Rethinking human impact on prehistoric vegetation in Southwest Asia: socioeconomics and long-term fuel/timber acquisition strategies at Neolithic Çatalhöyük

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Summary: Classic accounts of people-environment interactions in the archaeology and palaeoecology of Southwest Asia tend to conceptualize human impact on vegetation as an agent of significant, long-term negative change in the regional landscapes. In the case of archaeobotanical analysis, such approaches have been further influenced by ethnographic models of woodland exploitation positing sequential switches to "lower value" fuel species over time as "preferred species" are over-exploited. An additional influence form traditional accounts of vegetation ecology that describe climate and/or edaphic "climax" plant associations while attributing their decline or downright absence to long-term "destructive" human impacts. This paper summarizes recent results of macro-charcoal analysis from the long-term habitation (~7,400-6200 cal BC) of Neolithic Çatalhöyük in south-central Anatolia indicating switches in fuel/timber exploitation that bring into question the assumptions of these models. Drawing on these results, alternative frameworks are explored for conceptualizing prehistoric human impacts on woodland vegetation.

Key words: *Neolithic, Central Anatolia, Çatalhöyük, human impact, charcoal analysis*

BACKGROUND

The assumption that in Southwest Asia negative human impact on woodland and forest vegetation began as early as the Neolithic period is widespread. Archaeobotanical analyses of macro-charcoals have been used to argue that Neolithic communities exerted significant impacts on the landscape through clearance for cultivation, fuel collection for domestic and craft production, and livestock herding. However, such assumptions have found little or no support in off-site pollen and sedimentary records that (where available) have provided very little evidence of significant impacts on vegetation before the mid- to late Bronze Age. Particularly for fuel selection it has been argued, for example, that it is "selective" (cf. notions of "preferred fuel species") and thus that macro-charcoal sample composition is likely to reflect cultural filters. Assumed "preferred fuel species" (e.g., dense and slow burning taxa) are thought to be eventually substituted by species with lower density and heat value, spiny or difficult to collect taxa, and/or non-wood fuels (animal dung) in response to the over-exploitation and depletion of high-valued wood fuel species (e.g., Miller, 1985). More recent research (e.g., Asouti and Austin, 2005; Dufraisse *et al*., 2007; Théry-Parisot, 2002) has questioned the expectations of such models. A key criticism relates to their implicit assumption of the separation of fuel collection from the general sphere of economic activities, and its operation primarily as "resource extraction" resulting in linearly developing negative impacts on woodland vegetation. This paper addresses these questions in the context of macro-charcoal analysis from the Neolithic site of Çatalhöyük in central Anatolia. Recent analyses have extended the chronological range of the charcoal materials analysed from this site to its latest phases, thus providing the opportunity to examine a nearly complete macro-charcoal sequence covering its entire lifespan, in order reconstruct long-term trends of fuel/timber resource management.

PRELIMINARY RESULTS

Recent excavations at Çatalhöyük have focused on the exploration of the later levels of the site, in the South Area and the summit of the mound [TP Area] where the latest phases of Neolithic habitation dating to *ca*. 6200 cal BC have been unearthed, closing the chronological gap with the Chalcolithic West mound. Another recent development has been the reworking of Mellaart's phasing of the site coupled with a new programme of radiocarbon age determinations. This has resulted in a major revision of the site's phasing and thus a more realistic appreciation of temporal and spatial variation in sample composition compared to the Mellaart's level system previously used. Figures 1-2 present in summary form the charcoal data by phase. Although charcoal counts for midden samples from the TP and South Area is work in progress, preliminary results have indicated some interesting patterns that depart from previously reported patterns (Asouti, 2005). The first observation relates to the South Area samples, which suggest that the use of juniper increased with a parallel decrease of oak during the later phases of the settlement, while they also point towards a decrease in the use of riverine taxa (Fig. 1). However, a comparison of the latest levels of the site [TP] with the earliest (aceramic) ones [South G] (Fig. 2) reveals an interesting pattern: TP and South G assemblages appear very similar, except for the higher proportions of hackberry (*Celtis*) wood in South G and the higher proportions of juniper in TP samples. The similarity has to do with the high proportions of riverine taxa (Salicaceae, *Ulmus*) in

both assemblages. An important difference between the South G and TP samples relates to the apparent higher diversity of the aceramic samples (with steppe shrubs, such as Chenopodiaceae, Maloideae and higher proportions of *Celtis*) which is not evident in the TP samples (Fig. 2).

There are several potential explanations for these seemingly contradictory patterns. If South G and TP samples were omitted from the analysis, percentage fragment counts would surely suggest the progressive expansion of oak in the early part of the sequence, followed by its replacement by juniper as the main source of timber and firewood, as well as the over-exploitation of the local riverine woodland. However, such a conclusion is contradicted by the high percentages of riverine taxa in the TP samples. Similarly, the low percentages of oak and juniper in the earliest and the latest phases of Çatalhöyük might be indicative of the limited use of these species as timber and fuel during these phases. Although it is possible that a small proportion of oak and juniper charcoal might have been introduced as a result of building destruction by burning, it should also be pointed out that there is no evidence of burnt buildings predating South Area phases P-S. I have argued elsewhere (Asouti, 2005) for the regular use of old defunct structural timber and timber preparation waste as a source of fuel. These patterns are subject to further investigation (microscopic analysis of samples from the later South Area and TP phases is currently in progress). However, preliminary as they are, they point to temporal changes in sample composition that cannot be explained as the result of either climate-induced changes or progressively negative anthropogenic impact on past vegetation.

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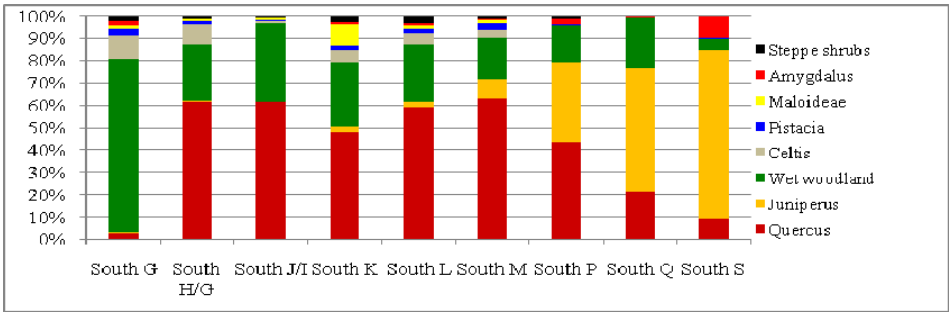

FIGURE 1. Percentage charcoal fragment counts for major taxa and groups of taxa present in Çatalhöyük external refuse deposits (middens) from South Area phases G (aceramic) to H-S (ceramic Neolithic).

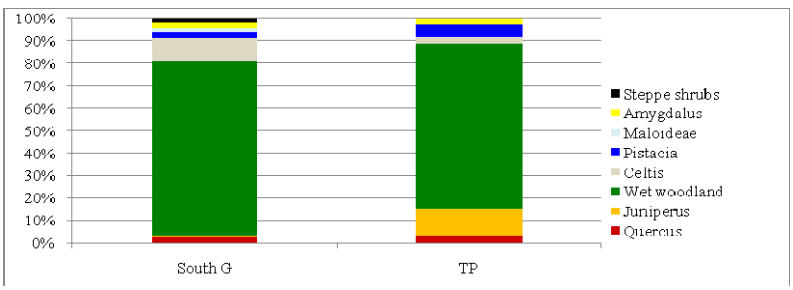

FIGURE 2. Percentage charcoal fragment counts for major taxa and groups of taxa present in Çatalhöyük external refuse deposits (middens) from South Area phase G (aceramic) and TP area (latest phase of Neolithic habitation on the east mound, ca. 6200 cal BC).