The Spatial Significance of Plants

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Abstract

Archaeological plant remains are rarely evaluated within a spatial framework to reconstruct social-cultural dynamics. This paper demonstrates that plants are valuable, in conjunction with other ecological and cultural data, to gain insight into domestic spaces within a community. A preliminary analysis of plant remains recovered from ten Historic Native American sites (1675-1800) at the Mashantucket Pequot Reservation explores the changes and continuities of plant strategies. This spatial investigation facilitates an understanding of complexities of households and the variability of decision making on one of the oldest and continuously occupied Native American reservations.

Introduction

This paper is the result of many years of research which focused on the spatial components of plant related activities at archaeological sites from Europe to North America. More specifically that research has focused on the intra-site variability of plant related activities through the utilization of GIS techniques, such as kernel density analysis (Kasper 2008; in press). In recent months, we have found problematic the lack of information which surrounds the study of human environmental interactions at the intra and inter-site level. This has left us with unanswered questions on how to proceed within a spatial framework for the co-author's (K.Kasper) dissertation project at the Mashantucket Pequot Reservation. Presenting the theoretical background behind that helped to formulate and also presenting a preliminary analysis of the data is at the heart of this paper and will hopefully spur additional/alternative

spatial approaches to situate human environmental interactions at the household and community levels.

The Research Framework

Native Americans plant strategies during the Historic period have often been characterized as highly reactive to changes in the biological environment and passive to European colonization of the Americas (Ellingson 2001; Harkin and Lewis 2007; Krech 1999; McNiven and Russell 2005). What remains unclear within Native American communities is how decision making related to plant use shifted in tandem with other cultural variables (biological, colonial and indigenous) during the Historic period. To investigate this problem, this paper explores the relationships between "nature" and "culture" at household, community and regional levels (Crumley 1994; Lightfoot 1995; Mrozowski 2006). Few researchers have examined the relationships between North American indigenous populations, plant-resources, and landscape evolution during the Historic period (e.g. Anderson 2005; Bragdon 1996; Cronon 1983; Handsman and Richmond 1995; White 1983). This study is the first to examine the historic landscape of a Northeastern Native American community, the Mashantucket Pequot, through an analysis of archaeobotanical, paleoecological, and ethnohistorical data (Figure 1). Indigenous communities struggling in the face of resettlement, resource circumscription and cultural assimilation developed decisive adaptative strategies, the contours of which can only be traced through this type of integrative and diachronic investigation. The synergistic information collected in this analysis provides critical data for a larger collaborative, multi-disciplinary research project which involves the Mashantucket community, the University of Massachusetts Amherst, the University of Connecticut and Harvard Forest. The data generated in this project will also be valuable for other environmentally-oriented and spatial investigations.

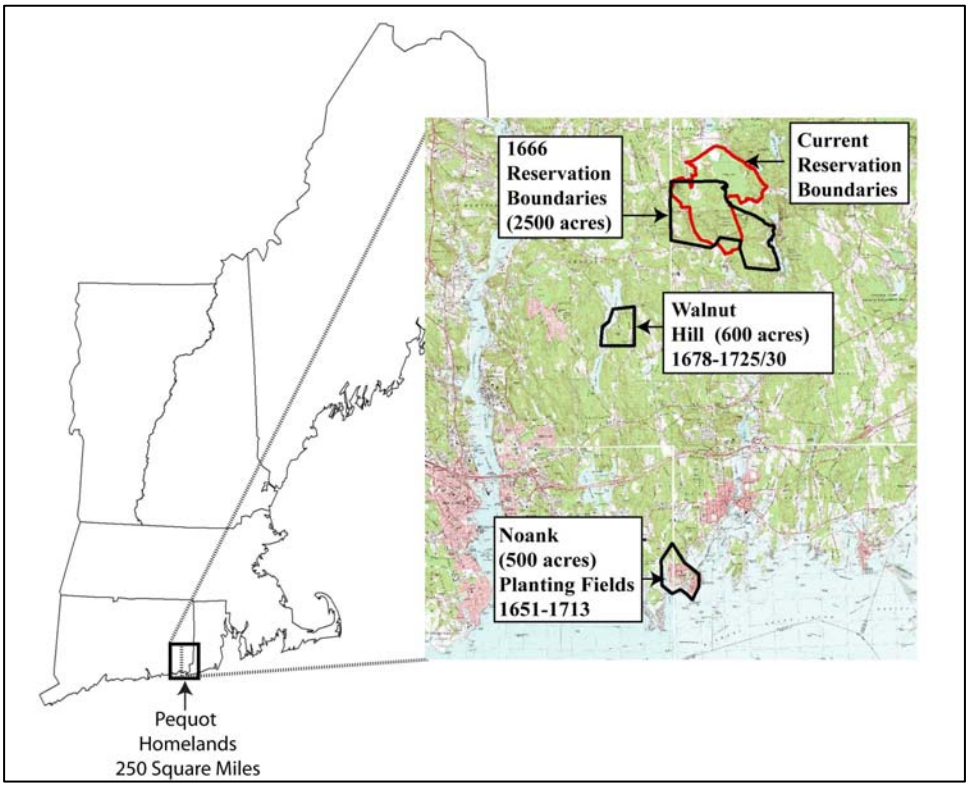

Figure 1. Location of the Mashantucket Pequot Reservation and Appropriated Mashantucket Lands in Southeastern New England.

Merging The Socio-Cultural Dimensions of Indigenous Plant Use, Household Archaeology, and Spatial Analysis

For this analysis, three mutually intertwined fields of investigation, indigenous plant use, household archaeology, and spatial analysis are merged to identify and explain patterns of human environmental interactions (Allison 1999; Bender 2002; Blackburn and Anderson 1993; Butzer 1982; 1990; Crumley et al. 2001; Foster and Aber 2004; Hardesty 2007; Hayashida 2005; Ingold 1993; Judkins et al. 2008; McNiven and Russell 2005; Tilley 1994; Wilk and Ashmore 1988). These theoretical dimensions help to define the cultural landscape and highlight human decision making processes and their effect within household, community and regional scales of analysis

(Balée and Erickson 2006; Hardesty and Fowler 2001; Lightfoot 1995; Mrozowski 2006; Silliman 2009). This investigation assumes an interactive relationship between individual choice, cultural predilection, economic components (modes of production) and environmental features. Over time, those choices cohere into a detectable set of human environmental strategies imprinted on the landscape and visible in the archaeological record (Abel and Stepp 2003; Bourdieu 1990; Doran 2002; Giddens 1984; Varien 1999). The complexity of those human interactions can be mapped, facilitating an understanding of the changes and continuities of human existence at a certain locale.

Indigenous Plant Use. Past case studies from the United States reveal the patterns of continuity within the plant use of Native Americans from pre-Contact to the Historic period (Gremillion 1993, 1995; McBride 2007; Newsom and Trieu 2006). During the Late Woodland and Contact periods before the establishment of circumscribed reservations, many Algonquian speaking groups coexisted on the regional scale and participated in a "semi-sedentary" settlement strategy within their homelands but occupied sites on a seasonal basis (Chilton 2005; McBride and Dewar 1987). The Pequot inhabited a homeland of over 250 square miles (160,000 acres) in southeastern New England (Figure 1; McBride 2007; Starna 1990). The Pequot and other Algonquian groups exploited a variety of wild plants to create a diverse subsistence base, even while participating in horticultural and agricultural activities (Bendremer 1999; Bernstein 1993; George and Dewar 1999; Johnson 1999; Little 1995; Stein 2008). Scholars, such as Cronon (1983), Fischer et al. (1997), Gremillion (1993;1995) and Newsom and Trieu (2006) have postulated that these pre-Contact and Contact period subsistence strategies significantly influenced Native American plant use into the Historic Period. In a preliminary analysis of the

Mashantucket Pequot, McBride (2007) highlights similar trends and demonstrates a high degree of continuity from pre-Contact through the eighteenth century.

In New England, research conducted by Bragdon (1996) and Cronon (1983) has successfully highlighted continuities and changes within Native American plant strategies during pre-Contact and Contact periods. Both works provide a baseline of Native environmental interactions and demonstrate that Native communities in southeastern New England were engaging in traditional plant strategies that utilized a spectrum of wild and domesticated plants. However, their analyses are more regionally based and do not focus on decision making at the community and household level. This has led to broad generalizations of Native environmental plant strategies and demonstrates a lack of understanding of how Native communities managed their own cultural spaces during Contact and well into the Historic period.

It is important to stress that few Euro-American narratives recognized the ways Native Americans navigated, exploited, and managed the diversity of New England ecosystems, from woodland, open field and wetland habitats. Most accounts focus solely on the sheer abundance of resources and the agricultural/agrarian aspects of Native lifeways (Cronon 1983; Thomas 1976). These situated colonial perspectives are similar to Anderson's (2005) historical research with the Native American populations and Anglo-settlement in California. She highlights how Anglo-American settlers completely overlooked Native American sustainable plant management, leading to a fundamental misunderstanding of Native American cultural practices within pre-Contact and Historic landscapes. Similar to Anderson's (2005) work, this research utilizes different lines of evidence to evaluate the variability within the Mashantucket Pequot plant strategies. At the Mashantucket Pequot Reservation, wetland, woodland and open field habitats were present and provided the Mashantucket Pequot with ecological choices during the Historic

Period. The study of this dynamic landscape can help to reconstruct the use and management of different ecosystems for agricultural and wild plant gathering purposes. Furthermore, this analysis will facilitate a better understanding of the shifts within traditional plant and land practices when faced with conflict and competition for resources by focusing on intra and inter-site variability.

Household Archaeology. In archaeological practice, households are seen as the vital spatial and ideological building blocks for reconstructing past communities (Allison 1999) and in this case study they are also valuable to reconstruct human-environmental interactions. In archaeological contexts, the distribution of plant remains can be seen as reflections of human behaviors and define the spatial components of social organization and practices. Consequently, the reconstruction of adaptive decisions related to plant use within a community can illustrate the power and complexity of the domestic space while defining social and economic organization. Households are a dynamic reflection of behavioral patterns and can be seen as a 'medium' for which structuring domestic activities inside and outside the physical parameters of a dwelling (Allison 1999). The physical nature of architectural remains is seen as a primary stage for plant-related activities and can situate human environmental interactions across an archaeological site or within a community.

Although several decades have passed since the beginning of this subfield, there are still many unanswered questions about the modeling of cultural activities related to plant use at the household level. The household in the past archaeological contexts can symbolically represent the social and economic strategies of plant use and relations of power which occur within or outside the house (Hastorf 1999; Hodder 1990). The household (whether nuclear or extended) is a dynamic reflection of individuals as it represents differential modes of production within a

variety of cultural activities (Hastorf 1998). Therefore, plant-related activities can be seen as a mode of production across a settlement site and help to define the organization of social units at the intra and inter-site level.

In recent decades archaeobotanical research has begun to focus on the interpretation of cultural activities associated with plant use within the spatial unit of the household and larger settlement organization. In the early 1970's, this subfield of archaeobotanical research was stimulated by various scholars who were interested in the differential contexts of archaeobotanical samples inside and outside household contexts (Dennell 1972, 1974, 1976; Hubbard 1976). In European archaeobotany, scholars, such as Bogaard (2004), Jones (1992), and Van der Veen (1992) have added innovative analytical criteria, such as relationship of weeds vs. crops, to understand the multifaceted cultural activities of plant use. Not only have these studies broadened our perception of the contextual nature of botanical remains but they have contributed immensely to the general awareness of the intra-site spatial variability of plant-related activities.

Nonetheless, there has been little discussion about the manifestations of plant-related activities at the household level in relation to indigenous social spaces during the Historic period. It is important to examine those relationships because the tangible spaces within a house (or multiple houses) are linked with the formation of defined cultural units which are the building blocks social organization (Hodder 1990; Wilk and Ashmore 1988; Wilk and Rathje 1982). The household is viewed as an organic cultural phenomenon shaped by the attitudes and traditions of people who inhabit a particular space (Allison 1999; Wilk 1991). Although traditionally in household archaeology the dwelling is at the heart of the investigation (Wilk and Ashmore 1988; Meher 1995), this analysis illustrates that the household does not have to be confined to within

the walls of a structure. Instead, a household can ideologically encompass a much broader cultural canvas and include physical spaces within a settlement site, such as hearths and activities areas located outside the structures. Wobst (2006) states that the artifacts recovered from 'defined' household contexts are usually interpreted as the products of the present day realities and social scales at a site. He (2006:59) puts forth that artifacts should be interpreted as "designs to shape the future" and examined as reflections of efforts to "bring social-spatial order about, to maintain it, to change it, or resist it." Therefore when analyzing the spatiality of plant use within households at the Mashantucket Pequot Reservation, the plant remains will be seen as reflections of the future and how the Mashantucket Pequot are attempting to change, maintain or resist the social-spatial order of the present.

Spatial Analysis. Space in the discipline of archaeology has always been a dynamic but problematic theoretical and methodological construct in the interpretation of human activities. In the early 1960's and within the quantitative revolution of the New Archaeology, archaeologists moved away from the spatial relationships of material culture as non-problematic and distant reflections of a cultural group (Trigger 1989). As an alternative, scholars started to investigate spatial components of the archaeological record within a more critical framework which views material culture as a result of a series of past processes and spatial relationships reflecting underlying patterns of behavioral activities (Hodder and Orton 1976; Clarke 1977). This was the first time that archaeologists shifted their theoretical frameworks away from the simplistic one dimensional "visual appraisal" of the material record to explore in more detail the shape, form and nature of the spatial patterns visible in the archaeological record (Dingwall et al. 1999; Wheatley and Gillings 2002). Space was seen as a canvas upon which cultural activities left unique signatures, which could then be identified and measured by archaeologists. Many

archaeologists sought to explore the external factors that influenced behaviors and this behavior created patterns that could be objectively measured and quantified, such as the factors behind the location of a settlement (i.e. distance to water bodies, fertile soil and/or other resources) (Wheatley and Gillings 2002). In recent years, archaeologists have begun to tease apart the social and internal cultural factors that are involved in the spatiality of artifact distribution, settlement locations and regional components to larger cultural groups and communities (Allen et al. 1990; Maschner 1996; Steadman 2000).

Similar to other disciplines which investigate geographically located material, archaeology has experienced a transformation in the methodological tools, such as the use of multivariate statistics and GIS (Geographic Information Systems), to identify and interpret the spatial patterning of artifacts and ecofacts at the intra-site(within a site) and inter-site (regional) level. The intensification of the use of spatial software has required archaeologists to examine the scale of analysis that have been employed. Identifying the appropriate scale of analysis for the questions at hand and acknowledging the trade-offs that occur in attempting to capture "data" has been difficult for archaeologists. Harris (2006) notes that no single mechanism at different scales of analysis can explain a shift or continuity in cultural patterns. Some patterns of data only become apparent at a certain scale and when investigated within a specific 'distance' and as analyses move from fine scale to coarse scale, it is hard to differentiate if patterns and processes change smoothly, gradually or even abruptly. Thus, it is important that archaeologists engage all different types of scalar analyses within their region of study to discern which cultural variables and information become preserved and lost.

Site Discussion

In twenty-five years of collaborative research at the Reservation, over two hundred and fifty archaeological sites have been identified between 11,000 B.P. and the present (Jones and Forrest 2003; Lammi 2005; McBride 2007; Trigg et al. 2007; Vasta 2007). Fifty sites, of which ten are the focus of this analysis, have been systematically excavated. This sample of ten sites was chosen for this dissertation analysis because 1) all are single component (except 72-88); 2) each contain discrete feature and activity areas; 3) each was excavated to 100% except 72-91, the Mohantic Fort; and 4) each contain moderate to large quantities of plant remains, especially wood charcoal which has rarely been preserved and/or recovered in large quantities at archaeological sites in New England.

The chronology and duration of occupation of sites was established through a combination of diagnostic artifacts (mean ceramic dates for ceramics and pipe stems), historical records and for the earlier historic sites C-14 dates when available (Kasper and McBride 2009; Mashantucket Site Files; Table 2 and Figure 4). All of the sites are single component domestic homesteads (wigwam or framed structures) except 72-91, the Mohantic Fort site (occupied during and right after King Philips War - 1675-1676 A.D.) and 72-88 (1775-1800 A.D.). Site 72-91, represents a fortified place of refuge for the Mashantucket with multiple domestic households occupied during the time of King Philips War. Site 72-88 is a domestic storage facility site with numerous pit features from the Historic period and other temporal component. C-14 dates (included in budget) will be needed from the pit contexts analyzed from this site to verify that they are not Contact period features. Both 72-91 and 72-88 will be useful to compare multi-context sites with the single component homesteads.

Contexts. The sites chosen for this analysis contain long-term deposits (middens and multi-episodic trash pits) and/or short terms deposits (structures, hearths, storage pits and single episodic trash pits) (Table 1). These types of contexts are fundamental to the investigation of plant-related activities. The seeds recovered from these contexts are taken as evidence for the plant-strategies and decision making of the Mashantucket Pequot. Long term deposits, such as middens and multi-episodic trash pits, are more likely to produce a high diversity of plant taxa and better representations of human decisions regarding plant selection at the household and community level (Asouti and Austin 2005). At five out of the ten sites, there are recorded midden and trash pits.

Site	Structure	Range of Occupation	Types of Deposits	Features
72-91	Wigwam/ Fort	1675-1680	Long and Short Term	N35W60/N28E4 (midden), 32/83/116 (hearths), 92 (pit) and 2 (palisades)
72-164A	None	1680-1690	Long and Short Term	1 (midden) and 3/4 (pits)
72-34A	Wigwam	1680-1690	Short Term	6 (hearth) and 35/37/38/40 (pits)
72-58	Untyped	1760-1770	Long and Short Term	4 (midden), 6 (hearth) and 3/9/11/12 (pits)
72-171	Untyped	1765-1775	Long and Short Term	5 (hearth) and 9/10/13/15 (pits)
72-88	Unknown	1775-1800	Short Term	6/19/23 (pits)
72-97C	Wigwam	1780-1785	Short Term	1 (hearth) and 2/3 (pits)
72-161	Wigwam	1780-1790	Short Term	1/12/32/40 (pits)
72-70B	Framed	1780-1800	Long and Short Term	1 (midden), and 2/3/4/6/7/8 (pits)
72-66	Framed	1785-1795	Long and Short Term	S30E5 (midden) and S15W12 (hearth)

Table 2. Archaeological Sites (and Associated Contexts) Chosen For Analysis at the Mashantucket Pequot Reservation.

In regards to the analysis of short term contexts, samples from hearths and storage pits were analyzed from each site. The analysis of plant remains from short-term contexts can aid in understanding the choices which surround the use of plants for a specific activity, such as building a fire, structure, or what was consumed at the site. This comprehensive analysis of both long and short-term contexts will establish baseline cultural proxies for deciphering the selection of specific plants and manipulations of the biological environment. Also, intra- and inter-site variation within these contexts will be explored to reconstruct the plant strategies of the Mashantucket Pequot through time and space.

Dataset

Overall, the presence of wild plants (in addition to nuts species) dominate the household contexts (hearths, pits, middens) at the ten Historic sites (Figure 2). The majority of the seeds consumed by the Mashantucket Pequot, such as goosefoot, sumac and knotweed, are local to North America. The overall presence of these types of species signal that the Mashantucket Pequot may have been selecting for local domesticates and wild plants in and around the Reservation boundaries. Past theories have postulated that when Native peoples were introduced to European crops, European based plants would eventually overcome the use of local wild plants or nut-mast trees. However, in spite of certain historical processes and biological constraints, the Mashantucket Pequot continue to use local wild plants well into the eighteenth century. It may be suggested from this data that Mashantucket Pequot choose plant strategies that did not parallel to the European notion of ‘living on the land’, instead they appear to be ‘living with the land.’

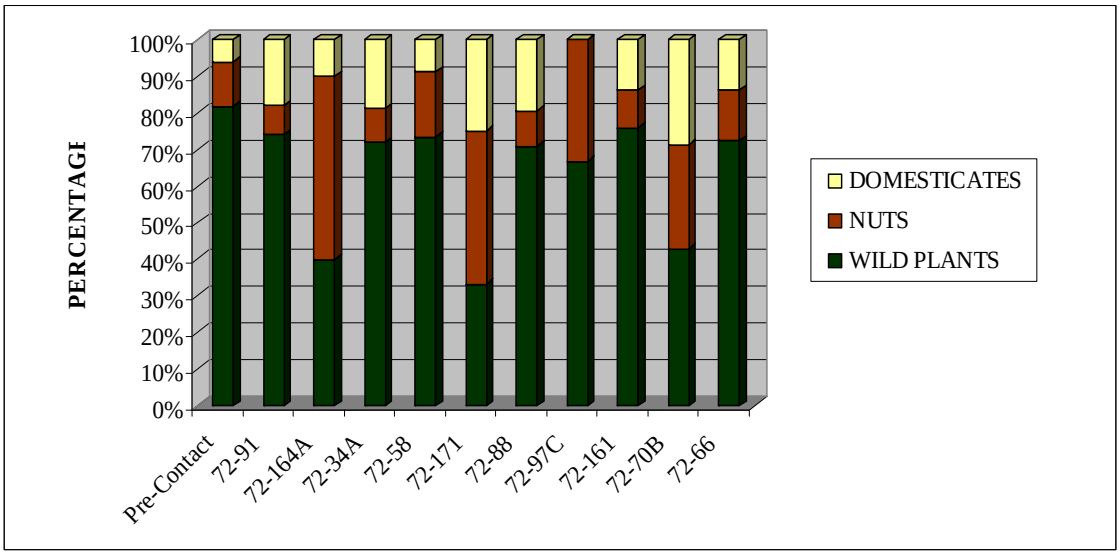

Figure 2. Presence Analysis of the Types of Plant Species Recovered from Ten Historic Sites at the Mashantucket Pequot Reservation
(Sites listed in chronological order from 1675-1800 A.D.).

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Within an additional presence analysis, a pattern of continuity also emerges within the use of habitats from the ten Historic sites even in spite of land loss and circumscription of resources from 1675 to 1800 A.D (Figure 3). The habitat distinctions for each plant species recovered were made with the use of references, such as Britton and Brown (1970). This trend indicates that the Mashantucket Pequot continued to explicitly engage in similar patterns of plant and land use throughout the Historic period. This occurs in spite of colonial and other cultural influences which may have been pushing and pulling them to limit their mobility across the Reservation and participate in European agricultural and subsistence practices.

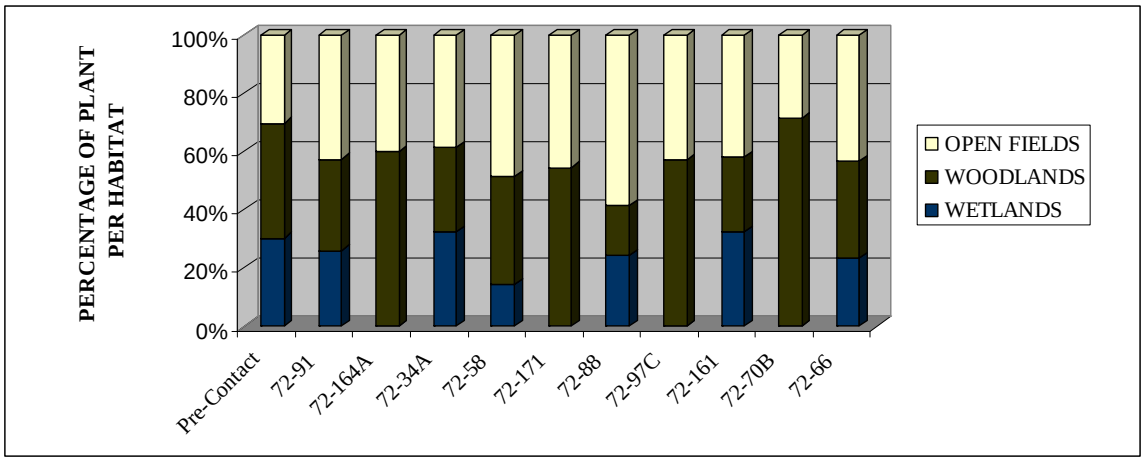

Figure 3. Presence Analysis of the Types of Habitats Exploited at the Ten Historic Sites at the Mashantucket Pequot Reservation
(Sites listed in chronological order from 1675-1800 A.D.)

Questions Emerging from the Theoretical Framework and Preliminary Data: How to Proceed?

In the application of the theoretical framework and the initial presence analysis, many questions have emerged. These questions will be addressed in the months to come:

1) How to move beyond presence analysis in an intra-site to evaluate the ubiquity/species richness of plants recovered? What types of statistical and spatial analyses can be applied to decipher the small nuances within the range of continuity and change presented in the assemblage? Cluster analysis and principle component analysis will be applied but are these the most useful to understand the spatial relationships which may exist within the human-environmental interactions of the Pequot through time?
2) How to further evaluate intra-site features and household contexts? Feature and household contexts may have discrete spatial signatures. What is the best statistical method to tease apart those signatures?

3) The plant data at each site needs to be standardarized (seeds recovered per volume of soil floated) before proceeding into any further statistical analysis. Finding that this is a problematic and cannot be conducted at the present time until I can recreate how much soil was floated from each feature context. Typically in archaeobotanical analysis, contexts with less than 10 seeds per context are deleted from the statistical analysis to normalize the data. These lower plant values are meaningful and should be included in the analysis. What ways can the data be standardized in archaeobotanical analyses? What types of statistical and spatial analysis can be applied to display the meaningful components of this data?

Further Research and Conclusions

In light of the evidence presented above, it may be suggested that the European notion of "improving the land" within only woodland and open-field habitats would have problematic for the Mashantucket Pequot. From 1675 to 1800, it appears that the Mashantucket Pequot revolve their environmental interactions around utilizing different habitats and plants in a heterarchial fashion, instead centering their plant strategies around the use of domesticated crops. Models of heterarchy encompass a network of cultural variables (social, political and economic components) in which each variable shares the same "horizontal" position of power and influence, each playing a theoretically equal role in shaping decisions (Crumley 1994; Ingerson 1994). Utilizing heterarchical models to explore plant use may be constructive because cultural variables associated to the use of domesticated crops may not be strictly positioned and controlled in a hierarchical fashion, as it appears at the Mashantucket Pequot Reservation.

In the months to come, further research of other types of plant remains, such as the large amounts of wood charcoal recovered, will be conducted which evaluates the use of wood

resources and exploitation of the Mashantucket Pequot. Although not discussed, the documentary record encompasses a wealth of information about the colonial interactions in regards to fuel use. This data will then integrated with documentary record to identify Native American decisions in relation to their access to fuel resources and further establish a historical and more nuanced understanding of the Native Americans within a contested landscape.

In conclusion, this type of integrative research seeks to contribute to a growing body of literature and collaboration that builds upon understanding indigenous inteactions and decisions. It accentuates the complexity of the cultural lifeways of Native Americans during the process of colonization. During the Historic period, it is possible that Native American communities in southeastern Connecticut altered their land systems in an outward fashion during the late 17th and 18th century but were able maintain a relationship to the land that was consistent with older patterns of traditional subsistence and land use. This investigation attempts to explore that that notion within Mashantucket plant strategies and demonstrate either patterns of continuity or change within traditional cultural practices and decisions.

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