



**BANEA**  
British Association for Near  
Eastern Archaeology



University of  
**Reading**

## **New Agendas in Remote Sensing and Landscape Archaeology In the Near East**

*A workshop celebrating T.J. Wilkinson's 35 years in Near Eastern archaeology*

**Friday, 10 January 2014**

**Palmer Building, University of Reading, 9:30 am – 5:30pm**



The field of landscape archaeology has been transformed enormously over the past 35 years, and for much of this time Tony Wilkinson has been at the vanguard of this advancement. With 5 current major research projects spanning the Middle East, Central Asia, and Eastern Europe, encompassing big issues such as long-term settlement trends, the rise and collapse of empires, the emergence of urbanization, agent-based modeling, hydrology and human niche construction, to name but a few, Wilkinson continues to demonstrate the importance of an interdisciplinary approach for understanding the impact of human activity on shaping the landscape and, conversely, the profound effect that landscape has on sociocultural development. His innovative field methods and pioneering intellectual pursuits in landscape archaeology – which have resulted in his gaining the dubious distinction of being labeled a “Post-Post-processualist” -- have also brought about numerous fruitful collaborations with scholars across many disciplines and have contributed to exciting new work by an ever-growing succession of scholars now forging uncharted intellectual pathways and exploring new agendas in remote sensing and landscape archaeology.

This session is intended to provide a forum for lively discussion on some of the most recent developments in landscape archaeology, highlighting Wilkinson's continuing research and his influence on the field by featuring the work of a representative group of his current co-investigators, colleagues, and students whose projects embody the breadth of possibilities resulting from harnessing remote sensing techniques for comprehending past societies. Focus will be on areas of the Near East that have been previously uninvestigated or are now inaccessible, as well as on the creative use of new technologies and methods for making cultural heritage meaningful to a wide audience. Speakers will address the challenges faced by archaeologists in the field today, and the tools, techniques, and theoretical approaches available to resolve them within the framework of landscape archaeology. Presented papers, along with other invited contributions, will be collected in a volume published by the Oriental Institute Press (Chicago), edited by Mark Altaweel, Graham Philip, and Dan Lawrence.

## Workshop Presentations

### Introduction

#### ***McGuire Gibson (University of Chicago)***

Tony Wilkinson stands as a pivotal figure in the field of landscape archaeology. The pioneering work of Poidebard, Jacobsen, and Adams and his students in the Near East, paralleling developments in other parts of the world (e.g., Viru Valley, Peru) did not have the benefits of both Wilkinson's training in and utilization of geography/geomorphology/ecology, or the availability of satellite imagery. The adoption of remote sensing by archaeologists has revolutionized our field, making available a record of the landscape that is not subject to the constraints placed on earlier access to aerial photographs and maps by governments that viewed such instruments as highly dangerous. Great strides have been made in the past two decades in interrogating the landscape through a variety of techniques. The range of topics to be presented here today gives a fair idea of the span of interests and approaches that Wilkinson has ignited in others.

### **The Search for hidden landscapes in the Shahrizor**

#### ***Mark Altaweel (University College London)***

While remote sensing and satellite imagery have enabled some perspective of past landscapes in other parts of Mesopotamia, in regions such as the Shahrizor, where landscape taphonomy and high sedimentation via alluviation are evident, offsite features and settlement and landscape relationships are far more difficult to reconstruct. Recent work, by University College London, University of Munich and University of Heidelberg in the Shahrizor valley, is beginning to utilize a range of paleoenvironmental analyses to determine climatic, land use and ecological characteristics starting in the early Holocene. Evidence for very different landscape conditions than today's setting are beginning to emerge, while evidence for intensive cultivation and settlement location provide a picture of the region and its economic underpinnings during the Holocene. Complimentary to this, the integration of settlement survey data and computational models allow the process of settlement distributions and urban patterns to emerge in relation to paleoenvironmental events. Techniques, only beginning to be applied in Mesopotamia, offer the potential to reveal the region's past social-environmental setting. This presentation provides a summary of recent works in this type of research and future directions are given that highlight key potential findings in forthcoming work.

### **Mapping and modelling the 'Invisible Dead': Reconstructing demographics in the ancient Near East**

#### ***Jenny Bradbury (Durham University) & Graham Philip (Durham University)***

The reconstruction of ancient demographics has traditionally drawn upon estimations of settlement size, remote sensing techniques, census data and anthropological analogies. These focus on the analysis of 'living' populations and there have been relatively few attempts to understand and examine these models in relation to 'mortality' populations over the long term. Whilst it is often assumed that formal disposal of the dead was the norm in the past, an analysis of long term changes in burial practice in the Levant indicates marked temporal and spatial discontinuities. Some periods and regions have produced so few burials that the practice appears to be the exception rather than a norm. While these patterns might once have been dismissed as reflecting the uneven pattern of fieldwork, this view is no longer tenable. Drawing upon work carried out as part of the *Fragile Crescent* and *Invisible Dead Projects* (Durham University) this paper will reconsider the variable significance of the dead in relation to past populations. Can we identify specific regions or periods in the archaeological record where modelled 'living' demographics tell a completely different story to those derived from contexts with human remains? If so, why might this be the case and how can mapping and modelling the 'Invisible Dead' help us to explore big issues such as long term settlement trends, the emergence of urbanization and concepts of the individual within the archaeological record?

### **Extrapolating Ebla: Combining Remote Sensing, Survey and Textual Sources to define an Early State**

#### ***Dan Lawrence (Durham University) & Sébastien Rey (Université de Liège)***

Remote sensing in Near Eastern archaeology has primarily been used as a prospection tool for locating new archaeological sites in advance of field survey. More recently, scholars have begun to map sites at a far larger scale, making use of sophisticated algorithms and computational techniques as well as simple visual examination. Whilst these approaches have produced a huge number of potential new sites, in order to make meaningful statements about the past more information is required, particularly in relation to periodization. This paper will present a method through which this problem may be at least partially

overcome. Using a regional scale database of surveyed sites developed through the Fragile Crescent Project, we show how particular morphologies of site can be related to particular periods in areas where good survey data is available. Importantly, survey data can also show us the kinds of sites which may be less visible on the imagery, and therefore missing from the remotely sensed record. We can then extrapolate from surveyed to un-surveyed areas to produce a more coherent understanding of regional settlement patterns. We apply this method to a particular site morphology, the high conical tell, which we argue can be linked to the BAD3 settlements recorded in the Ebla texts. Mapping the distribution of this site type across the Northern Levant therefore provides insights into the nature and extent of Eblaite power.

### **Beyond survey boundaries: Satellite remote sensing-based classification and dating of archaeological sites in the northern Fertile Crescent**

***Jesse Casana, University of Arkansas***

While regional analyses of settlement patterns have been a foundational component of archaeological interpretation for decades, the painstaking requirements of ground-based reconnaissance have necessarily limited the scale of even the most ambitious projects. The growing power of aerial and satellite-based remote sensing to reveal archaeological features now offers the possibility to explore past settlement and land use at much greater scales than previously possible, beyond survey boundaries and across national borders. In the Near East, declassified, 1960s-era CORONA satellite imagery has proven to be a key resource for identification and mapping of archaeological sites and features, largely because it preserves a picture of the landscape prior to recent urban expansion, agricultural intensification, and reservoir construction. Whereas most past efforts to utilize CORONA imagery in archaeology have focused on individual sites or small survey areas, my research team has recently developed new methods for efficient geometric correction of the imagery and has produced a CORONA image database covering the entire Near East. This paper presents results of ongoing research that seeks to exploit the phenomenal potential of this resource through the systematic mapping of all visible sites and features across the northern Fertile Crescent, a study area of 300,000 km<sup>2</sup>. Morphological analysis of more than 20,000 sites within the region, combined with remote sensing-based modeling recent and paleo-environments, now reveals previously unrecognized trends the spatio-temporal distribution of cultural modes of settlement in the Near East and offers a model for similar regional-scale research in other parts of the world.

### **Attrition, destruction and survival: Landscape taphonomic processes and the future of near eastern landscape archaeology**

***Andrea Ricci (German Archaeological Institute, Eurasia Department, Berlin)***

Landscape transformations play a crucial role in the preservation or loss of landscape features. Ancient and modern physical and cultural taphonomic landscape processes operate in a gradual loss of data through time. With constant increasing urbanisation and intensifying agricultural practices, more and more portions of land are removed, leaving a biased and misleading record to us. Ultimately this affects the quality of the recovery of ancient human occupation traces. Within the same region divergent taphonomic processes might occur, and opposite patterning of landscape loss or preservation might be observable at very close distances. Drawing examples from northern Mesopotamia, southern Caucasia and eastern Anatolia, this paper applies the key concepts of “landscape of survival” and “landscape of destruction” to investigate examples of ancient and modern taphonomic mechanisms. This study identifies not simply zones where the likelihood of landscape preservation is higher or lower, but aims to shed light on the economic, environmental and political factors behind such transformation processes. The ultimate goal is to suggest some possible future research perspectives for Near Eastern landscape archaeologists, including the application of heritage policies for the protection of parts of landscape.

### **How the Hollow Ways got their Form (and kept it): 5000 years of Hollow Ways at Tell al-Hawa**

***Emma Cunliffe (Durham University) & Michelle de Gruchy (Durham University)***

The importance of the linear valleys, known as hollow ways, in relation to early settlement interaction in the North Jazira in Iraq has become increasingly apparent with recent improvements in remote sensing. Although they are present in large areas of the Middle East, their formation and use is still poorly understood. Despite substantial landscape change, some linear valleys are estimated to be at least 5000 years old, and yet are still visible today. Whilst some work has been done to quantify the importance and effects of environmental variables relating to hollow way formation, this paper will demonstrate a new methodology for quantifying individual variables against the preserved hollow ways. Cultural variables, in particular the importance of situational social hierarchies, will be assessed for the potential role in hollow way formation. Was it necessary for travellers to visit the local headman before travelling through a territory? Route formation and use can provide vital insight into many aspects of early society, including

social structure, trade and exchange to name a few. However, the data on which this evidence is based is vanishing before our eyes. This paper will then examine the extent to which modern cultural impacts have affected the data we are so reliant on and discuss the impact this may have on future analyses.

### **The Gorgan Wall's garrison revealed via satellite search**

***Eberhard Sauer (University of Edinburgh), Hamid Omrani Rekavandi (Durham University/University of Edinburgh) & Dan Lawrence (Durham University)***

Until 2006 nobody knew what the interior of the over 30 forts on the Gorgan Wall looked like. Small-scale excavations in the 1970s had revealed some traces of walls, but not enough to reconstruct even a single building. The size and function of any permanent structures, and how much or little of the interior they filled, was a matter of speculation. Were forts perhaps largely empty and only occupied in times of crisis by peasant soldiers? As part of a joint project between the Iranian Cultural Heritage, Handcraft and Tourism Organization and Universities of Edinburgh and Durham, a magnetometer survey by Abingdon Archaeological Geophysics and subsequent excavations proved such assumptions to be utterly mistaken. Eight large buildings in four neatly parallel rows emerged in one fort, each containing 48 rooms at ground-floor level, most probably barracks for a well-organised professional army. Whilst in some forts one can still see today parallel long mounds, it was only then that the significance of these substantial features was recognised. The interior of many forts had already been ploughed flat by the time this discovery was made. The remote sensing programme of the joint project proved a major asset, as it enabled detecting barracks on CORONA images of the 1960s of which no trace remains above the ground. Moreover, systematic examination of satellite imagery revealed that all then still well-preserved forts contained such buildings, always an even number, with similar patterns also emerging in Upper Mesopotamia – evidence for the Sasanian army being highly organised, perhaps more so than its late Roman adversaries. Remote sensing it appears has the capacity to rapidly reveal the hidden military infrastructure of an empire and totally transform our view of its capabilities.

### **Early Islamic water management in the hinterland of Raqqa**

***Louise Rayne (Durham University)***

My research investigates the development of water management systems in the Balikh Valley, Syria. For a brief period Raqqa was the centre of the Abbasid empire; at the same time, water management in the area seems to have intensified. Because this project is interdisciplinary in nature a range of datasets are used, including elevation models and satellite imagery. Remote sensing techniques were applied to 1960s CORONA images and enabled photogrammetrically-derived elevation models to be produced. This data enabled features to be recorded and compared to survey data. By the Early Islamic period sophisticated systems began to appear in the Balikh Valley. The Nahr al Abbara system in the north of the valley makes use of a ridge of slightly higher ground in order to irrigate a large area; by keeping the main canal on the ridge, offtakes can then flow perpendicular to the main canal down a slope. In the Balikh, very low overall gradients could have been a limiting factor without this kind of careful planning. Further south, a very large system of canals shows evidence of flooding, probably caused by occasional high episodic runoff. A complex pattern of channels indicates repeated attempts to control this runoff; this may have begun as early as the Early Islamic period. The city of Raqqa and the Abbasid palaces nearby had separate water supplies. A qanat (subterranean groundwater collecting channel) supplied Raqqa's canal system. However a separate feature appears to have supplied the palaces with water. This originates as an opening channel but becomes a tunnel in order to traverse an area of higher elevation. Water management reached a peak in development and density during the Early Islamic period: This happened at the same time that Raqqa was the centre of an empire. The presence of the Abbasids was significant; the state possibly directly sponsoring canal construction/modification. The Early Islamic state built on earlier systems, choosing the same locations and re-using some channels, but it was also able to impose new, larger-scale water management systems on the landscape.

### **Dating ancient rivers in the Mesopotamian floodplain**

***Jaafar Jotheri (Durham University), T.J. Wilkinson (Durham University) & Mark Allen (Durham University)***

This study focuses on differences between two methods of dating of ancient rivers: using associated settlements, and using radiocarbon ages of organic material recovered from shallow drilling of ancient river channels identified by remote sensing. Most archaeological studies which have been carried out in the Mesopotamian floodplain have assumed that periods of active river channels are closely linked to the ages of archaeological settlements. Unfortunately, only rarely have absolute dating methods, such as radiocarbon, been applied before to any of these rivers. In this case radiocarbon dating of ancient river

sediments will be applied to the rivers of the Tigris-Euphrates river system in southern Mesopotamia. Nine separate ancient rivers or other channels in the Mesopotamian floodplain have been selected for the purpose of this study. All of these selected rivers have been carefully located by remote sensing and fieldwork which took place in the initial part of this study. In addition, the ages of these rivers have been determined from earlier studies, by the ages of settlements associated with them. In the present study, several boreholes have been drilled across each one of these nine rivers, and fifteen samples of organic materials have been taken from these boreholes for radiocarbon dating. As a result, this comparative study has revealed that in most of the nine cases the ages of ancient rivers are older than the suggested ages of their associated settlements. For example, an ancient river west of Najaf has been dated to the Neo-Babylonian period by radiocarbon dating, while the associated sites are of Sasanian and Islamic periods. On the other hand, in the case of a major river near Uruk there is a close similarity between the ages of the same river derived from each of these methods. In no cases have ancient rivers been shown to be younger than their associated settlements.

### **Complexity and regionality: upper Mesopotamia and the different trajectories towards the formation of social complexity as seen from settlement pattern analysis**

***Marco Iamoni (University of Udine)***

The formation of complexity is a key issue in ancient Near Eastern studies that has been the focus of much attention in recent years. On the basis of a number of case studies from both S and N Mesopotamia (in particular from the Upper Euphrates and Syro-Iraqi Jezirah), it seems that during the Late Chalcolithic multi-level settlement hierarchy emerged, with large urban centres which work as “main poles” around which minor settlements are located. This model seems to work more or less in all of the investigated Mesopotamian case studies (though with minor changes according to the specific region of the Ancient Near East under examination). However, recent data from the Upper Eastern Tigris area in Iraqi Kurdistan seem to suggest the occurrence of an alternative mode of socio-economic development: the evidence appears to be in partial agreement with other models, but the outcome seems to have been radically divergent. The purpose of this paper is to discuss the first indications of this process, taking into consideration also the evidence from adjacent regions in Upper Mesopotamia and to propose a preliminary explanation for its singularity.

### **Searching for Musasir: The Rowanduz Archaeological Program**

***Michael Danti (Boston University)***

In June–July 2013, the Rowanduz Archaeological Program (RAP) conducted its first season of archaeological excavations and surveys in the areas of modern Rowanduz, Soran, and Sidekan in the Zagros Mountains of northeastern Kurdistan (Erbil Province). Excavations at Qalaat Lokan (Rowanduz area) and Gird-i Dasht (Soran area) coupled with archaeological surveys are being used to develop an archaeological chronology and to reconstruct long-term patterns in human occupation in this virtually unexplored region at the northeast outlets of the Rowanduz Gorge (Gali Ali Beg). The occupational sequence revealed thus far spans the Neolithic to the modern era. Emergency salvage excavations and survey in the Zagros Mountains along the Topzawa Çay at the cemetery of Ghabrestan-i Topzawa and the burned settlement of Gund-i Topzawa (Sidekan area) have revealed a strong early Iron Age presence in this region — likely part of the early Iron Age kingdom of Musasir/Ardini. Investigating relations between the Neo Assyrian Empire and the buffer states located to its northeast represents a major RAP objective. Preliminary results indicate excellent preservation of archaeological sites but low surface visibility and low densities of surface artifacts. These factors combined with the highly localized ceramic assemblage, the difficult terrain, and inadequate remote sensing datasets present ongoing challenges to documenting human occupation in the region. In the coming years we will adapt our methods to meet these conditions.

### **Central Planning and Urban Emergence in Early Bronze Age Cities of Northern Mesopotamia**

***Jason Ur (Harvard University)***

The dominant interpretive frameworks for the origins of Early Bronze Age (ca. 2600-2000 BC) urbanism in northern Mesopotamia all revolve around goal-oriented actions of powerful elites: planned creation of cities, their palaces, temples and walls; and the creation and manipulation of intensified staple-based political economies based on centralized storage and redistribution. In other words, EBA cities were largely planned by central decision-makers. In proposing an alternative model, this study employs two approaches that Tony Wilkinson has mastered in the course of his career. Empirically, it draws on the full archaeological landscape, including settlement patterns but also off-site features surrounding and between them. It interprets these data through a dynamic modeling lens based on Wilkinson’s “Modeling Ancient Settlement Systems” (MASS) project, which attempted to see social evolution as an emergent result of

actions of individuals and households, rather than only decisions of kings and other elites. It concludes that urban form in the EBA was a product of social forces outside the concerns (or control) of elite households, and that unambiguous royal interventions in urban structure were reactions to these processes, rather than causative of them.

**Closing Remarks**

***Graham Philip, with Mark Altaweel and Dan Lawrence***