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Archaeological Survey in the Middle Kura Valley, Gardabani, Southeastern Georgia

Archaeological research in the Caucasus lags behind the hotspots of prehistoric research in Western Asia. Comparatively, very little has been investigated and less so published pertaining to the Neolithic (6200-5000 BC) and Chalcolithic (5000-3500 BC) of the region. What we know is pieced together from excavations at different sites that took place during different decades, applying different excavation techniques, and underlying theoretical paradigms. Archaeological surveys that provide a diachronic regional perspective on social developments, until recently (see Anderson et al. 2018; Batiuk et al. in press; Ricci 2017), have been very few, often unsystematic, and rarely published.

For our survey we propose to test a predictive landscape model (Balla et al. 2013; Byrd et al. 2016; Hitchings et al. 2013) that will facilitate the discovery of Neolithic and Chalcolithic sites in the municipality of Gardabani (southeastern Georgia), in an aim to provide a broader regional context for these formative periods. The predictive model will be designed based on data collected during the past two years from our work in the Gadachrili Gora Regional Archaeological Project Expedition (G.R.A.P.E) in Marneuli (Batiuk et al. in press). Our principal objective is designing better survey methods that help understand the Neolithic and Chalcolithic settlement systems more thoroughly than you can on the basis of a few excavated sites. In doing so, we hope to develop a much broader understanding of the changing relationship between population dynamics, settlement structure, and human mobility on the one hand, and changing environmental conditions and land use on the other.

The survey will cover the valley of the lower Georgian Kura River in the municipality of Gardabani. This region is composed of a relatively flat plain contained by the Kura River to the west, the Iori Plateau to the east, the Yagludzha ridge to the north, and the boarder with Azerbaijani to the south. The valley is dissected by a number of permanent and perennial rivers, all which feed into the Kura River. Through this intricate river network (the Kura and its tributaries) the region would have acted as a junction of movement and communication and a point of departure between the open plains of Azerbaijan on the one hand, and the Marneuli plain and the highlands of the southern (lesser) Caucasus on the other. This would have made the region a strategic location for settlement; the open well-watered plain would have provided a rich agricultural basis for occupation, while the connectivity afforded to the inhabitants by the location of the plain would have provided easy access to upland pasture, and highland sources of raw material. These factors would have been conducive to the exchange of ideas and cultural traits and therefore an ideal location for examining population dynamics and interregional interaction across time.

Objectives and Contributions to Understanding the Human Past:

The survey work we intend to carry out in Gardabani aims to address three major concerns pertaining to understanding the human past, and the future of the region:

- This part of the Caucasus remains an archaeological *terra incognita*, which has not received any archaeological attention. This survey will fill a gap in our knowledge that is severely lacking as the municipality of Gardabani remains void of known ancient settlements (see Sagona 2018: 87 Map 3.1). Areas surrounding Gardabani such as the Khrami and Debeda, in the municipality of Marneuli, along with extension of Kura River in Azerbaijan are considered the most significant areas for Neolithic and Chalcolithic research in the region. The established cultures of these periods derive their names from sites in the region such as the Neolithic Shulaveri-Shomu culture (Javakhishvili and Japaridze 1975; Narimanov 1965), and the Chalcolithic Sioni and Tsopi cultures (Nebieridze 2010).

- This region is witnessing major developments that contribute to the destruction and loss of important sources of information on the archaeological past and the cultural heritage of the region. The extension of the BP pipeline passes through the region of Gardabani (Gamkrelidze and Vickers 2010). More threatening however is the infrastructural boom surrounding the pipeline, which makes archaeological work in the region more urgent. This project will contribute significantly to the effort of preserving the heritage of the region by locating and documenting ancient settlements, and sharing this data with the Georgian National Museum, and the Georgian National Agency for Cultural Heritage.
- This region has the potential to answer many research questions regarding settlement and interaction dynamics of late prehistoric populations. The void in our knowledge has led to an incomplete understanding of population dynamics and changes in cultural boundaries during late prehistory. This can be only amplified by the recent systematic loss of the archaeological landscape. For the Neolithic and Chalcolithic periods, Gardabani represents the missing piece of the puzzle that connects the cultures of Azerbaijan on the one hand with those of Georgia and Armenia on the other. The position of this region will potentially allow us to observe cultural dynamics at play across time in a highly connected boundary zone.

Design and Methodology:

Landscape predictive modeling has proven to be an important tool for archaeologists by optimizing search through the reduction of time and cost invested (Hitchings et al. 2013). Landscape predictive models produce a choropleth map with variation in shading or coloring reflecting areas with higher and lower probability of locating the search target. In our case here the search targets are Neolithic and Chalcolithic sites in the lower Kura Valley in Gardabani. The predictive model will be based on the results of archaeological survey work that we have conducted as part of the Gadachrili Gora Regional Archaeological Project Expedition (G.R.A.P.E) over the past two years in the Municipality of Marneuli (Batiuk et al. in press). Before our regional survey, the majority of Neolithic and Chalcolithic sites in this region were last found in the 1960's and 1970's, mainly through informal survey and chance recovery (Javakhishvili and Japaridze 1975). During the past two years (Batiuk et al. in press), we have been able to locate seven new Neolithic and four new Chalcolithic sites previously unknown. Landscape elements that tend to reoccur in association with these sites will be the basis on which we develop our landscape predictive model. A predictive landscape model should use knowledge specific to the area of interest so that locally important variables can be considered and weighted appropriately (Byrd et al. 2016). Our Marneuli survey is ideal for this purpose due to its proximity to Gardabani.

The variables that we will use are the location of water sources and flood plains relative to target sites, the relation between sites and river confluences, soil types and their relation to target sites, the distance of communication routes and pasturelands to target sites, and the relation of slope and elevation to sites. These variables are central in most predictive models (Balla et al. 2013; Byrd et al. 2016) with some variation contingent on landscape type and objectives. The variation in these landscape features, we found, were central in governing Neolithic and Chalcolithic settlement in the Gadachrili survey zone. By comparing results across the two survey zones we can understand the degree in which cultural and environmental factors played in motivating settlement during the Neolithic and Chalcolithic periods not only across time but at a larger scale.

The data for the model is derived from a number of sources: digital elevation models (DEM) from satellite imagery for elevation and slope, cost surface and stream flow data generated through the use of geographical information system (GIS) software, old Soviet survey maps, New environmental data (Ollivier et al. 2018; von Suchodletz and Faust 2018), and recently published soil survey maps for soil types and geological formations. This data is

processed as multiple raster layers in a GIS. Multivariate statistics techniques, such as principal components analysis (PCA) and correspondence analysis (CA), will be applied to objectively weigh the significance each variable plays in determining the location of Neolithic and Chalcolithic sites. By identifying the variables that consistently score higher in governing the location of Neolithic and Chalcolithic sites, we can rank these variables for the model.

Once these conditions are fulfilled, we can apply the model to the Gardabani and begin the ground-truthing through field survey. Survey will consist of field-walking regularly spaced transects and collecting material samples in the areas of high probability in order to test the validity of the model. This will also be complemented by examining areas of both low and medium probability in order to test the accuracy of the model and to record sites belonging to different periods. This methodology will allow us to enhance the model based on success or failure of detection. The documentation of sites and landscape features will be carried out using Trimble handheld data collector (TSC7) equipped with differential GPS receiver that will allow us to accurately record transects and sites, with centimeter accuracy, directly into a GIS in real-time. Additionally, important features will be documented in 3D, using drone photographs and Agisoft PhotoScan software. The equipment used in this endeavor is part of the Archaeology Centre of the University of Toronto's field equipment. All data, maps, models, and photographs will be compiled in the University of Chicago's Online Cultural Heritage Research Environment (OCHRE) software platform. Researchers from around the world will be able to access comprehensive and rich dataset about the region in one location and share their work and ideas with each other (Schloen 2001).

Timeline of the project and funds:

We aim to carry out this project over the course of two years starting in April 2019. We have obtained a survey permit for the region of Gardabani on July 4th 2018 from the Georgian National Agency for Cultural Heritage. We have collected the required landscape data and began the processing phase of the various layers in a GIS (DEM, watercourses, and soil maps). During the upcoming months we will begin processing the data for the multivariate statistical analyses and weigh the different variables in accordance. The aim is to finish this portion of the model before we are out in the field in April 2019 for our first season. Overall, we intend to carry out two, one month, field seasons in Gardabani between 2019 and 2020. The funding requested from the American Institute of Archaeology (AIA), will help us in providing room and board for the team (six members) in the city of Rustavi, in addition to fuel cost for the vehicles we will be using for transportation during the first season. G.R.A.P.E and the University of Toronto will provide additional funding for airfare, vehicles, and equipment.

Expected outcomes:

This model will potentially enable us to conduct a quick low-budget survey that will close the gap in our knowledge in this region by determining the presence of Chalcolithic and Neolithic. This will, in turn, allow us to test some of the assumptions made about development trajectories taking place in the Neolithic and Chalcolithic periods, and determine the role environmental and cultural factors played in settlement systems during late prehistory.