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## Archaeology, hydrogeology and geomorphology in the Stymphalos valley

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## ABSTRACT

This paper uses the results of recent excavations of the city of Stymphalos and environmental studies on the floor of the Stymphalos polje to examine the role of both the lake and springs in the history of the classical city. Associated with Artemis and famed for Herakles' sixth labour (killing of the Stymphalian birds), the city has a rich (geo)mythology. While this narrative has been associated solely with the lake, it is argued here that this geomorphology was part of the city's relationship to environmental unpredictability and the relationship between water supply and water loss. Seen in this context, the construction of the fountain-house above the contemporary lakeshore is symbolic of the importance of springs to the foundation and sustainability of the classical city during both the Greek and Roman Periods. Through these archaeological and environmental analyses, we seek to illustrate the complimentary, but complex nature of archaeological, hydrogeological and palaeoenvironmental data that intersect in the geomorphological landscapes of Mediterranean antiquity.

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## 1. Introduction

The social memories associated with different landscapes are co-constructed via a complex intersection of monuments, natural features, stories and myths, to name but a few elements that constitute social memory (Van Dyke, 2008). While it has been long recognised that natural features, such as rock outcrops or rivers, are imbued with cultural meaning (Bradley, 2000), relatively little palaeoenvironmental (palaeoecological and geoarchaeological) research explicitly engages with the question as to how certain complex environmental processes may underpin the development of myths and memory in Mediterranean landscapes.

Many places are imbued with layers of meaning that are cumulative and mutable (Van Dyke, 2008: Kindle Location 10,205). Such is the case of Stymphalia, best known as the site of Herakles' killing of the man-eating birds, but also associated with Artemis, who in turn may have deeper (Minoan-Mycenaean) antecedents that lay with Potnia, a female figure associated with the natural world (Thomas and Wedde, 2001). The figures and myths referred to above are all associated with wetlands, and such stories and deities exist scattered across time and space within the Mediterranean world, and indeed, globally. Despite their importance, climate and hydrogeological conditions are a critical but often under-researched environmental combination in the archaeology of the Mediterranean region (Butzer, 2011; Rosen, 2007), and there is hardly any palaeoenvironmental research that addresses the development of these particular cultural aspects of past landscapes.

Much of the palaeoenvironmental work that has taken place in Mediterranean wetlands has understandably focused on the description and explanation of environmental changes with people considered a driver of certain environmental processes (e.g. vegetation clearance, erosion) (Dusar et al., 2011; England et al., 2008; Woodbridge and Roberts, 2011) and also at the mercy of certain natural processes (e.g. earthquakes, storms). In some cases, projects have also considered resource potential, and the relationship between site distribution and wetland characteristics (Benjamin et al., 2011; Farinetti, 2009; Karkanas et al., 2011; Perlès, 2001). Meanwhile, certain classicists or ancient historians have considered the cultural role and perceptions of wetlands. Here, the emphasis is often placed on how ancient writers, such as Herodotus, Thucydides, or Aristotle characterised wetlands vis à vis their economic value (e.g. medicinal plants), the risks that they posed to health, or even their strategic military role (Châtelain, 2007). In addition, archaeological projects have revealed detailed evidence relating to the physical characteristics and chronologies of certain temples. For example, in the Hellenistic town of Lousoi (Arcadia), Artemis' temple was expanded at c. 300 BCE, indicating the start of a period of activity running through to the first century AD (Mitsopoulos-Leon, 2011). Most recently, a synthesis of archaeological and palaeoenvironmental research from across the Peloponnese has assessed possible links between past environmental changes in developments in settlement and economy from the Neolithic to the Medieval Period and found overall a lack of correspondence (Weiberg et al., 2016), but this is not surprising given the problems of site visibility and survival and the relatively poor temporal resolution of both datasets. As they suggest, the key to understanding societal change was local socio-political processes (ibid.) and this includes culture and mythology. From the mythological perspective, scholars have

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considered the distribution of sanctuaries and their relationships with environmental features, including springs (Jost, 1996) or even soils (Retallack, 2008). While others have assessed the specific nature of rites associated with different sanctuaries and deities (e.g. Rougement, 2011), or the heterogeneity of rites and the variation in the roles and interpretations of deities and sanctuaries across Ancient Greek urban and rural spaces (Osborne, 1987). None of these approaches has employed palaeoenvironmental evidence with the explicit aim of assessing the relationship between wetlands and wider issues of ideological, cultural and mythological processes, and the manner in which these influenced human perceptions of, and thereby, interaction with these environments (see Table 1 for examples of some key Mediterranean wetland projects).

## 2. Background: Stymphalos, archaeology, environment and mythology

### 2.1. Constructing geo-mythologies

Over many years, archaeologists have studied the remains of the mountain city of Stymphalos situated on the lake edge (Gourley, 2005; Gourley and Williams, 2005; Williams et al., 2002). Although the precise location of the first early city (c. 700–375 BCE) remains unknown, logically it should have been close to a permanent water supply, the most obvious candidate being the lake. The later classical city has been the object of much research, which is summarised below. However, the nature of the physical and cultural relationships between the lake, the city, and the valley floor and slopes are poorly understood. Indeed, we had no data regarding the extent of the lake at the time when the city flourished before the research presented in this paper.

The site of Stymphalos (modern Stymfalia) situated in the Arkadian mountains, is 41 km south-west of the town of Kiato on the Corinthian Gulf (Fig. 1). Although many Mediterranean landscapes have been subject to landscape survey, the landscape around the lake at Stymphalos has seen relatively little research. Moreover, the environmental history and the management of natural resources in this area during the Classical Periods are poorly understood. Consequently, a landscape and environmental project was designed to investigate the palaeoenvironmental characteristics of this landscape. This research is required in order to enhance our understanding of the ways in which protohistoric societies engaged with, and mythologised both this enigmatic landscape and environmental change.

Some ancient historians claim that only texts provide precise information on the nature of ancient religion, in particular, the specifics of certain rites (Rougement, 2011). Although this is true vis a vis the attitudes of those who produced the texts, we also require interdisciplinary approaches that combine archaeological, palaeoenvironmental and historical evidence if we are to understand the origins of certain rites and sanctuaries and their possible relationships with wider natural and socio-economic processes. Such approaches can elucidate the origins

and development of ritual-landscape hybrids; processes that are rarely articulated in ancient texts.

Although Pausanias' fusion of history and mythology can cause confusion, his accounts reveal how toponyms were often constituted via associations with deities whose stories were usually associated with one or more element in the natural world (Saïd, 2011). Mythology and geomorphology connect as societies develop interactions with different parts of a landscape and develop forms of environmental knowledge which, although different from modern post-enlightenment scientific understandings, are in their own way internally consistent, offering explanations for processes that might be only partially or poorly understood. Climate and hydrogeological conditions are an implicit, or even explicit, part of the mythological comprehension of natural phenomena or 'geomythology' (Vitaliano, 1973). These two discourses are both particularly evident in relation to the valleys of the northern Peloponnese and Lake Stymphalos; famous as the place where Herakles carried out his legendary sixth labour of killing the Stymphalian birds (Bulfinch, 1856). Employing a Durkheimian view of religion, we would agree with Kopaka in that religion, and in this context, that many deities, including Potnia (a deity considered to be Artemis' antecedent, with possible Mycenaean/Minoan origins), are part of a religious phenomenon that "defines, encodes and orders the actual, physical structures, attitudes and experiences of the human groups it represents" (Kopaka, 2001: 15). Potnia's powers, including the ability to change animals into men, all suggest "civilising power over both nature and mankind" (ibid. 23). Moreover, as Osborne observed for the Classical period, "... Greek religion can validly be seen as 'problem solving'. By his religious actions man reconciled himself to the natural and human environment" (1987: 166).

Apart from the Stymphalian birds, the lake was also known for its unpredictable changes in level, from suddenly filling the entire valley floor to disappearing entirely. This problem was recounted by the Romanised Greek traveller Pausanias (b. 120 CE) who was known for his documentation of the human and natural geography of Greece between 145 CE and 180 CE (Clendenon, 2010). Pausanias recounts at least two occasions when the sinkhole ('chasm mouth', see Fig. 1) became blocked, and the lake flooded the valley floor followed by almost instantaneous drainage. The narrative of both events, the flooding and the drainage, involves the swallowing up of a deer and a hunter into the 'underworld' which was the general mythological conception of the karstic subterranean realm (Clendenon, 2009a). In an earlier 4th century BC narrative recounted by Strabo, Iphicrates, an Athenian general, besieged the city and tried to flood the area by blocking the sinkhole with a large quantity of "sponges" but gave up when Zeus sent an omen from the sky (Clendenon, 2009b). It is hardly surprising that stories of such dramatic changes in a landscape contributed to the creation of myths of supernatural forces related to the subterranean world before the understanding of karstic hydrology in the 18th century (Biswas, 1972). These stories and their contribution to the social memories of this landscape need to be scrutinised via reference to

**Table 1**  
Some examples of typical research in Mediterranean wetlands.

Site name	Region	Chronology	Nature of wetland	Research theme	References
Gla	Boeotia, Greece	Mycenaean	Wetland/marsh	Settlement in, and management of landscape	Iakovidis (2001)
Multi-site	Boeotia, Greece	Archaic – Late Roman	Mix of wetlands, valleys	GIS analyses of site distributions and landscape	Farinetti (2009)
Pontine	Central Italy	Roman	Wetland/marsh	Settlement in and management of landscape	Attema and de Haas (2005), Walsh et al. (2014)
Sagalassos	SW Turkey	Roman-Medieval	Lake & marsh	Human exploitation of landscape, vegetation change	Bakker et al. (2012), Vermoere et al. (2002)
Domuztepe	SE Turkey	Holocene	Alluvial landscape with wetland/marsh	Landscape change, relationship between environment/resources/settlement location	Benjamin et al. (2011)
Dispilio	Nth Greece	Neolithic	Lake	Site, lake environment and economy	Karkanis et al. (2011)
Multi-site	Thessaly	Neolithic	Wetlands	Landscape change, relationship between environment/resources/settlement location	Perlès (2001)

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