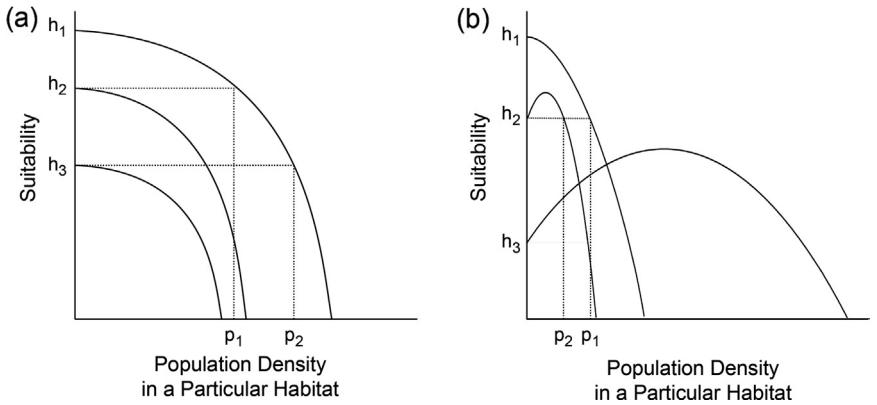

Fig. 2. Graphical representation of the IFD: (a) habitat suitability in three habitats as a function of population density. p_1 and p_2 are the populations at which habitat-specific suitabilities are equivalent between habitats. (b) the same representation with Allee effects, in which suitability correlates positively with low population densities (after Kennett et al., 2009:300, Fig. 20.1; Winterhalder et al., 2010:473, Fig. 3; Jazwa et al., 2013:78, Fig. 5.2).

influence) suitability. As people move into the habitat and population density increases, the exploitation and depletion of resources, along with interference competition, cause a decrease in the effective suitability of that habitat. Eventually, it will be advantageous for the population to expand into and settle lower ranked habitats.

A series of more specific predictions are related to these general ones (see Kennett et al., 2009; Winterhalder et al., 2010; Jazwa et al., 2013, 2016b). The ideal despotic distribution (IDD) is a variant of the IFD in which the inhabitants of a high-ranked habitat choose to defend a disproportionate share of resources. This impedes in-migration, which in turn prompts an expansion of the population to lower ranked habitats earlier than would be predicted by the IFD (Summers, 2005; Kennett and Winterhalder, 2008; Kennett et al., 2009, 2013; Culleton, 2012; Bell and Winterhalder, 2014; Jazwa, 2015; Jazwa et al., 2016b).

Messenia is a prime candidate for applying the IFD model to Bronze Age Greece because of the rich settlement data and preservation of the Bronze Age remains. The archaeological potential of Messenia remained relatively unexplored until the 1930s, partly because of peculiar historical circumstances of the region during