EXPLORING THE SOCIAL LANDSCAPE OF CERRO LEÓN:
AN EARLY INTERMEDIATE PERIOD SITE ON THE NORTH COAST OF PERU

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A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Arts in the Department of Anthropology (Program in Archaeology).

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ABSTRACT

Barker Fariss
Exploring the Social Landscape of Cerro León: an Early Intermediate Period Site on the North Coast of Peru
(Under the direction of Brian Billman)

Between approximately AD 1–200, just prior to the formation of the Southern Moche state, immigrants from the Andean highlands established large fortified settlements in many of the northern coastal valleys of what is modern-day Peru. This thesis is concerned with the spatial organization of a specific highland occupation in a geographically strategic location of the Moche Valley. Moche Valley site number 225 (MV225) is a massive site built on the steep slopes of Cerro León. It was the principal settlement of an intrusive highland-influenced polity controlling access to a highly prized coca-growing zone in the middle Moche Valley. The spatial organizational principles that governed settlement of Cerro León are cased here in a synthetic framework that blends both functionalist and structuralist views of domestic architecture. This investigation further reinforces that sociopolitical evolution on the north coast was influenced in part by a highland-coastal interaction during the Early Intermediate period.
This thesis is dedicated in loving memory of CY Pyle Sr.

On my 12th birthday he introduced me to the world of anthropology when he gave me a book, *The George Catlin Book of American Indians* by Royal B. Hassrick. And he continued to advance my education for more than two decades, until I arrived to where I am today.
ACKNOWLEDGEMENTS

I would not be where I am today without the previous academic experience, unconditional love and constant support of my wife Brandie Fariss, nor the silent encouragement of my son Keller. I love you with all I’ve got. My father Ed Fariss has taught me the important life lessons and to “go forth” no matter what lay behind; my mother Dolores Drummond and sister Kristie Suttee have always been there for me, through thick and thin. Thank you all, I love you. I would like also to express my love and gratitude to Bob and Lisa Sullivan; they have helped me in more ways than I can list here. I owe special thanks to Brian Billman for being a superb advisor and true friend. I would also like to thank Scott Madry for his help with all GIS-related matters, as well as for bolstering my confidence when it seemed that adversity lie around every corner. Carole Crumley has been a guiding light for me since my days as an undergraduate at Carolina. I would also like to thank Jennifer Ringberg; her assistance in the field and expertise in the lab have been vital to my success. I am indebted to all of the people I have worked with in Peru over the course of a decade; you are too many to mention, but you know who you are. Thank you. To Drew Kenworthy and Hugo, thanks for your hard work on the 2004 architectural survey. To Eric Hoover and Rafael Ruiz, thanks for all your help with the 2007 batan survey. Finalmente, reconocimiento especial a mi hermano Josè Meléndez, gracias tanto para todo.
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CHAPTER I

INTRODUCTION

Since the early 20th century, spatial analysis of human settlement patterns has contributed significantly to anthropological research of sociopolitical organization and culture change worldwide. The emergence of settlement pattern studies in *New World Archaeology* is in large part a result of Gordon Willey and James Ford’s survey conducted for the Virú Valley Project on the north coast of Peru over fifty years ago. Their survey paid particular attention to the spatial arrangement of individual dwellings and communal buildings. They found that the role of “natural” as well as “constructed” environments on settlement locations, technological innovations, and demographic changes influenced the sphere of interaction between all sites in the region (Ford and Willey 1949). This investigation recognizes that a similar situation exists in the Moche Valley. In general, over the last half-century since the Virú Valley Project, Andean archaeology has benefited greatly from the many applications of settlement pattern analysis.

Environmental constraints put on populations settling this region must have required some level of cooperation in order to capitalize on the marginally productive natural resources of the land and eventually manipulate it for agricultural production. On the other hand, marine resources are abundant and coastal populations likely strove to control this
niche. In addition, once the canal network was established in the valley production of high-value crops like coca was possible. Perhaps these resource bases led to the perceived elevated level of violence occurring periodically on the coast. As a result, cultural traditions were born out of this ecology and often expanded, but always dissolved or collapsed and were replaced by another, in a process of cultural ebb and flow known as dynamic cycling.

During the Early Intermediate period (EIP), strategies for cooperation and conflict oscillated in tandem with the dynamic cycling process taking place across the region. And while it is often presumed that the managerial requirements of construction and maintenance of a complex irrigation network over many generations are the means to development of centralized polities in such conscripted environments as the north coast, in this case “warfare, highland-coastal interaction, and political control of irrigation systems created opportunities for leaders [on the north coast] to form a highly centralized, territorially expansive state” (Billman 2002). Moche is considered by many to be the earliest state-level society to develop on the north coast. However, those same experts agree that the Gallinazo Group in the Virú Valley exhibited some first generation state qualities, such as large settlements, platform pyramids, and intensive agricultural systems (Bawden 1996; Shimada 1994; Wilson 1988). The Gallinazo Tradition is generally thought to have predated the Moche, but “many of the cultural patterns seen in the Moche culture have direct antecedents to Gallinazo” (Stanish 2001). The point is that Cerro León (known as site MV225) is situated both temporally and spatially at a critical junction for first generation state development. There is much to be gained from exploring the social landscape of Cerro León.
A milling stone, or *batan* as they are referred to in Andean archaeology (and the remainder of this thesis), is generally accepted by archaeologists to be indicative of domestic activity. This investigation pays particular attention to architecture and batanes with regard to the spatial organization of Moche Valley site number 225 (MV225), so named from Brian Billman’s pedestrian survey of the middle valley in the mid-90’s. While it is unlikely that all architecture or batanes on site are contemporaneous, analysis of artifact clusters within architecturally defined areas is significant for contextualizing the use of space at MV225. In combination with data from excavations, batan cluster analysis can provide an “inference to the best explanation” about the spatial organization of MV255 (Fogelin 2007). And anthropological theories about the function and meaning of household artifacts like batanes and domestic or public architecture are perhaps more tractable as viewed through the lens of spatially explicit analytical techniques.

Through spatial analysis of the organization of constructed space and batan clustering between areas, as well as within individual areas, the general aim of this project is to identify and interpret spheres of domestic- and public-use on site. Considerations herein deal with the defensive nature of the site; the manipulation of social boundaries through the *masa* (work party); the role women played in developing a tradition through domestic activities like *chicha* (corn beer) production; and the potential for the accumulation of wealth by the elite. The central question of this research is: How did the above concerns relate to the social landscape of MV225 and in turn the political economic situation in the middle valley just prior to the formation of the Southern Moche state?
In general, site specific spatial organization from the household to the communal level plays a central role in the analysis of broad anthropological questions, such as the origins of sociopolitical systems, patterns for the sexual division of labor and the emergence of social stratification. The fundamental objective for archaeologists is to integrate material evidence with abstract theories of social process. Some might argue that the middle-range theoretical perspective has become the most appropriate means for the examination of ethnicity, gender, wealth, status, and political networks. While questions of spatial organization might seem unexciting to some archaeologists, it is with such inquiry that fieldwork meets habitus, and precisely these questions that uncover unique prints left behind by the theoretical fingers of real-world social processes.

This investigation also explores how architecturally-defined site areas are constituted in terms of potential social boundaries and economic orchestration. The principal question for this research is: For each area, as well as site-wide, what is the best explanation for use of constructed space and are there interpretable systems of meaning encoded in the functional properties that are identified? This thesis hypothesizes that the spatial organization of MV225 should contribute to the theory that the population inhabiting Cerro León was of ethnic highland descent and to that end, highland-influenced patterns of behavior, social structure and economic infrastructure should be evident. Furthermore, considering the geographic location and size of the settlement, this project further supports the notion that at the time of early Southern Moche state development, highland-coastal interaction was significant on the north coast.
CHAPTER II

BACKGROUND

North Coast Environment

Cerro León is located in the middle Moche Valley of northern coastal Peru. The Moche River Watershed is formed by three westerly drainages from the Cordillera Negra range of the Andes, the upper Moche, and the Sinsicap and Cuesta Rivers. The Moche River floodplain naturally supports very confined riparian vegetation catchments, which have been extended substantially by an extensive irrigation network. Bedrock within the valley primarily consists of Cretaceous/Tertiary granodiorite intruding metamorphosed shale, sandstone, and andesitic pyroclastics from the Jurassic period (Jaén and Vargas 1998). The valley is surrounded by steep slopes resultant of tectonic uplift during the Cenozoic period. The valley floor is filled with fine‐grained alluvial sediments and dispersed river cobbles. Today, the majority of the Moche Valley floor is under intensive agricultural production of sugarcane. Tributary valleys like Quebrada León are filled with poorly sorted and unconsolidated flood debris, depositional colluviums and exhibit distributed terraces in a matrix of dry channels (Huckleberry and Billman 2002). The hyper‐aridity and physical characteristics of the valley provide for an extremely cracked and churned up desert that requires considerable labor, planning, and organization to put into agricultural production (Figure 1).
Figure 1: The middle Moche Valley looking north, up-valley from Cerro León. Note the abrupt contrast between agriculture and desert. The irrigation network in this part of the valley is today much as it was two thousand years ago.
The mean annual temperature along Peru’s north coast is 20° C (68 ° F). There is greater change in daily temperature than variation in seasonal temperature. The mild climate is regulated by a tertiary proximity to the equator, the Andes, and the Pacific. Aside from oscillations associated with periodic El Niño events, the north coast climate is relatively constant and generally predictable. The coastal plane is hyper-arid due to the rain-shadow effect of the Andes Mountains to the east and an extremely cold ocean current just off the Pacific coastline to the west. Massive weather systems generated from evapotranspiration of the Amazonian rainforest move east and are blocked by the continental divide, cycling copious amounts of rainfall off the eastern slopes. As a result, very little precipitation falls on the western slopes. Moreover, sea surface air is cooled by the Humboldt Current to the west and is not conducive to generating precipitation; yet recurrent low-moisture fog is produced daily.

The towering Andean continental divide creates a rugged and mountainous, hyper-arid coastal plane to the west and a vast, gradual cloud forest to the east. Approaching the northern half of South America the extremely cold Humboldt Current draws very near the coastline, further promoting the desertification of the coastal landscape. As mentioned previously, the Humboldt Current is also responsible for the recurrent fog known as garúa, during the austral winter, or dry season. Despite high relative humidity during this season the region remains extremely arid, with mean annual precipitation from 5mm directly along the coast to 30mm near the Andean foothills (Barrena 1994). Normally, the western slopes of the Andes will receive over 1m of rainfall between May and September, supplying the Moche River. On the coast, the relative humidity drops significantly between October and
April, and as the fog lifts the region increases in aridity. For several months the sun relentlessly shines on the coastal valleys, desiccating major rivers and often drying up minor tributaries.

The Andean environment is characterized by extreme variability in elevation across short-distances. The primary controlling factor for movement of goods or people is the degree of ascension. In 1967, John Murra proposed the “vertical archipelago”, or verticality, as a model for economic and settlement patterns in the Andes (Murra 1970). It was based primarily on ethnohistorical accounts. Although it is no longer in favor with political ecologists and geographers because of the lack of attention to modern transportation and communication, in the past it has been most applicable to the study of preindustrial society. However, because archaeologists deal with ancient economic infrastructure and networks, the notion of verticality still provides a viable ecological perspective to patterns of prehistoric settlement decisions.

A vertical archipelago might be thought of as a staircase with specific resources available on each step. But because of the sheer steepness of the Andes, one should imagine this particular staircase like a fire escape. The steps are condensed and abrupt, unlike other mountainous regions of the world where ecological zones are relatively dispersed. There is over 4,000 meters gained in less than 100 Euclidean kilometers in the Moche Valley (Figure 2). From fishing villages at sea level like Huanchaco, to pastures of the highest point in the Moche watershed, Señal Cerro Tuanga at approximately 4,300 meters, there are exclusive natural resources available. In the middle valley, where Cerro León is located, the biome is ideal for growing coca, as well as other important crops.
Figure 2: Abrupt elevation gain along the north coast of Peru.
The El Niño Southern Oscillation (ENSO) is one of the most powerful forces driving global weather patterns. It is arguable that nowhere else in the world is the affect of those patterns as extreme, both socially and environmentally, as in South America. Several researchers have recognized that El Niño was an important episodic event that certainly must have influenced the success or failure of constructed environments on the north coast (Billman 1996; Fagan 1999; Moseley 1987; Shimada et al. 1991; Wells and Noller 1999). So, it is important to communicate the significance of ENSO events while providing an environmental setting for Cerro León.

The term El Niño means “Christ Child”, coined by Peruvian fishermen in the late 1800’s to describe an unusually warm current that emerged sporadically in December around Christmas time. Today, El Niño is the term we use to describe the “warm” phase of a natural sea surface temperature fluctuation known as the Southern Oscillation, occurring about twice every decade. The sister phenomenon of the Southern Oscillation, characterized by a cooling phase, produces inverse climatic events. It is referred to as La Niña (LNSO). Atmospheric and oceanic changes are typical during each phase of the Southern Oscillation, such as wind velocity and sea temperature, and air pressure and sea level, respectively. The duration and intensity of these changes varies from event to event. The most dramatic effects of the Southern Oscillation, in terms of distinct weather patterns, usually occur during ENSO. On the coast of South America, particularly on the north coast of Peru, typical weather patterns completely reverse. In the event of an extreme ENSO the coast will experience heavy rain that results in very destructive flash flooding, as the terrain is not suited to absorb high levels of precipitation. Because there is little vegetation to
retain runoff on the unsettled steep slopes surrounding the valley, severe mudslides are common. The distortion of the landscape is extreme. Entire domestic settlements, irrigation systems and agricultural fields alike can be severely damaged or destroyed by such events.

Even during years of relatively mild ENSO events a slight shift in sea temperature can be detrimental to marine resources. Occasionally the beaches will become littered with thousands of dead fish. Oceanic winds will also shift, changing wave patterns and making the traditional reed-woven fishing vessel, called a *Caballito de Totora* (Reed Pony), more difficult to operate. In addition to immediate transformations of the landscape, there are many micro-ecological changes that influence the north coast ecosystem over longer periods of time. These less visible environmental fluctuations play a significant role in both ecological and social change now and in the past. The Southern Oscillation is a dynamic causal factor for change in both natural and cultural landscapes of the north coast, and must be considered significant for archaeological investigations in this region. And while it is unlikely that a single event brought about the rise or fall of any cultural tradition on the north coast, preceramic to state-level, destructive flooding and severe drought almost certainly had very serious consequences for the physical infrastructure of all societies. In addition, violent storms and their aftermath potentially created uncontrollable political and ideological turmoil. Although not discussed further in this thesis, the Southern Oscillation remains important to evoke as population/environment interactions created by severe climatic events no doubt played a role, both directly and indirectly, in the development and diminution of prehistoric Andean societies.
North Coast Cultural Chronology

There is a long cultural sequence on the north coast (Table 1). There are no known preceramic sites in the middle valley. Between the preceramic and the Initial period (around 1800 BC), dispersed settlements coalesced and settled in the middle valley. By the Early Horizon (500 BC), coastal irrigation and mountain agro-pastoralism supported vast expansion, “the rate at which new arable land was created failed to keep pace with the increasing demand for it” (Carneiro 1970). A decline in the Cupisnique Tradition, which is associated with the Guañape Phase of the Initial Period and Early Horizon, is marked by the shift in ceramic-style like that found at Sechín Alto (Moseley 1992). The collapse of the massive U-shaped ceremonial center there fractured a presumably shared ideology. Widespread settlement of the Moche Valley began again during the Early Horizon, as reflected in the Salinar Tradition. The Salinar Tradition is characterized by the “negative” or “resist painting” decorative technique on fine-ware ceramics. Salinar settlements included: fortified hilltops, many dispersed households, and clustered hamlets of from 20 to 30 residences with minor mounds. It is during this phase that construction of fortified structures was most prevalent, probably due to extensive raiding. For example, in the Santa and Casma Valleys alone there are over 60 documented hilltop bastions that date to the Early Horizon (Topic and Topic 1978, 1987; Wilson 1988, 1995). But the next major cultural cycle is marked by the emergence of a highland-influenced tradition known as the Gallinazo, for whom hillside architecture is customary. A cultural history framing the occupation of Cerro León (AD 200 – 500) begins with a discussion of the Gallinazo Group.
<table>
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<th>Est. Chronology</th>
<th>Andean Tradition</th>
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<th>Chicama Valley</th>
<th>Virú Valley</th>
<th>Santa Valley</th>
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<tr>
<td>1500</td>
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<td>Conquista</td>
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<tr>
<td>1350</td>
<td>Inca</td>
<td>Late Horizon</td>
<td>Estero</td>
<td>Late Tambo Real</td>
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<td>1150</td>
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<td>Fusional</td>
<td>Tomoval</td>
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<td>Huancaco</td>
<td>Guadalupe</td>
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<td>600-400</td>
<td>Moche IV</td>
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<td></td>
<td>Huancaco</td>
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<tr>
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<td>Late Suchimancillo</td>
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<td></td>
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<td></td>
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<tr>
<td>2500</td>
<td>Preceramic</td>
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<td></td>
<td>Pro-Ceramica</td>
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**Table 1:** North Coast Cultural Chronology.
The Gallinazo phase (AD 1–200) in the Moche Valley was a time of relative political disorder and increased violence. The ethnic-coastal population abandoned most of the upper and upper-middle valley, including the coca-growing zone (Figure 3). Most Salinar phase habitation sites were also abandoned and a rapidly fleeing populace converged in the lower middle valley in an attempt to protect vital canal intakes (Billman 1996). Most of the population unified at Cerro Oreja. However, there is some evidence that a separate group may have been located on the coast near modern-day Huanchaco at the site known as Pampa Cruz (Billman 1996). For nearly two hundred years the Cerro Oreja polity attempted to protect the middle valley from marauding highland raiders and large armies of the Gallinazo Group located in the adjacent Virú Valley.
Figure 3: Coca growing zone of the Moche Valley, in relation to Gallinazo and HEIP sites. Note that there are probably more ethnic-highland sites in the upper valley. Complete survey of the upper tributaries, the Sinsicap and Cuesta Rivers, is slated to begin in 2009.
By AD 200, populations probably from the Carabamba Plateau and Otuzco Basin settled much of the middle valley. These groups began to trickle down from the upper valley, occupying sites that coastal families were abandoning during the decline of the Salinar Phase. As the Gallinazo Phase of the Early Intermediate period drew to a close, highland groups controlled the upper valley and a large portion of the middle valley. East of Cerro León there is a pass to the Virú Valley. Highlanders controlled the southern banks of the Moche River and access to this pass. Comparison of surface collections from Billman’s survey and the Virú Valley sequence (Bennett 1950; Ford and Willey 1949; Strong and Evan 1952) suggest the middle Moche and Virú Valleys were occupied by highlanders contemporaneously (Billman 1996). Just before the beginning of the Highland Early Intermediate Phase (HEIP), coastal settlements at the mouth of the Virú Valley swelled. Taking up any available space, it is likely that the population was comprised of refugees from the Moche Valley and middle Virú Valley. The large group emerged as a centralized polity in the lower Virú Valley, but was eventually assimilated by the Southern Moche state. As the following map shows, its favorable geographic position strategically places MV225 at the logistical and ethnic crossroads for highlanders from the Carabamba Plateau and upper Virú Valley with that of the coastal Moche Valley (Figure 4).
Figure 4: Strategic centrality of Cerro León in the middle Moche Valley.
The primary indicator of the Gallinazo/HEIP transition is the ceramic assemblage collected during Billman’s survey of the middle valley. The HEIP ceramics are distinctive in paste, vessel form and decoration, and are unrelated to coastal ceramic styles. The paste color is brown to reddish brown, very different from the burnt-orange domestic wares of the Gallinazo and Moche phases (Billman 1996). Billman also notes that the most ubiquitous form is the globular olla, and that in addition to the constricted mouth and elongated rim, there is often an indentation or band of red paint present on the interior of the lip (Billman 1996). Another jar type, while slightly less common, is a similar form with a shorter rim that is thickened on the exterior side (Billman 1996). Both vessel forms were most likely used for cooking or storage.

Incursion of highland groups came in waves over two centuries, but by the HEIP in the middle valley there appears to have been three autonomous centralized polities (Billman 1996). The elite families of these polities lived in stylistically distinct residences in exclusive compounds contained within larger, aggregated sites like MV225 (Figure 5). These families possibly derived their political status from control over production regimes and military power. The surplus of staple goods may have been significant, and there is little doubt that controlling more land and the general spoils of raiding were important. Furthermore, because highland groups occupied the coca-growing zone in the Moche Valley for a substantial period, control over the production and exchange of coca may have been another important source of elite power (Billman 1996).
Figure 5: Elite residence Compounds 1 and 3, Area 1 at MV225, Cerro León; schematics drawn by Jenifer Ringberg.
The Early Intermediate period was a time of substantial growth on the north coast, “populations grew, irrigation systems expanded, and there was an increasing centralization of political authority” (Topic 1982). The size, location, and defensive nature of MV225 indicate that highland-influenced inhabitants strove to control access to the middle valley and an important corridor to the neighboring Virú Valley, where the Gallinazo Group had already established itself as a unified polity; but for the Gallinazo Group in the Virú, “a potential rival was taking shape at the site of Moche 25 kilometers to the north” (Topic 1982). By the early part of the Moche phase the Cero Oreja polity had forced most of the highlanders out of the valley. The southern Moche state emerged and eventually completely conquered the trespassers. Soon after the middle valley was no longer under highland occupation the political center shifted from Cerro Oreja to the site of Moche. Once total control of the Moche Valley was regained, monumental construction of Huaca del Sol and Huaca de la Luna marked the beginning of unimpeded expansion north and south from the valley. Over the next three centuries the entirety of the north coast, the resources and the inhabitants fell under political and economic jurisdiction of the southern Moche state.

In summary, the prehistoric settlement patterns in the middle Moche Valley were a result of ebb and flow in regional political organization. The observed settlement pattern differences that occurred over the course of roughly a thousand years between the Early Horizon and Early Intermediate period (500 BC to AD 500) can be in large part attributed to two prime movers, cooperation and conflict. The chronology of settlement patterns near Cerro León are condensed in the following table (Table 2).
<table>
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<tr>
<th><strong>Guañape</strong></th>
<th>Extensive canal and monumental construction projects in the middle valley</th>
<th>Many ceremonial centers in area suggest little armed conflict</th>
<th>Evidence for highland-coastal interaction in the Moche Valley is negligible</th>
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<th><strong>Salinar</strong></th>
<th>Agricultural expansion in the lower valley; monumental construction declines</th>
<th>Large settlements constructed in the river basin; seven site clusters emerge</th>
<th>Violence escalates; strong evidence for increased armed conflict in the region</th>
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<tr>
<th><strong>Gallinazo/HEIP</strong></th>
<th>No evidence for an increased investment in the canal network; some monumental construction begins</th>
<th>Settlements move to steep slopes and large populations become aggregated</th>
<th>Cerro Oreja polity controls lower valley; highland colonies settle in the middle valley</th>
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<th><strong>Moche</strong></th>
<th>Labor tax emerges on the north coast, as large ceremonial centers are erected in the valley</th>
<th>Settlements are dispersed in the valley; political center at the site of Moche</th>
<th>Complete control of the Moche Valley established under one polity at Moche</th>
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<th><strong>Labor Investment</strong></th>
<th><strong>Settlement Pattern</strong></th>
<th><strong>Political Climate</strong></th>
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**Table 2:** Chronological associations between primary labor investment, observed settlement pattern, and predominant political climate in the middle Moche Valley during Andean Phases are outlined here, indicative of an oscillating dynamic cycle.
Settlement at Cerro León illustrates an exceptionally complex system of sociopolitical development. Generally speaking, the more sophisticated a sociocultural integration is, “the more likely it is that the system’s functional lattices overlap” (Crumley 1976). Functional lattices are essential connections between groups within a larger sociopolitical system. When considered together, they might be thought of as a “highly complex set of interdependent linkages directing the organizational parameters of society” (Scarborough 2003). Functional lattices of sociocultural integration at MV225 can be observed in part through the association between settlement and production. With regard to the development of a sociopolitical system at MV225, highland-coastal interaction, be it through cooperation or conflict, exemplifies the idea of overlapping functional lattices. In essence, this is the notion of heterarchy. Carole Crumley defines heterarchy as “the relation of elements to one another when they are unranked or when they possess the potential for being ranked in a number of different ways” (Crumley 1995). In this case, the latter applies. Elements of sociopolitical development, as inferred through material culture at MV225, are ranked in a number of different ways that will be discussed in greater detail. Batan cluster configurations on the archaeological landscape of Cerro León are not stochastic. They are interpreted through spatial analysis as interconnected parts of a sociopolitical manipulation at MV225 that ultimately contributed to a compelling social presence in a geographically strategic region of the Moche Valley during the EIP.
CHAPTER III
THEORETICAL PERSPECTIVES

It has been said that Andean archaeology has a “healthy balance between processualist and postprocessualist approaches to the past” (Isbell and Silverman 2004). Many theories exist regarding the socio-ecological complexity of the past, and given the diachronic nature of prehistoric data, archaeology is in a particularly advantageous position to test and refine these theories (Freter 1997). Recent improvements in the quality and quantity of data documenting prehistoric environmental change, computer-assisted manipulation of geospatial information, advances in retrieving archaeological data, as well as the introduction of new and innovative methods and interdisciplinary theories, have created a unique opportunity for my research. Integration across the social, natural and spatial sciences is crucial for better understanding population – environment interaction and cultural transition.

Theoretical approaches to my study of the Cerro León settlement and its surroundings are summarized first as a functional approach, which focuses on the raw data as capable of communicating organization; second, a structuralist approach that then focuses on the interpretation of the data as encoded with generative value; and lastly, my synthesis focuses on the dataset as describing patterns of purpose and meaning.
By means of blending abstract ideas with empirical investigation, models “transform a reference situation, usually a complex system or process, in order to make it more accessible or tractable” (Winterhalder 2002). It is part of the scientific process to first emphasize the most obvious patterns in time and space, and then focus on the reasons for observed variation around the model (Kohler and Van West 1996). Strict ecologists generally model the notion of space in population dynamics, be it over land or over time, by combining knowledge of the rules governing interactions among individuals at sites with linkage between various sites via dispersal (Tilman 1997). This idea is useful for archaeologists; but for us, attributing the accurate rules that govern human actors and finding the linkage between individual and group decisions through normal methods of biological dispersal is complicated. This analysis of settlement pattern data does not intend to suggest that it is possible to unequivocally characterize the nature of settlement by simply assigning numbers and symbols to peoples and places. The hypotheses presented here reiterate that the “real heart of the GIS for archaeologists is our ability to conduct spatial analysis on the patterns and relationships between archaeological sites, and between sites and their environmental context” (Madry 2004).

In evaluating the social structure of Cerro Leon I appeal to a generative approach toward cultural naissance. Cultural inheritance theory, also known as “dual inheritance theory” (Boyd and Richardson 1985 & 2005; Cavalli-Sforza and Feldman 1981; Shennan 2002), examines the interconnectedness of evolutionary processes and individual handling of cultural knowledge. Individual behavioral variation results in different choices that inevitably alter cultural knowledge over time (Eerkens and Lipo 2005), and “it is precisely on
the individual level the evolutionary processes operate, and the aggregate effects are visible on the population level” (McClure 2007). Such an elegant theory is required for an appropriate archaeological investigation of batan clusters at Cerro León. It is a theory that goes well beyond simple “phenotypic” evolution (or memetics). In this context, it is explicitly designed to explain the social evolutionary process at MV225 as originating at the household level.

The synthesis of function and structure makes navigating the fractal properties of socioeconomic development more manageable. The mainstream Andean highland pattern of sociopolitical structure, that is, one of a “vertically compact” local subsistence economy, “may be contrasted with those of the north and central coasts of Peru ... where economic specialization in production and exchange was more highly developed” (D’Altroy and Earle 1985). The settlement at Cerro León conveyed many highland traditions, like communal labor arrangements, but in light of violent conflict an immediate necessity to produce as well as protect resources surfaced. Traces of this are seen in the presumed importance of communal labor efforts in juxtaposition to heavily fortified site perimeters nesting stylistically disparate elite residences. Such large-scale labor mobilization may have required large-scale chicha production. We know that in the central highlands “the role of maize changed between A.D. 500 and 1500, shifting from a culinary item, simply prepared by boiling, to a more complex symbolic food, transformed through grinding and brewing into beer, with elaborated political meanings ... this change in maize processing and consumption occurred at a time of heightened political and social tensions”; and the onset
of this change coincides with the abandonment of MV225 on the north coast (Hastorf and Johannessen 1993).

This investigation gives special consideration to the natural environment as it relates to site placement, the spheres of cooperation and conflict, the weight of gender on cultural transmission, the regimes of staple finance and wealth production, the political economics of highland-coastal interaction and the dynamic cycling of Andean traditions in general. By considering a more nuanced spectrum of structure – the influence of gender culture – from a dual inheritance perspective I draw logical connections between spatial organization of society and individual actors at Cerro León. Through these theoretical casings I also hope to demonstrate how the historical contingencies of warfare, trade and other spheres of highland-coastal interaction are inextricably related to the dynamic process of first-generation state formation on the north coast.
CHAPTER IV

RESEARCH

Field Methods

The Moche Origins Project Geographic Information System (MOP-GIS) is a comprehensive georelational database of the north coast. Construction of the MOP-GIS began in 2003. It is an ongoing effort to assemble, store, and administer all spatially referenced data available for the northern coastal region of western South America; but until recently, it has focused primarily on the Moche Valley. At present, the MOP-GIS database houses more than 40 gigabytes of information. Among archaeological, historical, ecological, geographical and geological datasets it includes stereo paired aerial photographs and satellite imagery, and two large-scale digital terrain models, a Digital Elevation Model (DEM) at 30 m resolution for the entire valley and a 5 m resolution DEM of Cerro León. A catalogue of over 1,000 prehistoric sites and their attributes in the Moche Valley is being compiled, including lower, middle and upper valley regions. Currently the settlement database holds over 500 sites, primarily from Billman’s middle valley survey, and some more recent data from the Sinsicap and Cuesta surveys. A survey of the upper Moche Valley is anticipated to be completed and fully integrated with the MOP-GIS by 2010.
Beginning in 2004, a major topographic survey of Cerro León was undertaken by a group of MOP researchers. Using a Leica Geosystems total station, the entire mountain was measured at 5 m contour intervals, and all standing architecture was mapped with the exception of a few areas deemed too dangerous to survey. These areas were circumnavigated and large “architectural rubble” polygons were recorded. The mapping project took a team of three (including the author) two months to complete. The post-processed topographic data was completed in 2007. The result is a highly detailed model of Cerro León and the prehistoric architecture associated with MV225, now fully integrated with the MOP-GIS. The MOP-GIS and Cerro León model (Figure 6) are used for spatial analysis of spatial organization at MV225.
Figure 6: Cerro León 3d Model.
During the 2007 field season of the MOCHE-UNC Field School in South American Archaeology, a complete systematic survey of batanes was conducted over the course of two months at MV225. A team of 3 to 5 investigators documented all planar rocks with a glass-like polished surface (Figure 7) by combing 12 architecturally-defined site areas (Figure 8), roughly 50 ha in total area. The survey team photographed each artifact, measured its working surface and complete artifact dimensions, spatially located it with a mapping grade Geographic Positioning System (GPS) hand-held unit, and described each batan and its context before assigning it a specimen number. A total of 93 batanes were identified in 10 of the 12 areas. Areas 1, 2, 3, and 4 have by far the highest concentration of batanes, while none were found in Areas 6 or 8. Considering the large quantity of batanes found on site, it is apparent that milling was an important activity at MV225. All batanes recorded on site are igneous rock. Each is one of the following three material types:
**Andesite:** An extrusive (volcanic) rock produced when magma flows on the earth's surface and solidifies very quickly. The mineral grains are two small to be seen, and the rock is black in color.

**Granite:** An intrusive (plutonic) rock produced when magma solidifies at depth beneath the earth, and then is exposed to the earth’s surface. Individual course mineral grains can be seen.

**Granodiorite:** An intrusive course grained rock very similar to granite, but containing more plagioclase and potassium feldspar, giving it a distinctive rose color. Most of Cerro León is made of Granite and Granodiorite.

**Figure 7:** Batanes, large lithic tools used for milling and mineral processing, like the Granodiorite specimen pictured here, are material remnants of social boundaries at an elite domestic complex in the middle Moche Valley. An unbroken Granite chungo, or grinding stone, is pictured resting on top of the batan in the upper left-hand corner.
Figure 8: Cerro León architecturally-defined site Areas 1 through 12.
Analysis and Results

A preliminary question for evaluating survey data is whether or not batan usage remains isolated and concentrated or spreads and becomes increasingly diffuse. To help identify an appropriate neighborhood distance for cluster analysis, a Moran’s I spatial autocorrelation test was run. The index score was .57, indicating that statistically speaking there is less than a 1% chance that the observed clustering is a result of random chance. Batanes are isolated and concentrated; as a result, a small neighborhood distance was used for the cluster analysis. The point density function in ESRI ArcGIS software calculates the density of points around each raster cell by: 1) defining a standard neighborhood for each cell’s center; 2) totaling the number of points that fall within that neighborhood; then 3) dividing the total by the area of the neighborhood to produce a density value for each pixel (Silverman 1986). The neighborhood is defined by a circular search area, calculated at approximately 1.5 m².

The graphical representation of cluster analysis is a polychromatic scale of pixel densities (Figure 9), clearly identifying Area 1 with the highest batan concentration per map unit (square meter). The density of batanes in Area 1 is far greater than that in any other area with the exception of Area 4. However, it is the variation in configuration of batan clusters between Areas 1 and 4 that is the crux of the matter. The significance of this finding is discussed in the following section that reviews the results of analytical techniques used for this project.
Figure 9: Cluster analysis of batanes. This analysis shows that Areas 1 & 4 (top center and right, respectively) demonstrate the highest concentration relative to other Areas by the yellow and orange pixilation; red points indicate the actual batan waypoints.
The goal for spatial analysis of defensibility at Cerro León is first to determine the nature of mobility between any point on the valley floor and the elite, administrative center in Area 1. Once these corridors are modeled in a virtual reality they can be compared to actual locations of empirically defined “defensive” architecture. If the architecture, which appears defensive, does in fact impede the virtual corridors, there is a greater likelihood that ensuring security was intentional in construction design.

The first step in this process was to generate a slope model from the 5 m digital terrain model of Cerro León in ArcGIS. Next, execution of a least cost path analysis transformed the slope model to represent a cost distance for traversing the friction surface, whereby cost increases as slope increases per the user-defined unit of land, in this case every 5 m. The slope model approach has been a primary tool for determining least cost paths between locations for decades (Lindgren 1967; Warntz 1957; Warren 1990; Wescott and Kuiper 2000). In reality, travel cost is not strictly a function of slope. Other impedances like ground cover or weather damage are often present. A mathematical transformation called the hiking function can account in part for this issue (Tobler 1993). However, this transformation is generally more useful over long distances, and because it is too difficult to speculate on the quality of prehistoric trails and the overall fitness (i.e. walking speed) of individuals climbing the mountain or other obstacles that may have been present at any given moment in prehistory, no additional tolerances were included in the least cost path analysis. The following is a graphic representation of the best possible routes to Compound 1 from all outlying settlements (Figure 10). Further discussion of the significance of these findings will follow in the next section.
Figure 10: Least cost paths on Cerro León. This analysis was conducted from the calculated center of all architecturally-defined site Areas (known as centroids) rather than arbitrary points of embarkation from the valley floor. The decision to use centroids operationalizes the data for a variety of analyses.
The defensive line of sight for Cerro León can be extrapolated through spatial analysis of the natural landscape with the *viewshed* function in ArcGIS. Viewshed identifies the cells in an input raster that can be seen from one or more observation points or lines, in this case, from the center of each area, plus 2 m on the Z axis for an arbitrary average observer’s height. Every cell in the output raster is valued by how many observer points are visible from each location and all cells that cannot see an observer point are given a value of zero. *Cumulative viewshed analysis* (CVA) is commonly used in archaeology to make inferences about the relationships of intervisibility between related locations on a landscape (Wheatley 1995). The following map illustrates the potential for visual exposure attackers would face if advancing from the south and stresses the importance for parapets found on this side of the mountain (Figure 11). In conjunction, the least cost path and cumulative viewshed analyses demonstrate that the settlements, parapets and breastworks on the south-facing side were defensive in nature. Again, the significance of these findings will follow in the next section.
Figure 11: Cumulative viewshed analysis for defensive sites at Cerro León. This analysis is a calculation of all site Area centroids across the digital elevation terrain raster surface model.
Compelling evidence for craft production at MV225 is the presence of Andesite batanes. Andesite has a much harder working surface than Granite or Granodiorite and it is recognized as a common lithic material used for metal-working in the Andes (Lothrop 1951a & 1951b; Lechtman 1976). Andesite batanes are rare on Cerro León and are not evenly distributed across the site. When the attribute table for survey specimens is queried, only six Andesite artifacts are identified; three in Area 1, one in Area 2, and two in Area 3 (Figure 12). In addition to being the same material, all six batanes are nearly the exact same shape and size. In Area 1, two of the stones that comprise the discrete cluster of three are located just below Compound 1, what is believed to be the primary elite household at Cerro León. Formation processes on the mountain suggest a series of post-occupational events probably relocated artifacts down the steep slope from their original location inside the walls of the residence. It is reasonable to assume that the third was also displaced from Compound 1, as it is isolated from any architecture and was most likely thrown aside by looters. The batanes in Areas 2 and 3 probably suffered the same fate, either at the hands of looters or the taphonomic course of a seismic or weather event, possibly all three. It will suffice to say that all of the artifacts probably now rest in a different location than where they were originally deposited by the artisans that used them.
Figure 12: Andesite batanes located in Areas 1, 2, & 3.
CHAPTER V

DISCUSSION

Batan clusters considered within their architectural contexts on Cerro León illustrate discrete use-areas of the site. For example, individual batanes located inside residential compounds probably indicate household-level domestic milling, while multiple uniform groups of very large batanes suggest a communal space or perhaps a corporate-level administration of large-scale milling. The absence of batanes in considerably large areas of stonework implies non-domestic activity. These areas might have been for ceremonial, or some other type of communal or defensive use. Areas that have a few batanes scattered about and are associated with specialized architecture like aggregated, steep slope construction with a wide cumulative viewshed, were probably defensive in nature and part of the military complex at Cerro León. The following sections will expand on function, but attempt to go further by exploring meaning through the interpretation of material evidence in the context of spatial organization at MV225.
The Best Offense is a Good Defense

Acute vulnerability from the south side of the mountain was a primary concern for the citizenry of Cerro León. Defensive architecture was probably constructed to thwart attacks from the ethnic-coastal polity amassing large armies at Cerro Oreja. Very large walls on the south side of the mountain, three of them nearly 4 m tall, were constructed at the top of arroyos that are out of view. To cut off any potential for mounting a sizeable direct assault along primary ridgelines, long parapets defended every possible access over the mountain from the more gradual routes of ascension. Areas 6 and 8 are just below these extended parapets and are littered with minor breastworks. No batanes were discovered in either area. It is possible that they were overlooked, but considering the strict survey protocol it is unlikely. If there were large stone artifacts present in these site areas, certainly at least one of them would have been located. But these areas are large and the architecture is extensive, why aren’t batanes present? Lex parsimoniae ... all things being equal, the simplest answer is usually the best. Areas 6 and 8 probably served a specific function that had nothing to do with the domestic processing of food. Perhaps they were military staging areas. Maybe they were locations for Cerro León’s tambo (trading post). It is possible that they were ceremonial gathering places. Potentially, Areas 6 and 8 served all of these functions, either during a single occupation or over the course of many generations.

To the southwest, on the extremities of Cerro León, Areas 9, 10, 11 and 12 are characterized by clusters of architecture that imply domestic habitation of lesser-status families. Some, but not many, batanes are present in these areas. Because living quarters
are extremely small compared to the north side of the mountain, it is a near certainty these were not elite residences. They were most likely defensive in nature. There are a number of breastworks scattered around the structures. Interesting, each narrow ravine is blocked by a small domestic compound, which is in turn flanked on either side by a tiny bastion-like structure about 10 to 20 m overhead. Constructed on the extremely steep slopes, these structures give the impression of small “crow’s nests” or even miniature Moche Alamos, where snipers could fire down at invaders or residents could retreat if overwhelmed.

The military complex of Cerro León had a good defensive strategy. By fortifying the very top of the south side of the mountain they were able to place their enemies in a more disadvantageous position than if they fortified lower on the hillside. Climbing the terrain would have tired enemy combatants and the naturally narrow arroyos would have thinned skirmishing contingents linearly. Through the flexible application of combat power, armaments in elevated positions could sling stones and other projectiles from behind breastworks, then duck and cover. They could also send men to flank attackers from above to engage in hand-to-hand combat, most likely with long handled, stone-tipped maces.

Warfare in Andean prehistory and in pre-state societies in general is often underestimated as to its importance for sociopolitical development. Because “the architecture of premodern defenses is poorly understood and many arguments used to dismiss military interpretations are incorrect” much evidence for violent conflict has been dismissed in the study of Andean prehistory (Arkush and Stanish 2005). It is apparent that a
considerable amount of labor and resources were committed to the military complex at MV225.

While well beyond the scope of this project, primary theories on the origins of warfare such as those defined in *Anthropology, Archaeology, and the Origins of Warfare* (Thorpe 2003) – evolutionary psychology, materialism, historical contingency – could be useful for interpreting the meaning of the material evidence for warfare at MV225. Conflict is a significant area of further study at Cerro León because “military institutions, like other social institutions, organize major areas of values, attitudes, and interests in the service of social needs” (Hacker 1997). In the case of the middle valley during the Early Intermediate period, perhaps it is not necessarily the impact of war itself that had such lasting significance as the preparation for war. The life histories of both ethnic-highland and ethnic-coastal individuals would have informed the decisions they made with regard to daily life, whether they were elite members of society or not. In a cumulative fashion, individual decisions might then have been translated into cultural memories and materialized in a shared identity. It is likely that conflict shaped the social structure at Cerro León. And there is little doubt that the violence in the middle valley at this time had historic significance with regard to subsequent sociopolitical development in the Moche Valley.
Chica Production and Social Construction

How did the elite manage to wield control over the social boundaries of such a large population and mobilize the workforce necessary to construct such a large, heavily fortified domestic site? As mentioned previously, the masa was most likely a much utilized social manipulation during settlement of MV225. Still a common Andean tradition today, men are served copious amounts of alcohol in exchange for their labor. Because activities such as brewing chicha are correlated with the presence of corn milling, and considering the quantity of batanes and proximity to irrigated fields, it is logical to assume that major chicha production events could be efficiently mobilized by the Cerro León elite. Chicha does not store well, without refrigeration it will turn to vinegar in less than a week and batch brews must be consumed within days of complete fermentation. Through large social gatherings, the masa, elite architects could tap into the instant sweat equity of laborers.

MV225 was masterfully constructed. Elite residences were well protected by a heavily fortified and aggregated domestic complex. The Cerro León population was well provisioned. The site was intentionally placed with direct proximity to vast fertile fields, the coca growing zone and easy access to neighboring highland groups. It is safe to assume that through more than two centuries of occupation, socio-cultural construction of the Cerro León community was equally well-established. The masa and chicha were most likely crucial aspects of day-to-day life at Cerro León, from production to consumption. In turn, they probably were significant to the evolving social fabric of the site.
To get at the broader sociopolitical structure of chicha production at Cerro León it is important to understand the role gender played within the system, as it was almost exclusively women that were brewing the beverage. Physical traits of women often translate in archaeological research to a limitation of their social roles in prehistory (McClure 2007). But because domestic activities of women have largely been presumed “invisible” in the archaeological record, if the universality of a sexual division of labor is going to be invoked, it should be first substantiated rather than assumed outright (Conkey and Spector 1984).

With respect to the Moche Valley during a period of rapid population growth, ethnohistorical evidence from a modern squatter community near Cerro León, Ciudad de Dios, characterizes the role of women during an early stage of the demographic transition. On a daily basis, most women were in or near the household conducting important domestic activities related to food preparation and child care, reportedly due to the requirements of raising a disproportionately large population of children (Fariss 2004). Women at Ciudad, like other Andean communities, are also primarily responsible for the production of chicha. Jerry Moore found that by “using ethnohistoric and ethnographic accounts of chicha production one can identify the material remains associated with production steps, then use the archaeological data to understand the distribution of chicha making” (Moore 1989).

As is evident from the relatively skewed ratio of elite residences to commoner dwellings at Cerro León, a sharp increase in the general population occurring during the HEIP would
presumably mean that women would have been caring for more babies and toddlers in addition to keeping up with other household duties. Making a living in an ecologically conscripted environment such as the northern coastal desert is no easy task today, and in all probability was less so back then. Making sure that your children and your neighbor’s children survive the extremely steep slopes of Cerro León in the midst of a political transformation that involved frequent violent conflict further substantiates that women were probably responsible for the primary domestic roles at MV225, such as child rearing, food preparation and chicha production. Through these activities, women and girls were the custodians and benefactors of essential cultural knowledge over centuries of societal development. The following section will explore the potential of cultural inheritance theory to address this level of agency in one interpretation of the social landscape at MV225. Through an emergence of large-scale domestic production of chicha by women, the important question is: How might the masa shaped the lives of Cerro León society and contributed to the expansion of an ethic-highland power base in the middle valley?

Dwight Read, Professor of Anthropology at UCLA, outlined a dual inheritance theoretical model that is mathematically based on the inferential process underlying language acquisition. His method assumes that decision-making behavior is founded on cultural meaning in the context of information that an individual receives about the state of one’s natural and constructed environments. He relates this model to the transmission of information between individuals, dual inheritance theory. In this way, he associates the cultural context of decisions with the form of their transmission. There exists a significant difference between “cultural” and “material” knowledge; that is, between information that
raises questions about behavior resultant of identity, as opposed to the sort of information that raises questions about behavior as the expression of an alternative decision (Read 2001). Material knowledge of a group is passed from individual to individual in packets or “chunks” of knowledge (Read 2001). When expressed through normal means of transmission, usually by tangible examples and subjective imitation, these chunks lose certain characteristics that are not readily recoverable. Subsequently, the knowledge is not always completely understood. Whereas when cultural knowledge is passed incompletely, as most often is the case through oral tradition, the underlying logical structure of culture, much like the underlying logical structure of a language, allows for the replication of omitted information. The potential for complete comprehension of knowledge increases as essential characteristics of that knowledge are transmitted. Evolutionarily speaking, the difference is that “cultural knowledge is more resilient and less prone to drift effects than is the case for material knowledge, when information is transmitted from one person to another, or when only partial information is transmitted” (Read 2001).

If women – as sisters, wives, and mothers – but more importantly in this context as millers, were primarily responsible for milling at MV225, then they possessed a feminine-specific culture within the context of a larger society there. And if this is true, then Read’s model suggests that dual inheritance theory is accessible for interpreting some evolutionary aspects of culture at MV225. While the material knowledge of milling could be passed on to any individual within the society, male or female, specific cultural knowledge would have been passed down only through generations of women. At Cerro León, processing staple goods for domestic purposes may have gradually transformed into large-scale production of
chicha for power and wealth. While it is difficult to ascertain strictly from batan clusters the nuanced affect of a lasting feminine culture on the milling industry as highlighted by dual inheritance theory, the role of women, not only for institutionalizing production, but also in maintaining social boundaries, was no doubt vital. To that end, the process that evolved out of a multi-generational sexual division of labor ostensibly generated an abundant surplus of processed staple goods and access to large quantities of chicha, whether under a cooperative labor arrangement or compulsory work system, it was almost certainly administered by the elite households and passed on to the general population of MV225.
Accumulation of Wealth and Power

The density and sophistication of architecture in Area 1 of MV225, particularly in Compounds 1 and 3, is indicative of a high-level of labor mobilization by the elite household(s). Excavations here have revealed multiple floors and reconstruction events, implying a very long duration of occupation. Ceramic assemblages include many ceramics of the HEIP tradition discussed in the Background section of this thesis. Some highland-style fine-ware ceramics have been recovered from excavations at Compounds 1 and 3, indicating that the elite had access to wealth. Bone, shell and stone beads, as well as precious metals usually associated with affluent residences, have been discovered. The protected physical location and open view orientation of Area 1 on Cerro León places these compounds in perhaps the best possible position with respect to site-wide administration.

Waldo Tobler of the University of California at Santa Barbra said that the first law of geography is that "everything is related to everything else, but near things are more related than distant things" (Tobler 1970). In keeping with this notion, Area 2 by immediately neighboring Area 1 is likely to be the most linked to elite residences. Beyond the geographic relatedness of Areas 1 and 2 there is little evidence that leads to the assumption they were associated. However, Areas 2 and 3 exhibit a significant amount of domestic living space and a proportionately adequate number of batanes for personal use relative to other site areas. It appears from the extent of architecture in Areas 2 and 3, this was the barrio of the masses. While complete architectural survey was not possible in Area 3 due to latent rockslide conditions, it appears from the sheer magnitude of rubble wall fall that
more people per potentially available covered floor space lived in Area 3 than anywhere else on the mountain. It is likely that many batanes would be discovered here as well, but due to the extent of looter damage, visible surface survey was not possible.

Once the elite household(s) gained control of a substantially large workforce, it is possible that intensification of staple surplus production may have taken place. As mentioned before, large-scale chicha production was presumably a significant means of manipulation of site social boundaries. It is Area 4 that suggests the emergence of communal, or possibly corporate, milling at MV225. From an article published in 2001, Hendrik van Gijseghem finds that differences in construction styles of the later Southern Moche state capital at Moche “reflect strategies of household social reproduction among Moche's urban population that depend largely on socioeconomic status, [and] different forms of labor were responsible for the construction of residential compounds and other specialized areas, the function of which may not be primarily residential” (Gijseghem 2001).

Area 4 is by far the largest of all architecturally-defined site areas. It appears that there are very few domestic structures and the entire area is situated in a virtually unprotected location near the valley floor. In a series of very large cleared spaces, there are four great rhombus-shaped enclosures too big to have been roofed by available materials. These enclosures may have been used to desiccate grains, peppers, and coca leaves; such enclosures are common still today in the Andes. Considering that the highlanders controlled the coca-growing zone, it is logical to assume they were harvesting it. Coca at
this time was a particularly valuable crop. It requires little post-harvest processing and is light and readily storable. Coca could have easily been traded at long distances.

Directly in front of these large rooms, there are two constellations of very large batanes. The batanes located here are by far the largest on site. They are positioned right next to one another, arranged in a formation that closely resembles an assembly line. At the very least, three individuals could work on each stone at once and four to six stones are bunched together in each constellation. Just at these work stations alone, more than a dozen people could be milling at the same time. There are several other large batanes in proximity to these constellations, radiating outward in concentric lines of three to four batanes each. A total of 18 very large batanes are situated in a work area of approximately 25 m². That means that there could have been more than 30 individuals milling in a space roughly equivalent to a basketball court. The amount of grain that could have been processed in this area would supply more than is needed for domestic use, so large quantities of processed grain could have been used for masa chicha or as trade commodity.

In Area 5 there are a number of very large concentric circular features, presumably used as pins or corrals for enclosing animals. Only one batan was located near these possible corrals, exactly at the center. The features are tucked back into the mouth of a narrow basin and are naturally protected on three sides by very steep slopes. Highland groups moving goods between the Carabamba Plateau and the Virú Valley would have utilized llama trains. Excavations near the features in 2006 revealed a number of faunal remains in Area 5. They were identified to be llama. Further excavation is needed to corroborate that
these features are indeed corrals, but if they are, the existence of a large-scale production facility at Area 4 next to a staging location for llama-assisted portage supports the notion that a complex system of wealth accumulation was emerging at MV225.

If a finance regime was established, then it might have allowed members of elite households a unique opportunity to engage in other wealth producing activities. In reconciling “field” with “habitus” it is important to first accept that the spatial analysis of artifact clusters assumes the reliability of “class-distinguishing characteristics” (Bourdieu 1984). Excavations at Compound 1 have produced a number of metal objects, from gold beads to copper fish hooks. Small flakes of sheet metal have also been discovered. Stone beads, mostly mudstone, and rounded stone bead blanks are common. Very small hoe-shaped tools, likely too small for the usual agriculture commission, have been found, as well as small donut-shaped stones that are inadequate for efficiently busting dirt clods (or enemy skulls for that matter). Both examples of these lithic tools seem to be of a more specialized utility. Perhaps they were used to produce fine manufactured goods.

Again, excavation is needed to investigate artisanship at a household level; however, there are indications that the presence of Andesite batanes indicate specialized craft production at MV225 and may be associated with wealth producing activities of elite households. Andesite does not occur on Cerro León naturally, stones must have been brought up the mountain from the river basin below. Considering that Andesite batanes are distinctly uncommon at MV225, their presence is exceptional and point to some level of specialization, if not class-distinguishing. As mentioned previously, only six were found. Yet
because the stones are relatively portable and presumably of some value, when the site was abandoned it is possible that the local artisans took some of their batanes rather than discarding them.

The largest of the Andesite batanes measures approximately .75 by .5 m. They are extremely small compared to their fixed Granite and Granodiorite cousins on site, suggesting that they were functionally inadequate for milling grain and in turn used for some other purpose. It is widely recognized in Latin American Archeology that Andesite is a common lithic material used for many crushing, compressing, and refining activities involved with prehistoric metalworking (Bray 1971; Grossman 1972; Lechtman 1976; Lothrop 1951a & 1951b; Shimada 1978). Furthermore, the spatial relationship of these batanes to elite residences is at least attention-grabbing, and because *formal, spatial, quantitative,* and *relational* properties of artifact variability are usually distinctive [the four dimensions of artifact variability are described by Rathje and Schiffer 1982; also Schiffer 1987] the resemblance of individual artifacts to one another obliges consideration that they are in some way unique at MV225.
Summary

In order to adequately describe early Southern Moche state development one must consider the primary penultimate settlements in the Moche Valley and the power bases of leaders at those settlements. Generally speaking, there are four fundamental bases of power: political, economic, ideological, and military (Mann 1986). For the purpose of this thesis the first two were combined, indicative of “control over the procurement or distribution of basic resources” such as grains, chicha beer and coca leaves (Billman 1999). There are many ways to achieve control over basic resources, “through physical control of productive facilities, such as irrigation systems [Haas 1981 & 1982; Moseley 1975], or by gaining a monopoly in trade in critical items, such as salt or high quality stone for tool manufacture [Costin and Earle 1989; Haas 1981 & 1982; Webb 1975]” (Billman 1999).

While a mode of passage for cultural information has been proposed here, what that meant in terms of an ideological power base is not retrievable with this dataset. However, the military power base was very important at Cerro León. The military complex played a significant role in the power achieved by elites in the middle valley. It contributed greatly to the sociopolitical development of Cerro León, and through conflict with the Cerro Oreja polity, ultimately contributed to the manner in which the Southern Moche state developed.

The lines of evidence presented above support the notion that a group of highland-influenced elites at MV225 exerted control over a large portion arable land in the Moche Valley during the EIP. By erecting a large defensive settlement at Cerro León, they may have manipulated the flow of processed staple goods, valuable agricultural products like
coca, and potentially other crafts and wares between the middle valley, Virú Valley and Carabamba Plateau. Whether the people of Cerro León were assimilated or annihilated by the purely coastal Moche identity that emerged, it is evident through the material remnants of MV225 that highland-coastal interaction influenced first-generation state formation on the north coast.
CHAPTER VI
CONCLUSION

The argument that state-level societies emerged in western South America prior to the Early Horizon is unconvincing. There is really no good evidence for a substantial level of integrated administration on the north coast under a single identity prior to the Early Intermediate period. Pre-Moche polities in the region are best characterized as interrelated, but autonomous village clusters. At risk of articulating a linear track of political development, any villages that did emerge as semiautonomous settlements on the north coast by the EIP are at most analogous to a chiefdom-level political complexity. We do know that the Gallinazo Group emerged on the north coast during the Early Intermediate period, and, in the Virú Valley, they populated a town of several thousand people (Bawden 1996). While there was also a sizeable Gallinazo presence in the neighboring Moche Valley, the conventional theory is that Gallinazo culture came to pass prior to the Moche. Yet, Bawden believes there may have been some continuity between Gallinazo and Moche traditions, particularly with respect to domestic architecture (Bawden 1990). There is little debate however that attributes of first-generation state formation exist as part of the Moche tradition, characterized by replication of distinctive artistic, mortuary, and architectural styles across great distances on the north coast (Stanish 2001).
Between Gallinazo and Moche is the HEIP, characterized by MV225. This investigation relies heavily on inference from spatial analysis of survey data to model the spatial organization of the settlement at Cerro León; and given certain theoretical parameters, it speculates as to “meanings” of that organization. By classifying spatial variability in terms of variation in use-area, this investigation illustrates potential interactions among residents of MV225 as well as potential interactions between the populations of Cerro León and surrounding settlements. Spatial analysis used in this investigation transforms the functional latticework of the middle valley into tractable social landscape.

This investigation gives special consideration to the natural environment as it relates to site placement, the spheres of cooperation and conflict, the weight of gender on cultural transmission, the regimes of staple finance and wealth production, the political economics of highland-coastal interaction and the dynamic cycling of Andean traditions in general. These mechanisms are inherently connected by spatial proximity and relative to one another by temporal distance. This project investigates the fundamentally intertwined parameters of ecological, physical, and cultural environments in the middle valley. By considering a more nuanced spectrum of societal structure – the influence of gender on culture for example – logical connections are drawn between individual actions and collective behaviors. The investigation also demonstrates how historical contingencies of warfare, trade and other spheres of highland-coastal interaction are inextricably related to the dynamic process of first-generation state formation on the north coast.

This project adds to the growing body of middle-range, household-level archaeology that is becoming so imperative in order to fully understand prehistoric social systems. The
conclusions presented here should help to conceptualize Cerro León as central to the highland/coastal interaction process, be it through cooperation or conflict, and thereby contribute to our comprehension of first-generation state development on the coast. Cerro León was a significant site in the regional political latticework during the Early Intermediate period.

Like nesting dolls, finding the appropriate theoretical perspectives that fit one into the other is important for synthesizing a sound multifaceted approach to complex questions so that when all are properly nested together the whole is significantly stronger than any individual perspective. This is true of the theoretical implications for elements of state formation from the household – to intra-site – to inter-site – to a regional political economic structure. While one might be able to get a sense of the political trajectory from the top-down, a more robust appreciation will come from the ground-up. In conclusion, this research constitutes a new and innovative direction for settlement pattern studies and exemplifies the effectiveness of combining spatial analysis techniques with social theory in the field of archaeology now and into the future.
Fourteen years ago GIS was considered an “Application of Space Age Technology in Anthropology”, as the title of conference proceedings at the John C. Stennis Space Center in 1991 indicates (Winterhalder 1991). From its humble beginnings as Mylar overlay analysis, passing through the status of space-age technology to the era of complex spatial analyses, GIS has evolved well beyond an inaccessible and specialized technology. Today, a great number of researchers all over the world, including many working in Peru, consider GIS an integral part of their work because of its analytical power, increased functionality, and visualization potential (Allen 1990; Craig 2000; Crumley and Marquardt 1990; Madry 2004; Rogers, et al. 2003; Teichert 2000; Tripcevich 2004).

Archaeological geomatics is today a significant subfield of archaeology (Sebastian and Judge 1988; Thomas 1988; Lock and Stancic 1995; Westcott and Brandon 2000). Although the most appropriate techniques and methods for analyzing spatially referenced archaeological data are still debated (Ebert and Kohler 1988), the potential to create useful models is generally accepted to be a valuable resource within both the archaeological and planning communities (Madry 2003). Several reviews citing the utility of GIS in archaeology in general have been published (Allen et al.1990; Warren 1990; Maschner 1996; Westcott and Brandon 2000). With respect to the possibilities of GIS in Andean archaeology, Brian
Billman has proposed that “both the scope of the questions that we will be able to investigate and the manner in which we will investigate them will soon change” (Billman 1999).

MOP-GIS future projects in the region include: comprehensive settlement pattern analysis of the North Coast by revisiting former projects in the Chicama, Moche, Virú, Chao and Santa Valleys; complete survey in the upper Moche Valley, featuring data from the Sinsicap and Cuesta tributaries; agro-ecological zonation, site location predictive models and landslide hazard risk assessment; and a large-scale hydrological model for rural development projects in the middle valley. In addition, further investigation of strategic hilltop forts like Cerro Ramon, a large single-component site demonstrating ceramic evidence for highland interaction at the geographic extremities of Imperial Chimú expansionism, “may provide a more detailed look at the trajectory of highland–coastal interaction on the north coast of Peru” (Fariss et al. 2006).

The project described by this thesis would be greatly enhanced by a complete survey of chungos and manos at MV225. Spatial analysis on the occurrence of these with respect to batanes might improve the inferences made about function and extent of use-areas. Also, the architecture in Area 3 needs to be surveyed completely. While dangerous, given the appropriate precautions and equipment, it would be possible to safely administer a complete survey of architecture and material remains on the surface of the slope. Finally, a survey of other lithic materials such as sling stones and mace heads would be appropriate on Cerro León, particularly on the south side. There is potential for a very productive experimental archaeological investigation here. One could measure the distance and
trajectory of sling stones hurled from breastworks using physical trials, modeling the
effectiveness of what is presumed to be defensive architecture.

Another worthwhile avenue of investigation would be paleoethnobotanical analysis of
macro botanicals. Small scratches and tiny striations on a ground stone could harbor
botanical fingerprints, providing clues to prehistoric food production. Analysis of botanical
remains that are desiccated rather than charred could provide another interpretation of the
communal milling complex at MV225. Providing that such ecofacts are recoverable, this
evidence would certainly better our understanding of foodways and agricultural production,
and assist in guiding us across the complex social landscape of MV225, Cerro León.
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