The Körös Regional Archaeological Project Field School, 2002:

Independent Research Project: Geomorphological and Hydrolocial Influences In the Archaeological Record of the Körös Region

Bethany Purdin
Florida State University
August, 2002

Introduction

The analysis of any archaeological record brings with it the assumption that diachronically, transitions between cultural periods will be relatively smooth. The exceptional case of the abrupt change from the Late Neolithic to the Early Copper Age cultures in the eastern Carpathian Basin has therefore gained some interest in the scientific community.

The Late Neolithic was characterized by relatively few (34 excavated sites), dense, nucleated settlements built on tells, tell-like mounds, or 'flat' sites. Within the settlements are multi-roomed houses (with some evidence of two storied houses) and burials scattered throughout in no formal pattern, both in and outside of the house. Late Neolithic cultures also made use of extensive trade networks to bring in raw materials such as copper and gold ores, obsidian, and flint from the surrounding mountains. Three major cultural groups dominated the Great Hungarian Plain during this time: the Tisza, the Csöszhalom, and the Herpály.

The Early Copper Age however, saw a great number of distinct changes. The most noticeable was the 700% increase in the number of settlements (243 sites), now thinly dispersed over the plain, and lacking a large settlement nucleus. House structures are now of single room construction and developed over 'flat' sites. Ceramic figurines and 'ceremonial tables' disappear from the archaeological record in this period. Other traits are the weakening of trade links, almost non-existent in the center of the plain, and the melding of the three major Late Neolithic cultures into the Tiszapolgar culture. (Parkinson, 2001)

This being said, the most natural question is thus, What caused this drastic change to occur? This question may be attempted through many different modes of analysis, one of which- focused upon in this paper- is through analysis of geomorphological and hydrological changes in the Carpathian Basin. This information may then be used to determine how these changes may have affected the progress of the Late Neolithic cultures into the Early Copper Age.

Purpose Statement

Geomorphological studies, while important to many archaeological projects, are especially useful in the interpretation of archaeological data in the Carpathian Basin, specifically, the Körös region of eastern Hungary where I base my study. This region has a relatively level elevation throughout, with distinct sediment and soil signatures covering the area. Therefore, any changes in these signatures, both sedimentological and topographical, are met with interest. For instance, if a sudden rise in elevation to 86m occurred in an area that is more or less 85m, we may hypothesize that this was a ‘flat’ site, with some vertical accumulation. This hypothesis, as can be seen all over the region, is increasingly true near those recently flowing rivers and those we may identify as paleomeanders from topographic maps.

Analysis of soil stratigraphy is another source of useful information. As with elevation, any abrupt change in soil composition may indicate a major event in the history of the region. For example, in the Körös region it is a safe assumption that, wherever sand is found, a river of some magnitude had once flowed over that very area. This is an acceptable answer because the soil in the region is predominately silty clay loam, with sand occurring only in constantly flowing channel bottoms where flow is generally the most powerful. From information such as this, we may trace the movements of the sinuous channels (and paleochannels) of the region. We may then use this information to describe where ancient peoples lived in relation to these channels and, if C-14 dates permit, when this occurred.

When stratigraphic sediment data is placed against cultural stratigraphy, it is possible to trace events occurring at the site that may have affected cultural deposition. For example, if a deposition of Late Neolithic material at a ‘flat’ site were to suddenly be covered by a heavy layer of compact silty clay, while the southern end of the site was cut into by medium sand, we may safely say that this site was cut through by a channel. This event would most likely have occurred during an extended period of high precipitation, thus forcing the channel flow rate to increase. This may have caused the local inhabitants to move further away from the previous channel or to higher ground.

Geomorphology must take known climatic changes into account, as well as making its own assumptions based upon soil composition and deposition. For instance, based upon a phase in eastern European climateology characterized by high precipitation and paleomeander cut-off during 5500-4800 BP (Starkel, 1994), we may look for floodplain deposition indicating an increase in silt and clay stratigraphy and thick accumulation of channel sediments at the ends of paleomeanders (Waters,1992). This in turn may have had an affect on the areas of past settlement or in the resources they were able to procure (i.e.- crop yield).

It is through a combination of these areas of study within geomorphology (topography, climate, and soil composition) that I have wrought my hypotheses concerning the causes for drastic change in cultural characteristics from the Late Neolithic to the Earl y Copper Age and determined the methodology for preliminary testing of these hypotheses.

Hypotheses

The climatic changes that occurred during the early to middle Holocene, explained by Starkel (1994) and Huntley and Prentice (1993) have provided the basis for two hypotheses regarding causing factors for the Late Neolithic–Early Copper Age transition. These periods, marked by constant shifts in dry/wet climates, influenced both channel formation and vegetation, both of which may have greatly affected the cultures existing in the Körös region during those periods. I believe that these climatic changes directly affected house construction and trade practices.

Hypothesis #1

Starkel (1994) described a series of flood phases that occurred in the Vistula River Basin, Poland during 6750-6000,5500-4750, 4500-4250, and 3250-3000BP. This area closely resembles the Carpathian Basin in both topography and the climatic phases that affected it. The climatic changes that occurred during these periods and in their interim may have caused a change in the availability of wood resources used for making houses. Parkinson (2001) describes this change in construction. Late Neolithic houses were quite variable in size, though they tended to be "large, rectangular 'longhouses' of timber framed wattle and daub construction (2001:10)." Many of these houses had internal sub-divisions and there is evidence of two-storied houses at Berettyóújfalu-Herpály. Houses of this construction had to have substantial wooden posts to provide a stable foundation. I believe that this sudden change from multi-roomed to single-roomed, simple wattle and daub constructions directly correlates to climatic changes affecting the types of vegetation (specifically trees) available for utilization. In short, the wood used for construction may not have been available for house construction in the Early Copper Age, leading to a forced change in house construction and ultimately, social organization.

Hypothesis #2

These very same climatic changes may have also caused particular river channels to suddenly change their course or be completely abandoned. Sherratt (1997) describes the change in trade goods and trading sources between the Late Neolithic and Early Copper Age. He states that the plethora of materials traded in the Late Neolithic (figurines, anthropomorphic vessels, flint, obsidian, and perhaps domesticated animals and textiles) drops off considerably in the Early Copper Age. The areas of contained within the trade networks also change, from a free trade covering the entire Carpathian Basin and the surrounding highlands in the Late Neolithic, to a system of trade mostly between the surrounding mountains and the nearby highlands of the Basin during the Early Copper Age. I believe that a climatic change altered the availability of resources to the peoples living in the center of the Basin, who depended on the waterways as a link to trade routes. Such a change would refuse those people living in the interior of the Basin trade items, while including those living on the outskirts of the Basin. I also believe that some major centers of trade, Vésztö-Maygor for instance, lost importance because of a sudden abandonment of the channel wrapping around the tell site.

Research Design

To test my hypotheses, I needed to gain information about the current topography, collect core samples, and compare my analyses to widely accepted climate models of eastern Europe. Scrutinizing over topographic maps of the region allowed Dr. Tod Frolking and I to determine the optimal areas to take core samples. Naturally, core samples were taken in different areas around Vésztö-20 to provide us with a 'standard' with which to analyze the other samples. Other areas of interest included the outside of meanders to determine what undisturbed sediments are normal for the region, and running a transect of core samples within the meanders to determine how much they have moved over time and the sedimentation that has occurred. We also felt it important to take core samples in areas we believed were never previously near a meander to determine what sediments are deposited on the rest of the floodplain. It was also useful to take cores within the last area of deposition of a paleochannel to determine how fast the channel was abandoned and perhaps the cause of abandonment.

The depth of each core was variable. Most cores were ended when a prolonged zone of gleysol was encountered. We felt that this indicated an area that had been almost completely devoid of oxygen for as long as the water table had overlain it. While the water table has varied within the Holocene, no useful information for this project could be obtained by coring more than 0.5m below the beginning of a zone of gleysol.

Analysis of the core samples was performed as each core was extracted to give a fair analysis of its current condition, though some information may be somewhat skewed due to the rapid drying of samples in the field. The analysis was done to determine if the climates shown on Huntley and Prentice's (1993) maps are generally correct and to determine if Starkel's (1994) article on the Vistula River Basin could be used for a comparative analysis.

Note: Cores are measured in inches because the coring device is set in English measurements.

Results

In order to condense the vast amount of information gathered, I will only discuss those core results that have an impact on the hypotheses mentioned. I have chosen two major characteristics to analyze in the samples that may reveal the condition of the paleolandscape. They are mineral cementation and sediment boundaries. Table 1.1 illustrates the discussed site locations.

Mineral Cementation

Rapp and Hill (1998) believe that calcitic cementation is an indicator of inundation or saturation by water. This condition leaches the minerals from the surrounding soil, causing accumulations within the sediment after it has dried. Every core site contained zones of calcium carbonate concretions, as well as some manganese carbonate concretions (in lesser amounts). This gives some evidence to the idea of a biannual inundation of the Körös region, as mentioned by Sherratt (1997). However, cores taken at VE-20-1a, VE-20-2a, and VEMA-3 had particularly large amounts and large calcium carbonate concretions, sometimes on the order of 1cm wide. This is highly indicative that these areas were inundated or saturated for extended periods of time. During the dry periods, the concretions were able to form, only to be added to through leaching during the next wet period. Site VEMA-3 is particularly interesting. At a depth of 36", large carbonate concretions appear and continue to a depth of 54". From 54" to 117" there are few concretions, though the matrix does effervesce. Effervescence then drops off from 117" to 153". At 153", large calcium carbonate concretions begin to reappear so large that they block the coring device. This variability in leaching of CaCO3 is indicative of alternating dry/wet phases, whereby the wettest phases occurred from 36-54" of deposition and at 153" onward. The dry phase in between would have allowed the leached minerals to cement.

Sediment Boundaries

Another method of inferring historical geomorphology and hydrology is through analysis of sedimentation. Nearly every core represented in my data displayed a conformable appearance (i.e.- "bedding plains between sedimentary layers and no apparent break in deposition (Rapp and Hill, 1998)"). This was, no doubt, caused by the seasonal inundation of the area. Hence, the presence of an abrupt change in soil or sediment characteristics indicates a change in 'normal' conditions. These include changes in calcium carbonate deposits, as mentioned above, as well as textural and color changes. Site VE-20-1a, for example, contained a zone of increasing quantities of *gastropoda* and *molluska*, beginning at 114" and decreasing by 164". This may indicate the presence of either a channel bottom or surrounding marsh at some point. However, the depth is too great for it to have affected the settlements at Vésztö-20. Site VEFA-3 exhibited an abrupt change from the ‘norm’ of silty clay to fine-medium grained sand, beginning at 61-64”, followed by a zone of silty clay, and resuming sand at depths of 87-135”. This indicates that the channel bottom was directly over this area at some point in history (Waters, 1992). The zone of silty clay above 87” may indicate a sudden abandonment of the meander, perhaps in accordance with one of the dry phases of the early to middle Holocene (Starkel, 1994), followed by a wet phase that reutilized the meander (Starkel, 1994; Kalicki, 1994; Huntley and Prentice, 1993). A transect of core samples from VEFA-3 to VEFA-4 at 50m intervals proves that the meander had moved considerably (about 350 meters), explaining the gradual change above 64” from sand to silty clay. This parallels the sample transect at site VEMA-4. The paleochannel around Vésztö-Magyor begins to pick up sand at about 45” and gradually becomes coarser until 63”, where it resumes silty clay characteristics. By 81”, the sand reappears and becomes coarser with depth and drops off to silt by 144”. The results are very similar to VEFA-3. The slight change in depths may be due to the ability of the VEMA paleochannel to remain longer, due to its obvious size advantage and therefore, greater flow capacity than the Hölt-Körös, as seen on topographic maps.

Other Areas of Analysis

Rapp and Hill (1998) briefly state that soil can also be analyzed based upon color. Color indicates both the presence of certain minerals and the presence or absence of oxygen in the matrix. Environmental conditions can thus be studied through knowledge of the constituents in mottled soils and how they change, as well as through analysis of soils with red hues (mottles). Unfortunately, while I have the sample results, I do not have adequate knowledge to interpret them.

Conclusions

The data presented permits some reasonable conclusions to my hypotheses. In response to Hypothesis #2, it is safe to assume that at some point, both the Hölt-Körös and the Vésztö-Magyor paleochannel were abandoned for a time due to a dry phase in the early to middle Holocene. Because of the relatively shallow depth at which these changes occur, I believe it characterizes an interim dry period between the cool, wet periods of the Younger Dryas (Kalicki, 1996). If

C-14 dates proved this particular dry phase to coincide roughly with the Late Neolithic/Early Copper Age transition, then the interpretation of unavoidable trade route changes as a causing factor in the abrupt cultural changes can definitely not be discounted. For if the channel, which could have provided Vésztö-Magyor with a direct link to trade items, were to be suddenly abandoned, then the line of trade would have been abruptly cut off, perhaps forcing many residents of the tell site who depended on incoming resources to leave the settlement. This drying would have made Vésztö-20 a prime place to settle, for it was close to the major settlement while far enough away for a smaller group of people to support themselves and ration the local resources for an extended period of time. Then, as this period receded into a wet phase, the channels would refill and the area would once more be biannually inundated. This may explain the use of Vésztö -20 for only a short period.

With this climatic change in mind, we may assume that Huntley and Prentice's (1993) article on Holocene climate change was correct for this region. Therefore, in response to Hypothesis #1, I may say that resources did indeed change between the Late Neolithic and Early Copper Age. If the gradual change in the Great Hungarian Plain was from boreal and mixed forests in 6000BP to a mainly steppe region by 3000BP (1993), the resources would have been gradually depleted, forcing the people of the area to prioritize wood use. Thus, a forced change in house construction may have coincided with the proposed forced move from the tell site.

Suggestions for Further Research

The above discussion allows for conclusions based on some certainty, though without the aid of absolute dates, this data can never be truly proven or disproved. I suggest firstly, that the findings of temporary channel abandonment be tested on meanders near other major tell sites of the Great Hungarian Plain. If the results are more or less conclusive, then C-14 testing should be performed. C-14 samples were collected at VEMA-4 at a depth of 126-135" and at 135-153". This could then be compared with any dates given by tests at other meanders.

I also suggest a charcoal analysis to be done on the post holes both within the house in Block 2 at Veszto-20 and in the ditches surrounding the site in Block 5 and 6 to determine what kind of wood was being utilized and for what purpose. This data can then be compared to data given by Hegedus and Makkay (1987) on wood types identified at Vésztö-Magyor within Tisza cultural contexts.

Works Cited

Hegedus, K. and P. Raczky
1987 "Vésztö-Magyor: A Settlement of the Tisza Culture." In *The Late Late Neolithic of the Tisza Region: A Survey of Recent Excavations and Their Findings*, pp. 11-30. Szolnok, Budapest.

Huntley, Brian, and I. Colin Prentice
1993 "Holocene Vegetation and Climates of Europe." In *Global Climates Since the Last Glacial Maximum*, editor H.E. Wright Jr. University of Minneapolis, Minneapolis.

Kalicki, T.
1998 "Climatic or anthropogenic alluviation in Central European valleys during the Holocene?" In *Global Continental Changes: the Context of Paleohydrology*, Geological Society Special Publication No. 115.

Parkinson, W.A.
1999 "Integration, Interaction, and Tribal 'Cycling': The Transition to the Copper Age on the Great Hungarian Plain." In *The Archaeology of Tribal Societies*, edited by W.A Parkinson. International Monographs in Prehistory, Ann Arbor, MI

Rapp, George Jr. and Christopher Hill
2000 *Geoarchaeology: The Earth Science Approach to Archaeological Interpretation*. Yale University Press, New Haven.

Sherratt, A.
1997 "The Development of Neolithic and Copper Age Settlement in the Great Hungarian Plain." In *Economy and Society in Prehistoric Europe: Changing Perspectives*, pp.252-269. Princeton University Press, Princeton.
1997 "Mobile Resources: Settlement and Exchange in Early Agricultural Europe." In *Economy and Society in Prehistoric Europe: Changing Perspectives*, pp.252-269. Princeton University, Princeton.

Starkel, L
1996 "Paleohydrological reconstruction: Advantages and disadvantages." In *Global Continental Changes: The Context of Paleohydrology*, Geological Society Special Publication no. 115
1994 "Reconstruction of hydrological changes between 7000 and 3000BP in the upper and middle Vistula River Basin, Poland." In *The Holocene 5.1*

Waters, Michael R.
1992 *Principles of Geoarchaeology: A North American Perspective.* University of Arizona Press, Tucson.

Table 1.1

Site	Location
VE-20-1a	10m from SW corner of Vésztö-20 excavations
VE-20-2a	50m from SW corner of Vésztö-20 excavations
VEFA-3	Inside of Hölt-Körös meander apex, 8m east of channel Meander.
VEFA-4	High point inside Hölt-Körös meander, approx. 300m from VEFA-3. N46º55’37.7” E21º13’13.7”
VEMA-4	Inside of paleomeander at Vésztö-Magyor. N46º56’12.1” E21º12’32”