THE DOMESTIC MODE OF PRODUCTION AND THE DEVELOPMENT OF SOCIOPOLITICAL COMPLEXITY: EVIDENCE FROM THE SPONDYLUS INDUSTRY OF COASTAL ECUADOR

by

Alexander Javier Martín

B.A., Florida International University, 1999

M.A., Florida Atlantic University, 2001

Submitted to the Graduate Faculty of

The School of Arts and Sciences in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2009

UNIVERSITY OF PITTSBURGH

SCHOOL OF ARTS AND SCIENCES

This dissertation was presented

by

Alexander Javier Martín

It was defended on

January 16th, 2009

and approved by

Dr. James B. Richardson III

Dr. Marc Bermann

Dr. John Frechione

Dr. Maria Auxiliadora Cordero

Dissertation Advisor: Dr. Robert D. Drennan

THE DOMESTIC MODE OF PRODUCTION AND THE DEVELOPMENT OF SOCIOPOLITICAL COMPLEXITY: EVIDENCE FROM THE SPONDYLUS INDUSTRY OF COASTAL ECUADOR

Alexander Javier Martín, PhD

University of Pittsburgh, 2009

Archaeological evidence from the prehistoric *Spondylus* industry of coast of Ecuador is analyzed to clarify how the production of export items was structured and the role that it played in the development of social complexity. The reconstruction of the trajectories of social change of the prehistoric populations of the Machalilla National Park suggests that the region retained very low population numbers and very little evidence of social stratification until the end of the Regional Development Period (*ca.* A.D. 700). At around this time, a large population boom, increased evidence of supra-local forms settlement organization, more status distinction between settlements, and more architectural investment in elite structures suggest a marked rise in social and political complexity. These developments occurred at the same time that central Andean states began demanding locally produced *Spondylus* objects. Evidence for the manufacture of such items within the study area is widespread. Many models of social development propose that elite cooption of specialized craft production can serve as a useful avenue through which elites can acquire differential status and institutionalize their leadership. However, contrary to the expectations of these models, the data analyzed here suggest that craft production of sumptuary goods was an activity essentially carried out by household units for the benefit of the domestic economy. The appearance of large consumer markets of *Spondylus* items in the central Andes seems to have promoted local social stratification by providing the centripetal forces that pressured population nucleation and the derived managerial formations needed to permit smooth social articulation of large numbers of people residing in close proximity to one another.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

The development of this dissertation and its associated research has been—more than any other project I have undertaken—the result of help, cooperation, and guidance from a large number of people and institutions.

The single person most responsible for helping me generate this research is my advisor Robert D. Drennan who always provided thoughtful advice, practical guidance, and much of his time and knowledge to me and many other Heinz fellows. All of my committee members also offered valuable advice throughout the process. James Richardson III enthusiastically provided much information regarding coastal adaptations. The dissertation benefited greatly from several discussions with Marc Bermann regarding the household unit and the domestic mode of production. Maria Auxiliadora Cordero offered valuable editorial comments as well as some critical details on Ecuadorian prehistory. I am also very grateful to John Frechione and the Center for Latin American Studies for all their support and financial assistance during preliminary fieldwork.

Fieldwork simply could not have been completed without the help of Fernando Flores, who is one of the best field archaeologists I have had the opportunity to work with. The help of Catherine Lara for mapping surface structures and lab work was considerable and greatly appreciated. Fernando Astudillo also graciously joined the field team and helped research get

underway in its beginning stages. Likewise, I am very thankful to the many other students from the Pontificia Universidad Católica del Ecuador who joined the survey at the Machalilla National Park. As always, Valentina Martinez and Michael Harris offered all of the resources at their disposal to help me carry out field research successfully during their 2007 stay in southern Manabí. Richard Lunniss also provided valuable comments regarding Formative chronology and ceramic changes.

The expertise of Victoria Dominguez on Ecuadorian ceramic chronologies and of Amelia Sanchez on local malacological assemblages were invaluable and critical to carrying out this research. Ernesto Salazar offered very useful comments regarding lithic typologies. I would also like to thank Maria Patricia Ordoñez for all the help she provided during lab analysis. I greatly appreciate the efficient and professional help that Jose Chancay at INPC (Litoral Branch) provided during the permit requisition process.

In the Comuna Agua Blanca, I am greatly indebted with Fabian Soledispa who everyday guided the research teams throughout the study area with his excellent knowledge of the local landscape. At the same time, while president of the comuna, Raul Ventura provided critical support for the development of this research within the community. I would also like to thank Florencio Delgado who was kind enough to encourage me to work within the Buenavista Valley during my first visit to Agua Blanca. Throughout the last few years, Sarah Rowe has also graciously assisted me in many occasions with her in-depth knowledge of the Manteño culture.

The formulation of this research also benefited from many long discussions with my colleague and friend Mauricio Murillo, who always shared his thoughts on archaeological method and theory and offered many useful references throughout the dissertation writing

process. Finally, I would like to thank my parents for all their support and my wife Soledad who has stood behind me more than any person has.

I had the opportunity to attend the Doctoral Program at the University of Pittsburgh thanks to the Howard Heinz Endowment Graduate Fellowship. This research was possible due to a grant from the National Science Foundation (award number 0638456), the Center for Latin American Studies Graduate Research Grant, and the K. Leroy Irvis summer Research Grant. This study was authorized by the Ecuadorian Instituto Nacional de Patrimonio Cultural (authorization number 004.SRL.INP.2007).

1.0 INTRODUCTION AND RESEARCH QUESTION

1.1 CRAFT PRODUCTION, LONG DISTACE EXCHANGE, AND SOCIAL DEVELOPMENT

It has often been argued that craft production for long distance exchange played a significant role in social development (for example Blanton and Feinman 1984; Feinman 2000; Gilman 1991; Chase Dunn and Hall 1991; Kipp and Schortman 1989; Peregrine 2000; Schneider 1977; Vaughn 2006). However, the nature of the role that craft production played in prehistory varies greatly according to different researchers. Some models of social development propose that the production of exports served exclusively for the support of elites and fomented social development primarily by structuring political institutions (Kristiansen 1987; Peregrine 1992, 2000; Schneider 1977). According to this view, control or monopoly over craft production and/or long distance trade of luxury goods offers a useful avenue through which elites can increase their status and acquire political power. This can be done either by controlling the movement of exotic goods critical for cultural reproduction, or by directly increasing their wealth through the extraction of surpluses. Other models of social development, however, propose that societies engaged in craft production because their general population gained direct economic benefits from this activity (Blanton and Feinman 1984; Masucci 1995). Under this latter view, craft production for export influenced the development of more complex types of social

organization because it comprised a substantial part of local economies and it provided increased economic returns for the society as a whole. Both of these views see craft production and long distance trade as important factors in social change. Yet, the first sees their role as primarily helping to structure political institutions, while the second one sees them as occurring on large enough scales, in some instances at least, to have direct impact on prehistoric economies. Beyond the boundaries of this debate over the impact of craft production for export on social change, of course, lie a number of other models, in which craft production or long distance exchange are seen as having little importance of any kind.

In the last few decades, researchers have tended to place a stronger emphasis on the role of political elites when explaining the mechanisms through which societies become more complex. In particular, models that propose that the monopoly of the manufacture of luxury items by elites acted as the catalyst for sociopolitical development have quickly placed themselves at the forefront of the discussion about the rise of social complexity. For example, the well-known *network* strategies model proposed by Blanton et al. (1996) notes that elites can gain social control by monopolizing the production of luxury items and exchanging them for exotic goods not available locally. The distant provenience and exclusivity of these items helps local elites justify their differential status in society and validates hierarchical stratification. In a similar manner, Peregrine (1992, 2000) argues that the development of North American Mississippian chiefdoms resulted from the elite monopoly over the traffic of prestige items essential for social reproduction. The control over the trade of symbolic objects, according to Peregrine, allowed the Mississippian chiefs to increase their coercive control since they monopolized access to symbols that held great social power.

Kipp and Schortman (1989) propose an alternate model that varies somewhat in the way that it explains social development, but which also implies a strong association between elites and the production of luxury goods. They argue that elites are in a position of having to constantly try to restrict other internal social factions from gaining access to trade with foreign entities. The result of this constant need to restrict production and exchange is an inherent tendency for the chief to make his power increasingly more institutionalized and bureaucratic, eventually transforming more chiefly undifferentiated societies into bureaucratic state formations. Even though for Kipp and Schortman the mechanism of social development is not precisely the same as in the examples described above, it similarly assumes that craft production and the exchange of luxury goods were intrinsically tied to elite agendas.

In this regard, the model proposed by Baines and Yoffe (1998:235-240) in their description of the development of *high culture*, also assumes a strong association between craft production of luxury goods, its exchange, and the elite sectors of society. Specifically, they argue that high culture—which includes amongst other things writing, monumental architecture, and the manufacture of prestige goods—was intimately tied to the interregional communication of elites of different political entities.

More recently, another variation of this model has been presented by Vaughn (2006), who proposes that elites have key opportunities to extract surplus from the domestic units every time they convince the general population—through feasting—to donate labor for communal craft production. Based on Stanish (2003, 2004:15), he notes that in the earliest stages of the development of social stratification, when societies are highly egalitarian, it would be very difficult for elites to convince the general population to work harder at the type of production they already do. However, these same elites would be able to convince community members to

undertake a different type of production (such as craft production) for a short period of time after feasting. According to his model, elites provided a feast in exchange for labor for craft production that the elites controlled. By controlling the means of this specialized production, elites became increasingly wealthy and in turn were able to carry out even larger feasts and increasingly expand their labor pool.

These are only a few examples that show how diverse these models can be. Nevertheless, in all the cases described, the production of luxury goods and their exchange is controlled by elites who take advantage of the prestige or surplus gained from this activity to separate themselves structurally from the general population. In other words, craft production and exchange are seen as being a key component of the development of a local political economy (Earle 2002; Johnson and Earle 2000:22-27; Smith 2004:78).

In general, these types of models have tended to downplay the economic role that the manufacture of exports had on the general population. Other models of social development, however, see the production of trade goods as having a major direct economic impact on the livelihood of producing populations. For example, Blanton and Feinman (1984) argue that the availability of large consuming states in central Mexico significantly pushed peripheral populations to specialize in the manufacture of textiles for long distance exchange in order to meet increasing central Mexican demand. They are clear in seeing this development as a fundamental reorganization of the division of labor in order to meet general societal needs. Under this alternate view, this industry did not just have an impact on elite sectors, but significantly modified the basic economic organization of the general population.

In a similar tone Masucci (1995) has argued that in the coast of Ecuador the manufacture of exotic shell beads for export took place within domestic units. The production of these non-

perishable trade resources, she argues, provided a secondary, more stable, form of income that helped households buffer environmental uncertainty and the resulting fluctuations in returns of more direct sustenance pursuits.

However, models such as these, which emphasize the economic role that craft production played in the general population, have tended to be much less prominent. This is interesting in that while craft production has often been studied along the axis of its possible role in the formation of a political economy, researchers such as Feinman and Nicholas (2000) and Smith (2004:83) have noted that, for most prehistoric cases, craft production probably took place within the domestic unit or in workshops associated with the household. In fact, from a large cross-cultural comparison of societies of different levels of complexity, Clark and Parry (1990) show that the type of full-time attached craft specialists that are often invoked in models of elite monopoly of craft production is strongly correlated with complex states (and not with societies in the early stages of social differentiation). This suggests that for non-states societies, it might be more appropriate to think of craft production as associated with the domestic subsistence economy rather than the formation of a political economy.

Unfortunately, it is difficult to determine precisely how the generation of trade items affected social change—if at all. This is because to date little research has been conducted to establish the actual degree to which prehistoric economies relied on the production of trade items for their livelihood. Specifically, there has been a lack of empirical studies aimed at exploring if the specialized production of luxury items was a large enough activity that could have been undertaken by the general population, or if it was only carried out by a few specialists working for the benefit of elite agendas. This has meant that while researchers continue to invoke craft production for export as an agent of social development, their concepts of the economic

significance of prehistoric craft production for export, and its role on social development, are based more on plausibility and preconceptions than on empirical studies of this aspect of the activity.

1.2 THE IMPORTANCE OF THE ECUADORIAN COAST AS A CASE STUDY

Coastal Ecuador provides an excellent opportunity to enhance our understanding of this phenomenon because it is often cited as a prime example of large-scale pre-historic long distance trade. Coastal Ecuadorian populations were in a singular position to specialize in the production and exchange of *Spondylus* shell objects because of the restricted availability of the shell, to which Ecuadorian populations had access, and the existence of widespread markets located in present-day Peru that are archaeologically known to have consumed luxury goods made from *Spondylus* in large quantities (Marcos 1995; Martín 2001, 2007; Paulsen 1974; Pillsbury 1996; Zeidler 1991).

The *Spondylus* mollusk (also called the thorny oyster) appears prominently in the archaeological record of central Andean states both iconographically and as actual shell remains even though the shell's natural habitat does not extend farther south than coastal Ecuador (Abbott 1974; Keen 1971; Olsson 1961). In fact, ethnohistoric sources attest that the shell continued to hold great ritual and symbolic importance to Andean communities even at European arrival (Murra 1982). For this reason, it has often been proposed that the movement of the shell was instrumental in sociopolitical development along the South American coast (Marcos 1977/78, 1985, 1995; Paulsen 1974; Pillsbury 1996; Zeidler 1991). For example, Zeidler (1991) has noted that the long distance exchange that linked successive coastal Ecuadorian chiefdoms to

various complex states on the coast of Peru seems to have provided the impetus for the social development of the coastal Ecuadorian communities.

Historical accounts from the time of European arrival note that the exchange of *Spondylus* objects, primarily in the form of small beads called *chaquira*, but which also included figurines and decorative objects, radiated in part from a unified polity referred to as Çalangome, partly located in present day Machalilla National Park, Southern Manabí, Ecuador (Pizarro 1527, 1571). The indigenous populations that resided in that area were referred to ethnically as the Manteño. Within the Çalangome territory, ethnohistoric sources indicate that the manufacture of shell ornaments took place at four Pre-Columbian urban-like centers: Çalangome town, Tuzco, Çalango and Seracapez. Researchers working on this area have tentatively identified these settlements as roughly corresponding to the modern day towns of Agua Blanca, Machalilla, Salango, and López Viejo respectively (Silva 1984; Currie 1995a, 1995b). They are illustrated in Figure 1-1.

The trade of *Spondylus princeps* objects has received widespread attention in the archaeological literature for decades. More recently, as well, several authors have noted the importance of *Spondylus calcifer* and the pearl oyster species (*Pteria sterna,* and *Pinctada mazatlanica*) in the exchange networks that radiated from coastal Ecuador (Currie 1995a, 1995b; Mester 1990). These species not only share similar natural habitats with the thorny oyster but ethnohistoric accounts and archaeological remains also attest to their importance in Pre-Columbian Peruvian states (Mester 1990:180). Consequently their manufacture and exchange complemented *Spondylus princeps* in coastal Ecuador's long distance exchange networks (Mester 1990; Currie 1995a).

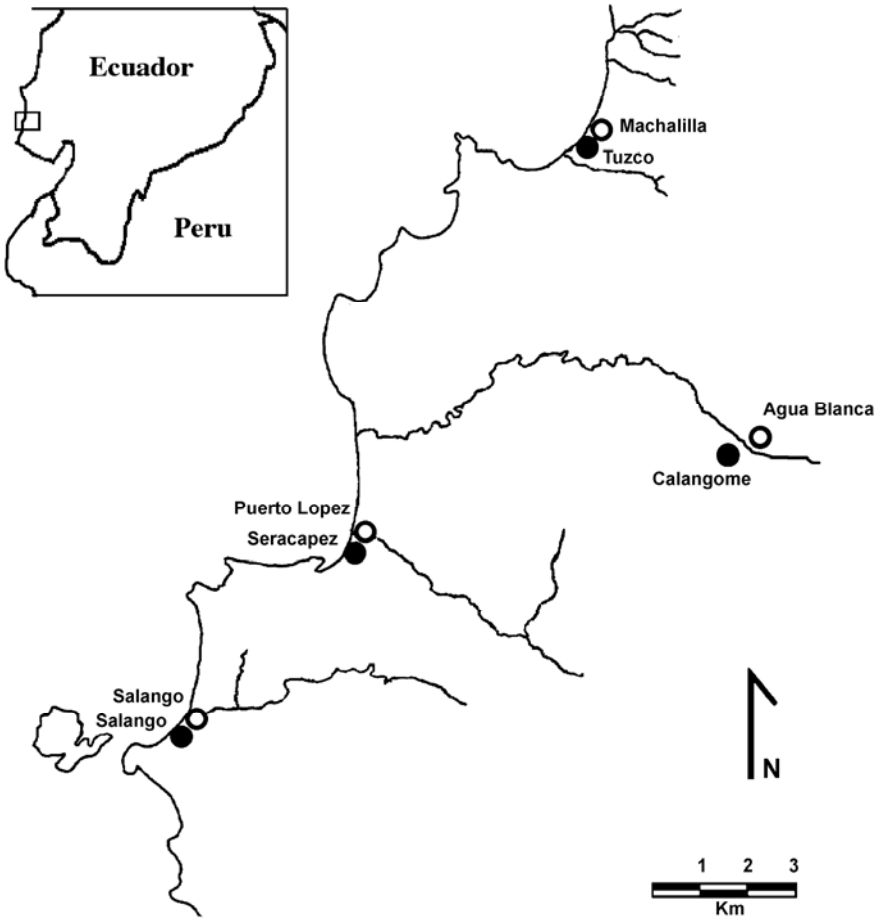


Figure 1-1. Çalangome towns and modern settlements.

The final cultural phase of southern Manabí before European arrival (denominated the Integration period: A.D. 800–1532), which is roughly contemporaneous with the Late Intermediate Period of the central Andean chronology, coincides with the peak of *Spondylus* consumption by central Andean states, which roughly begins at Moche V and continuous through the Sicán and Chimú occupations (Cordy-Collins 1985, 1990; Martín 2001, 2007; Pillsbury 1996; Shimada 1994).

The prehistoric production of shell objects of *Spondylus* and similar species in southern Manabí represents one of the most likely known archaeological cases where production for

export is argued to have been so important as to have a major direct economic impact on social change. Several authors have proposed that the populations of southern Manabí differed from their neighbors in that their geographic access to *Spondylus* allowed them to specialize significantly in trade (Marcos 1977/78; Muse 1989; Norton 1986). Under this view, the long distance trade connections that the Manteño of southern Manabí forged with coastal Peru were the fulcrum of their adaptive development. For example, Muse (1989) has argued that this specialized character was so accentuated that they essentially had to trade the exotic goods they manufactured to the Huancavilcas (located south of them in present day Guayas province, Figure 1-2) in exchange for maize to meet their subsistence needs. Muse describes Manteño society as following a distinctly different developmental trajectory from others in the region, one where the production of export items essentially underwrote their economy and led them to depend on symbiotic relationships with neighboring regions.

While not all researchers agree that the *Spondylus* industry was as important to the local economy as Muse proposes, investigators working in the area have often said that, nevertheless, it was the exploitation and trade of this resource that was directly responsible for the development of sociopolitical complexity in the region, often by helping to structure political institutions. For example, Zeidler (1991) has argued that *Spondylus* helped to institutionalize the positions of the "big men" who controlled its trade from as early as Valdivia times (3500–1500 B.C.). Similarly, Marcos (1995) has proposed that the increase in the numbers of *Spondylus* during warmer years fomented the origins of inequality by validating the shamanic knowledge of those individuals who understood this to represent the oncoming of an El Niño event (Marcos 1995).

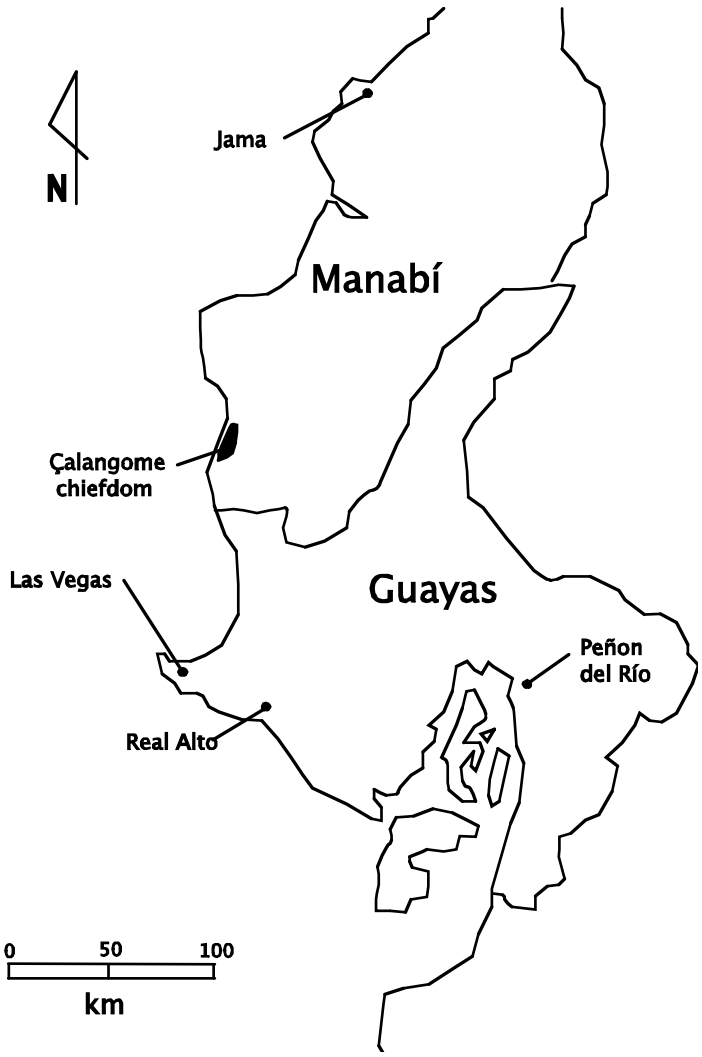


Figure 1-2. The coast of Ecuador.

In essence, these societies have regularly been portrayed as highly dependent on the *Spondylus* industry for their survival and sociopolitical flourishing. Again, however, many of these propositions have not been empirically determined, so the importance of this industry to the development of the society has tended to be assumed rather than demonstrated. It is precisely because of this that southern Manabí constitutes a particularly important case study to those interested in the way that long distance trade affected social development. It gives us an opportunity to learn about the reason behind the development of one of the best-known cases of

long distance trade. By reconstructing the trajectories of development of these populations, how and why they changed through time, we can clarify the reasons behind their social and political transformations, and at the same time, shed light on the nature of prehistoric craft production for export and its role on the development of social stratification.

1.3 SOUTHERN MANABÍ AND THE TRAJECTORIES OF SOCIAL CHANGE IN COASTAL ECUADOR

Most of the information that we have about southern Manabí has been reconstructed from ethnohistoric accounts and localized excavations. Ethnohistoric sources do tell us that at European arrival these societies were hierarchically organized supraregional polities and that the manufacture of shell items was among the craft activities practiced.

Localized excavations corroborate the presence of workshops on the coast (Carter 2008). Because of the attention paid to *Spondylus* trade in the academic literature, a considerable amount of research in southern Manabí has been focused on the shell working areas of sites and on the middens associated with them. Of the four Çalangome towns, shell working areas have been systematically excavated in López Viejo (ancient Seracapez), Los Frailes (south of present-day Machalilla or ancient Tuzco) and Río Chico (south of present day Salango) (see Figure 1-1 for locations).

Currie (1995a, 1995b) has proposed that the Manteño period midden unearthed at the site of López Viejo represents an "artisans' quarter" for the manufacture of luxury export-oriented items. She suggests this on the basis of the large absolute quantity of artifacts related to the manufacture of luxury items (shell and related tools). Likewise, Mester (1990) has also published

detailed data on a shell workshop with an associated midden from the site of Los Frailes for the late Guangala/early Manteño period (A.D. 800-1200). She classifies the context as a workshop based on the presence of tools and shell debitage associated with manufacture. At the Río Chico site, Martínez (2001) and Clark (2001) note that the assemblage is indicative of a workshop floor based on an unusually high proportion of *Spondylus* and other exotic shells and a high concentration of bivalve leftover "cores" (discarded after the orange or purple lip had been removed for processing) during the Bahía occupation (200 B.C.-A.D. 500). Martínez also notes that the site probably retained its function as a *Spondylus* processing center during the following Manteño period (personal communication).

While not in southern Manabí, the El Azúcar site, located in present day Guayas province, has also provided useful data on coastal Ecuadorian workshops (see Figure 5-8). The site constituted a small rural hamlet dating to A.D. 100-650. According to Masucci (1995) and Reitz and Masucci (2004) the El Azúcar shell assemblage, combined with analysis of the terrestrial faunal remains, makes it possible to characterize the shell manufacturing industry as a part time domestic activity that supplemented other more direct household subsistence pursuits, for this case at least.

While these excavations have furnished us with good detailed data about workshop make-up, it is not possible to assess from these isolated cases the impact of this industry in the development of those societies. There is much left to find out about the scale and nature of the societies of southern Manabí and their trajectories of development. Hence, it is important to determine how these elements fit together into a regional system, and how they developed through time.

Even though authors such as Marcos (1995), Muse (1989), and Zeidler (1991) have proposed that the development of southern Manabí was singular (amongst others in the region) in its emphasis on shell production, most studies aimed at reconstructing regional scale developmental trajectories have taken place, not in southern Manabí, but in the Guayas province to the south (see Figure 1-2). This has meant that until now it had been possible to reconstruct the lifeways and sequences of development of the Guayas province in much better ways than those of southern Manabí.

The trajectories we know from Guayas show societies sustained by what D'Altroy and Earle (1985) have denominated staple finance. They show a gradual increase in reliance on maize agriculture though time, and this emphasis seems to form the basis for the increase in sociopolitical and cultural complexity. The crop makes its appearance in the phytolith record of the Guayas province during the Preceramic at the Vegas site (OGSE-80) at around 4600 B.C. (Pearsall 2002:54; Stothert et al. 2003). During Valdivia times, in the site of Real Alto, maize is present in the phytolith record throughout the occupation even though other species consistently occur more abundantly (Pearsall 2002:54). We also know that around the same time, in Valdivia 3 (2500 B.C.), changes in the layout of the Real Alto site suggest increased sociocultural complexity, with evidence of storage at the supra-household level, and early monumental architecture (Drennan 1995; Marcos 1988).

Damp (1984) analyzed settlement patterns to determine the adaptive emphasis of those populations. At the start of the sequence, sites appear far away from each other, with few located near the ocean. They are progressively more densely packed as time goes by, but they retain spacing permitting a catchment area with a radius of 5 km, which would leave enough space for agricultural pursuits. The settlement pattern does not seem at all oriented towards the coast.

Furthermore, the densest concentration of sites, when packing does occur, tends to be in the northern regions, which have more precipitation and therefore offer greater agricultural returns. Damp concludes that, in Guayas, the settlement distribution of the Valdivia occupation appears dictated by agriculture and not maritime adaptations. At this point, it seems that population levels were not very high and that, based on the size of the catchment areas, the region could have easily supported much larger populations (Drennan 1995:312-3). Even so, Damp (1988) has proposed that demographic growth in the Chanduy valley might have been responsible for the increase in sociopolitical complexity seen at Real Alto, which could have served to resolve social conflict through ritual. In either scenario, this social differentiation is not highly accentuated; causing Zeidler (1991) to refer to them as "big man" societies and not chiefdoms.

During Machalilla times, maize is already one of the dominant forms of subsistence (Pearsall 2002; Pearsall et al. 2003). By 500 B.C. there is increasing emphasis on settlement inland, and extensive areas of the Guayas basin are converted from swamplands to raised fields (Martínez 1987). To Stemper (1993), these changes coincide with the development of a political economy in the Río Daule area where elites, distinguished by their possessions (such as gold, silver, and elaborate copper jewelry), are able to control agricultural surplus and exchange it for precious metals. This evidence is indicative of more structured hierarchical relationships. Nonetheless, it should be noted that even by the Guangala period (100 B.C. to A.D. 650) the distribution of sites tends to show a pattern of widely dispersed, relatively uncentralized settlements. Craft production during Guangala appears to be controlled by the domestic economy (Masucci 1995), which also suggests a lack of centralization.

However, by A.D. 900, the size of the site Peñón del Río in relation to other settlements gives it the character of a regional center. Muse (1991) attributes this development to its role as a

bulking center of the agricultural produce of its raised field complex. He proposes that elites increased the surplus production under their control by expanding their own households, sometimes to hundreds of people. These kin-based means of producing surplus came eventually to create intense economic integration at Peñón del Río and expanded the variety and quantity of goods brought from the Andean zone beyond the precious metals for sumptuary use seen by Stemper in the Río Daule.

Recently, Delgado (2002) conducted a settlement pattern study of the occupations of the lower Guayas basin with the purpose of understanding the relation of the raised field complexes to the social organization of that region. He concluded that the raised field systems of the area, which dated to the Integration Period (A.D. 750-1450), were probably built rapidly in small intervals of time, requiring large amounts of labor (Delgado 2002:199). The distribution of settlements around them, together with the locations of commoner households, support the view that the raised field complexes were controlled by elites who organized commoner labor in a top-down fashion. These findings indicate that the political formations of the Guayas basin had reached a level of institutionalized leadership that was able to mobilize populations for the creation of significant public works by late pre-contact times. Integration period sites are characterized by denser material remains, more labor investment in architecture, more standardized types of pottery, and more distinct settlement hierarchies than earlier periods. The nature of the material remains of this period is consistent with pre-state complex societies and the distribution of sites shows much more centralized political formations than seen anywhere else in the sequence.

The Guayas sequence, then, shows that the increasing centralization and development of institutionalized hierarchical structures took place over a long period of time and reached its

most accentuated form at fairly late prehispanic times. The archaeological data supports the view that the increase in sociopolitical complexity was underwritten by a maize-based staple economy. These findings are congruent with the way that Muse (1989) has characterized Guayas societies. He proposes that the Huancavilcas of Guayas province were productive agriculturalists who traded their agricultural surpluses with their Manteño neighbors in southern Manabí for exotic goods. The societies that developed in Guayas province, in sum, do not exhibit evidence of specialization in shell manufacture and trade.

Such societies also seem to have developed in northern Manabí (Figure 1-2). There is considerably less data with which to reconstruct social development, but research in the Jama River valley seems to indicate that agriculture was also at the base of complex regional polities there. In this area, permanent settlements make their appearance much later (Valdivia 8) and are concentrated in alluvial valley floors, suggesting a focus on riverine resources. Beginning with Chorrera (*ca.* 1000 B.C.), settlements increasingly shift to the uplands, apparently relying more heavily on terrestrial and agricultural resources (Zeidler and Pearsall 1994:211). The results of pollen, phytolith, and macro-botanical remains show that the plant resources exploited were varied, from Valdivia up to European contact, but the analysis remains inconclusive regarding the changes of these resources through time (Zeidler and Pearsall 1994:209). Maize, nonetheless, becomes a significant component in subsistence by the late pre-contact period (Pearsall 1996) when ethnohistoric sources record the presence of hierarchically organized political units.

The polities cited in the ethnohistoric accounts as responsible for much manufacture of *Spondylus* items are in southern Manabí, between the two regions just discussed (with Guayas to the south and northern Manabí to the north). If shell production for export played a large role in social change in southern Manabí, then evidence of this activity, and its influence in social

development, should be more abundant than in neighboring regions. Of particular importance to this research, if production of shell luxury goods for export was an important force in social change, then the trajectory of social change there should be characterized by periods of vigorous demographic growth and sociopolitical development that coincide with periods of marked increases in external demand for shell luxury goods.

Researchers working in the north of Peru note the drastic increase in Peruvian consumption of the shell during the last phases of the Moche sequence (*ca.* A.D. 600) and continuing through the subsequent Sicán and Chimú occupations (Cordy-Collins 1985, 1990; Pillsbury 1996; Shimada 1994). Richardson and Heyerdahl (2001) also note that Moche V iconography, for the first time, begins depicting qualitatively larger vessel types capable of undertaking longer sea voyages with heavy cargo. Before this time, *Spondylus* remains in Peru are modest, often comprising a few fragments or specimens per site (Martín 2001, 2007). However, around A.D. 600, *Spondylus* remains begin appearing in increasingly large quantities so that by the Peruvian Late Intermediate Period some sites exhibit many hundreds of specimens. If the production of shell luxury goods was a vital factor in the development of complex societies in southern Manabí, then this should be a period of booming social complexity and demographic growth for these coastal Ecuadorian communities. In that case, we should expect population estimates within this region to increase around this time (in the form of more larger and/or denser sites). Evidence of political complexity, in the form of a more defined settlement hierarchy, more evidence of supra-local forms of settlement organization, and a more centralized site distribution, should also increase during this period. In addition to inland sites situated for agricultural production, there should be substantial coastal occupation focused on the acquisition of *Spondylus* shells. We should also expect the quantity of evidence of shell working in southern

Manabí sites of this period to rise sharply. If this production was monopolized by elites, we should expect this evidence to be particularly associated with elite residential areas.

On the other hand, if the production of shell items for export had little impact on social change in southern Manabí there is no reason to expect demographic growth or sociopolitical centralization to be especially impressive around the Peruvian Late Intermediate Period. Nor would settlement location be strongly influenced by the acquisition of *Spondylus* and evidence for the manufacture of shell items would not necessarily increase much. As discussed above, just this type of evidence can be seen in the developmental trajectories of the neighboring regions (Guayas and north Manabí). There, settlement patterns indicate that sociopolitical complexity increased gradually and appears associated to the development and control of raised-field agriculture. In these regions, settlement hierarchy develops progressively, and no particular boom in complexity is associated with the increase in *Spondylus* consumption by Peruvian states. Settlement location shows no added emphasis on coastal resources around that time, as sites in both northern Manabí and Guayas continue to be spread out to make use of all available resources with special focus on inland locations near the best farmlands and raised fields (Damp 1984; Delgado 2002; Muse 1989, 1991; Stemper 1993). If southern Manabí really has a special trajectory of development that makes it distinct from its neighbors, with the manufacture of *Spondylus* items having an important role in the rise of sociopolitical complexity, its developmental trajectory, then, should contrast with these neighboring regions and show a more evident correspondence between the development of *Spondylus* production responding to external demand and the rise of sociopolitical complexity.

2.0 METHODOLOGY

2.1 FIELD RESEARCH AND ARTIFACT ANALYSIS

2.1.1 The Study Area

2.1.1.1 Location

To understand the trajectories of social development of the populations of southern Manabí, including changes in their subsistence strategies, political organization, craft production, etc., it was important to choose a study region large enough that would make possible the reconstruction of an entire regional-scale community or polity. For this reason, the area chosen for study covers an extension of 100 km^2 and was specifically located where ethnohistoric accounts describe the presence of politically organized societies that engaged in craft production at the time of European arrival (Currie 1995a, 1995b; Pizarro 1527, 1571; Silva 1984). The study area falls within the boundaries of present day Machalilla National Park (*Parque Nacional Machalilla)*, in southern Manabí, Ecuador. Its easternmost edge falls on UTM 532900.00 E and continues west until it reaches Pacific Ocean. Its southern and northern limits are demarcated by UTM 9828600.00 S and 9840000.00 S respectively. Figure 2-1 depicts the study area as well as the location of several present-day towns and other features.

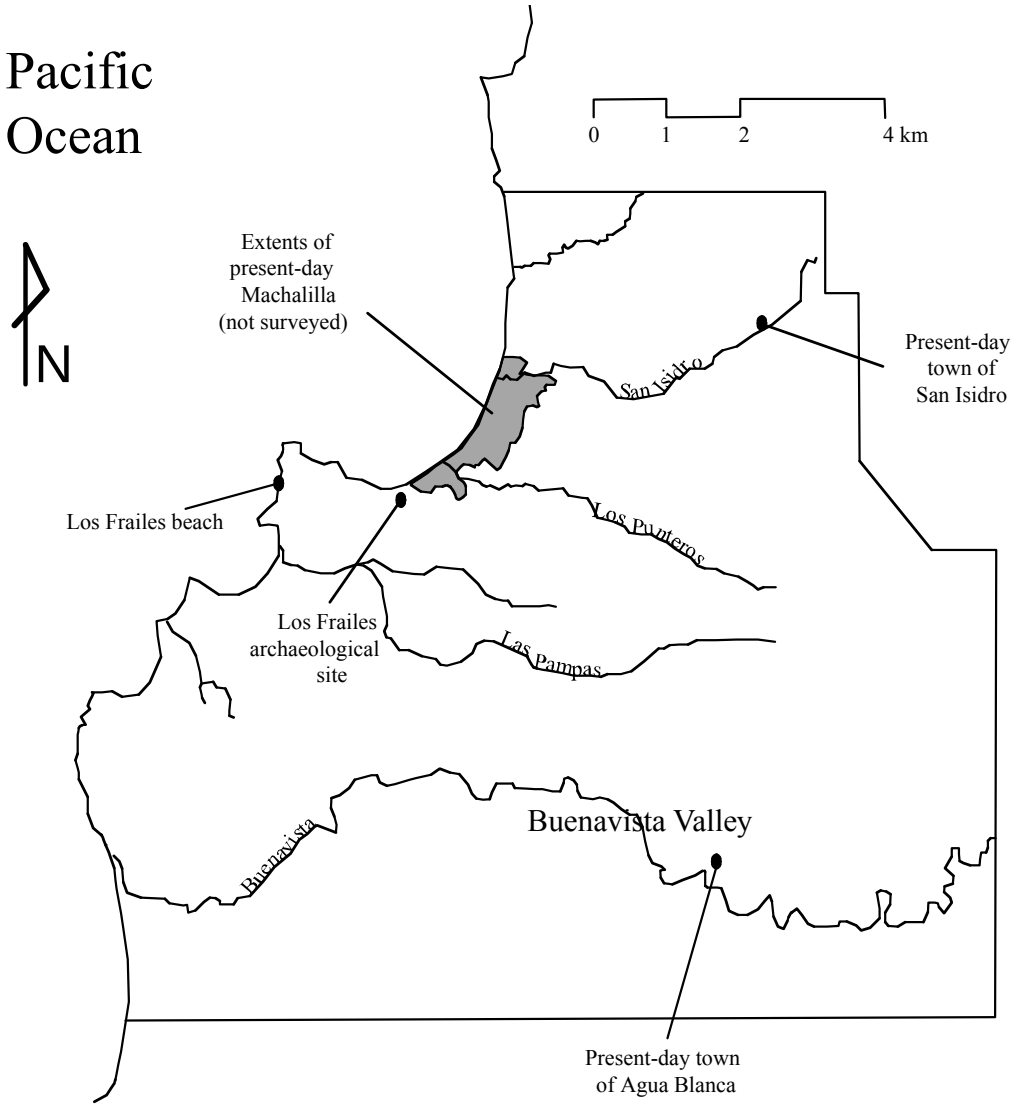


Figure 2-1. Study area.

This particular area was also selected because it contains two of the four pre-Columbian towns specifically credited with the manufacture of *Spondylus* items as well as their surrounding hinterland, Machalilla (credited to be ancient Tuzco) and Agua Blanca (proposed to be ancient Çalangome town) (Currie 1995a,1995b; Mester 1990; Silva 1984). The two towns, one located on the coast and one inland, are different enough in their geographic setting that their contrast might shed light on adaptive strategies of the population as a whole. Furthermore, the two towns

have traditionally been understood to have different functional roles; while researchers have commonly understood Agua Blanca to be an elite or ceremonial center (McEwan 2003; Piana and Marotzke 1997), investigations at Machalilla have focused more on its role as a craft production locale (Mester 1990). Having a study area that encompassed a diverse range of human behavior was essential to reconstructing the importance of different activities within the total population. It was also hoped that including an elite center within the study area would shed light on elite endeavors and strategies.

Other important considerations included the relatively minor level of surface disturbance by present day settlers. With the exception of a few small settlements (San Isidro, Agua Blanca, and El Carmen) and the town of Machalilla, almost the entire area under survey is protected by the boundaries of the national park, which severely limits the amount of modern human intrusion to the region. The generally undisturbed conditions of the landscape had the negative effect of considerably increasing the amount of brush cover while at the same time offering very few access trails. Nevertheless, for survey purposes, this was more than offset by the relatively undisturbed condition of most of the sites, which facilitated their recognition and recording immensely.

Another important consideration in choosing southern Manabí as a research area was its clear inclusion within the Manteño ceramic tradition. McEwan (2003) is explicit in noting that, based on ceramic and ethnohistorical data, it is likely that this area represents the southernmost chiefdom of the Manteño people who were spread out through the modern Manabí territory. Just a few kilometers to the south, roughly commencing at the Guayas province border (see Figure 1-2), the Huancavilca ceramic tradition likely demarcates the presence of a different ethnic group. In fact, Rowe (2003) has remarked that it is likely that the current provincial division is a vestige

of much older ethnic (pre-Columbian) differences between the Manteño and Huancavilca. Through a useful statistical analysis of Manteño ceramic composition and form she also demonstrates that all along Manabí, Manteño ceramics show remarkable homogeneity and minimal differentiation (Rowe 2003:65) suggesting at least some degree of cultural consistency.

2.1.1.2 Geography and Environment

The study area was also selected because it includes a variety of geographic settings that provide a range of possible habitats. The coastal areas are primarily composed of sharp hills and high ridges that reach precipitously to the ocean. The uneven terrain and dramatic drop in elevation as the ridges reach the sea make the area, although visually striking, unfavorable for modern large settlements. However, there are several coastal places where the terrain flattens for long stretches and it is precisely in these areas that modern towns are found. Within the study area the most notable is the location of present day Machalilla (Figure 2-1). Although considerably smaller in areal extent, the area immediately behind the Los Frailes beach also provides a level landscape, but no modern day settlement is present at that location.

Fresh water reaches these settlements from a series of natural channels and rivers that cut across the national park. In the hills to the east, where they originate, the channels are small and cut sharply between the mountain ridges. As they approach the ocean and find more level topography near the towns and valleys, they merge to form several shallow rivers. The most notable of these is the Buenavista River, but the San Isidro and Los Punteros rivers are also of significant importance (Figure 2-1).

The weather conditions that predominate throughout most of the year create a dense mist or light drizzle (locally referred to as *garúa*) but produce very little precipitation. However, from January to April, these conditions are offset by a period of bright sunshine broken by brief

tropical downpours (Mester 1990:34). It is fundamentally only during this rainy season that channels serve to drain large quantities of precipitation away from the hills and towards the ocean. During the rest of the year, with minor exceptions, almost all of the channels and rivers are completely waterless and can be walked through as if they were regular terrain. This stark difference between rapid water accumulation and drainage on the one hand, and completely dry conditions on the other, becomes even more accentuated during ENSO (El Niño-Southern Oscillation) events. When the drastic climatic conditions associated with El Niño take place, the region receives drastically larger quantities of rainfall, which cause many of the shallow rivers to overflow into the adjacent flood plain areas. It is for this reason that most of the modern day settlers build their houses, not on the lowest terrain by the rivers, but on the slightly higher *lengüetas* that provide some safeguard against periodic, although not necessarily frequent, floods. The last major example of this phenomenon took place between 1997 and 1998 with the occurrence of a mega-El Niño event. That time, the destructive inundation that occurred from torrential rainfall completely submerged many of the rural roads, virtually disconnecting the populations of towns such as Agua Blanca from reaching important supplies from the larger towns of Puerto López and Machalilla.

By far the largest inland valley within the study area surrounds the Buenavista River. Also, in the northeastern part of the study area, the terrain flattens alongside the San Isidro River and forms a smaller valley where the town of the same name is located (see Figure 2-1). Other much smaller valleys form occasionally around lesser rivers and between other mountain ridges.

Because of the arid conditions, most present day farming tends to be located near year-round or artificial water sources. The clearest example of this can be seen at the Buenavista Valley where the Agua Blanca *comuna* has organized agriculture around a sulfurous lagoon

supplied by a subterranean water spring. At other inland locations, were no year-round water sources exist, settlers rely on predicting precisely when the three months of rain will begin and end in order to time the planting of the crops effectively. If crops are planted too early, they might not receive enough water as they begin to sprout. Alternatively, if they are planted too late, the rainy season will probably finish before the plants have reached their desired growth, leading the crop to produce little or no returns (McEwan 2003). In the past few years (2004-2007) farmers in this area note that crops, particularly maize, have rarely succeeded because of low or erratic patterns of precipitation during the rainy season. In response to these conditions, many settlers diversify their subsistence by combining cattle and goat ranching with farming endeavors.

Throughout the study region, the farming areas around the river valleys are usually flanked by small *lengüetas* that edge the mountainsides. As noted above, these *lengüetas* are small foothills of very low elevation that can be used as house platforms above shallow rivers and flood areas. The towns of Agua Blanca, San Isidro, and El Carmen take advantage of precisely this kind of topography. McEwan (2003:133) notes that these natural mounds seem to have been the preferred settlement location of prehispanic communities just as much as that of modern day settlers. While the *lengüetas* are located, in some cases as little as a couple of meters above the low ground, the change in vegetation is drastic and unequivocal. Beginning there and continuing up into the *montaña*, species adapted to survive through long periods of drought predominate, in particular the *ceibo* (*Ceiba pentandra*) and several varieties of cactus (such as columnar cacti and *Opuntia phaeacantha*) dominate.

As one makes his way up into the montaña, dry conditions continue and steep uneven terrain makes modern day settlement highly scarce, if not altogether absent. These conditions

prevail through most of the study area and it is essentially only at the flat tops of hills that the terrain evens out enough again to provide useful space for human settlement. Today, most of these areas are completely uninhabited because of the regulation that the National Park exerts. However, the survey undertaken revealed that these flat areas had, in fact, considerable pre-Columbian occupation.

At the very highest elevations (for example the hills to the east and north of San Isidro) an interesting climatic phenomenon takes place. These hilltops are dominated by a distinct microclimate that causes increased precipitation, constant *garúa* and much denser vegetation. Restricted to the highest hills, these small forests depend on coastal fog for their moisture. Within them, conditions were less favorable for visual surface reconnaissance. However, these hilltops constituted less than 5% of the total study area. Throughout the rest of the survey region, even though the landscape was heavily covered with dry bush, the arid conditions provided remarkable surface visibility.

In general terms, the Machalilla National Park has a tropical climate that averages between 24° and 27° C (Mester 1990:35). During the rainy season, temperatures can warm up substantially, but the climate becomes reasonably temperate during the remaining months. Deer, anteaters, armadillos, ocelots, and monkeys are amongst the wild mammals present in the region, although they primarily make their way into the study area during the wet months when precipitation makes water sources available.

2.1.2 Field Work

From 1979 to 1982, McEwan (2003:139) conducted a survey of the Buenavista Valley (an area of roughly 35 km^2) with the purpose of locating sites of different periods and mapping all visible

surface architecture. His research focused primarily on the ritual implications of the architectural alignment within the valley during the Integration Period. Sites were recognized on the basis of surface scatter and their location was recorded as points on a map (2003:157-8). He depicted two maps showing the Integration (A.D. 800-1532) and Formative (3500-500 B.C.) period occupations, but proposed that the Regional Development (500 B.C.-A.D. 800) settlement could not be accurately portrayed because the geological formation processes of the regions had likely obscured it.

While his research produced a rich data set of mapped surface architecture, it did not focus strongly on acquiring data that would make possible a broad reconstruction of the trajectories of social change that the Buenavista Valley populations underwent from formative times to European arrival. Basic information on settlement preferences, the organization of subsistence and craft production strategies, the degree of political centralization, demographic expansion and contraction, or how these elements changed through time are critical to understanding the nature and development of these societies. To understand these social features, aside from the point location of sites, it is necessary to systematically gather data about their size, density, and artefactual contents so that the regional settlement can be more meaningfully reconstructed and we can assemble a fuller picture of social development. In particular, it is important that the data gathered can give us information about the evidence of different kinds of activities (such as household, ritual, craft, etc), social divisions (commoners versus elites), and social structures at different places and in different times. It is information such as this that, amongst other things, will give us a better understanding of how the evidence of political elites is distributed and what it tells us about their role in craft production.

In order to get a fuller understanding of the structure and changes of the societies of the Buenavista Valley, Florencio Delgado carried out preliminary research during the years of 2004-2005. Under the auspices of the Universidad San Francisco de Quito he conducted a survey in a small area of the valley (roughly 5 km^2) that served as a pilot study for future plans to survey neighboring areas. By running parallel transects tightly together (20 m apart) and stopping to record the presence or absence of different types of artifacts at regular intervals of 20 m, he moved beyond simply noting the presence of sites, and composed information about their extents and the distribution of materials in them. His preliminary fieldwork served as a useful foundation on which the methodology carried out by this study was based. However, since the area to be covered in this study was significantly larger, survey methods were adapted to make possible the efficient gathering of data systematically from sites across a much larger region. The methodology chosen, nevertheless, still took special care to gather data in such a way that it would let us evaluate how the artefactual evidence of human occupation varied across the regions and through time.

Since the survey carried out by McEwan was mostly directed at recording the presence/absence of sites and the layout of surface architecture—and did not focus on recording the extents, densities, or artifact variations of surface scatters—it was necessary to revisit the Buenavista Valley (roughly a third of our 100 km^2 survey area) in order to make systematic surface collections that were consistent with the methodology devised for the rest of the study area. This made it possible to frame the data from the Buenavista into a single coherent larger scale picture of the regional settlement.

Fieldwork began in April 2007 shortly after receiving the archaeological permits from the Guayaquil branch of the *Instituto Nacional de Patrimonio Cultural* (permit No. 004.SRL.INPC.2007) and continued until early August of the same year.

The crew was separated into two teams of four people headed by Fernando Flores of the Pontificia Universidad Católica del Ecuador and myself. The entire 100 km^2 landscape was systematically covered by walking transects 50 m apart whenever the topography was level enough to permit it. In the case of very vertical and abrupt mountainous terrain, this methodology was carried out on any flat *lengüeta* or level top. Each team located itself on the landscape through the use of a GPS and satellite imagery printed on paper at a scale of approximately 1:6000.

An unusually dry rainy season during early 2007 considerably diminished the local vegetation and made surface remains highly visible. Whenever a site was identified on the basis of visible artifact scatter, its limits were drawn directly onto the satellite photos. Sites larger than one hectare were roughly divided into one-hectare lots. Within each lot, a systematic surface collection of all artifacts was taken through the "dog-leash" technique as described by Drennan et al. (2003b) and Drennan and Peterson (2005:20).

In each systematic collection, the aim was to pick up at least 40 artifacts so that, based on that sample, the proportions of artifacts of different types in the assemblage of the lot could be estimated with error ranges no bigger than ±10 at 80% confidence (Drennan 1996; Drennan et al. 2003b). Based on the amount of material visible on the surface, we estimated how large a circle would be needed so that at least this minimal number of artifacts was recovered. While this proved to be an expedient and efficient way to try to recover the minimal number of artifacts in a single circle, it meant that the area of the circle changed for every collection made. However, by

recording the size of the radius every time, we were able to keep track of the total area of each collection circle so that the artifact densities of every lot could be calculated. Nevertheless, in some cases the collection circle failed to recover the minimal number of artifacts required. When this happened, a second collection was taken to the immediate north of the previous collection. This was repeated until at least 40 artifacts were gathered for each one-hectare lot. This methodology made it possible to compare different densities and proportional changes of material across different lots in a meaningful way.

When artifact densities were as low as one sherd per square meter (or lower) systematic collections became highly impractical because a very large number of collection circles (or one unreasonably large circle) would have been needed. In these cases, the extents of the surface scatter were still drawn on the satellite photos, but the density was estimated directly in the field based on what was visible on the surface. Crewmembers, then, walked around the area recovering all the artifact fragments that they could find. These types of collections were labeled "unsystematic."

All this information was recorded in a "lot form" that included the lot number, the type of collection being done (systematic or unsystematic), the number of collection circles and their respective radii, the type of vegetation present where the collection was carried out, the denseness of the vegetation, and the number of artifact bags that each lot produced.

An important line of evidence regarding production of exports in the region was the malacological assemblage. For this reason, the teams took special care to identify any unusually high concentrations of shell remains. Whenever one of these shell concentrations was discovered, it received its own lot number and an extra systematic collection was taken directly over it. These malacological concentrations were often too small in size to be drawn directly onto

the satellite imagery, sometimes being as small as one square meter. For that reason, a GPS reading was taken directly in the middle of the concentration and its area and contour was recorded within a lot form that was filled out exclusively for that shell concentration.

All visible surface structures and man-made features (such as reservoirs and cisterns) were measured and drawn in an addendum form and included in the general lot forms. A GPS coordinate was taken at one point within the structures so their location could be referenced. All structures and features where drawn so that the Y Axis of the drawing aligns directly with magnetic north.

Every afternoon, artifacts were cleaned, counted, and separated into different bags for ceramic, lithic, and shell. Each night, all mapped information about the sites (location, extents, surface structures, etc.) was transferred into digital form through the use of tracing software. Finally, all the data recorded on field forms (lot numbers, type of collection made at each lot, the number of collection circles and their respective radii, etc.), as well as the artifact count, was transferred into a spreadsheet on a daily basis. In all, survey documented a total of 553 individual collection lots including 39 shell concentrations.

2.1.3 Artifact Analysis

2.1.3.1 Ceramics and Chronological Placement

Ceramic analysis took place from September to October 2007 and was carried out in the laboratory of Victoria Domínguez in the Valle de los Chillos, Pichincha, Ecuador. Victoria Domínguez was hired as a consultant and assisted with labeling, identification, and drawing. The ceramic analysis was also carried out with assistance from Fernando Flores from the Pontificia Universidad Católica del Ecuador.

A number of stratigraphically controlled excavations within the study area and in neighboring regions have helped to clarify the cultural chronology of southern Manabí. See for example Bischof (1982), Damp (1988), Estrada (1958, 1957) Marcos (1988), Meggers (1966), Zedeño (1985), Paulsen (1970); and more recently Lunniss (2001), Masucci (1992), Mester (1990), Oyola-Coeur (2000), etc. In general, these studies have placed local phases within the broad chronology developed by Meggers (1966) that separates the prehistory of Ecuador into three distinct periods (Formative, Regional Development, and Integration). Figure 2-2 shows the general chronology of coastal Ecuador including local phases as has been reconstructed from these studies.

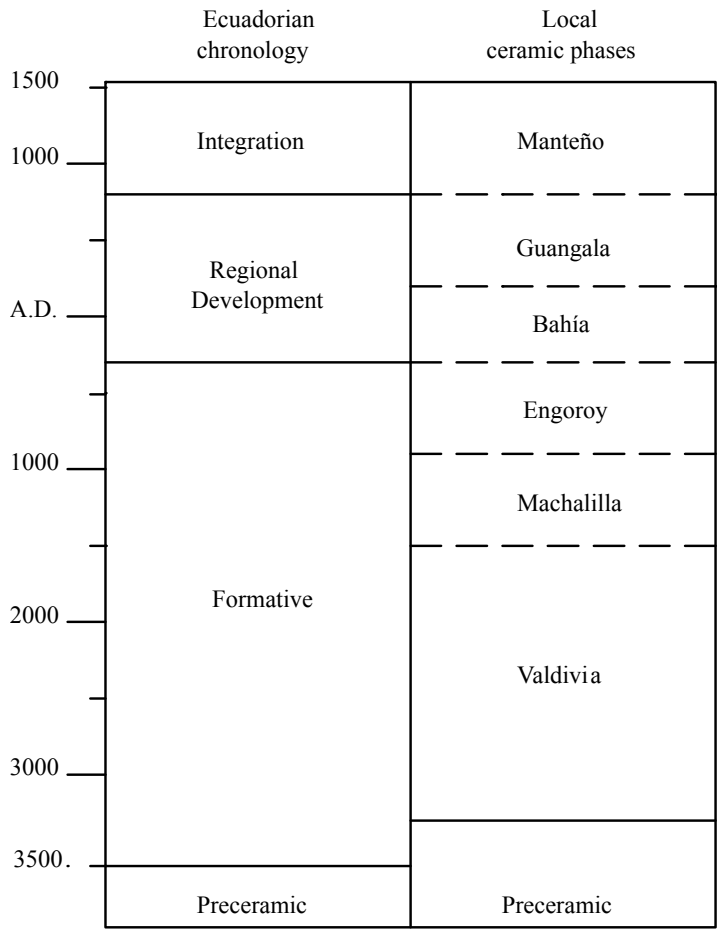


Figure 2-2. Ecuadorian chronology and local ceramic phases.

Decoration and form have traditionally been the fundamental attributes that are used to generate the typologies that enable us to place ceramic remains within a particular period. When ceramic remains are well preserved it is relatively easy to determine the chronological period and phase to which ceramics belong, but even when they have been strongly deteriorated by site formation processes the distinct form and decoration attributes that differentiate the three periods of costal Ecuador make at least some degree of chronological placement possible. Hence, those sherds that carry information on form (rim sherds, bases, handles, etc.) and decoration (paint, plastering, burnishing, etc.) have usually been critical to sort out the different periods of occupation within a site. Invariably, however, these “diagnostic” sherds constitute only a small fraction of the total sherd assemblage. In a regional settlement study such as this one, where ceramic remains have been gathered from a large array of surface locations and are often highly deteriorated and fragmented, an even smaller number of sherds carry any information about form and decoration that can help place them in a given chronological period.

For data gathered from surface contexts, like in this survey, this presents a clear problem because there is also no stratigraphy that can help associate these “ordinary” sherds to chronological periods. This would cause the vast majority of sherds recovered to wind up as "unidentified." The problem is compounded since, in order to gather data efficiently from a region of 100 km^2, the amount of material that can be collected at any given one lot is relatively small when compared to horizontal excavations. This means that a relatively small quantity of sherds is used to evaluate the activities that took place within a given lot and to determine what period they belonged to. Thus, if the majority of sherds end up chronologically unidentified, most lots would have no chronological placement at all, and those that do, would have only a minuscule number of sherds on which to base any analysis.

Finally, in order to meaningfully compare the evidence of different types of human activities in different regions and at different times, the data collected needs to retain its properties of representativeness. If only a small fraction of the ceramic assemblage is identified based on a few recognizable features of form or decoration, we run the risk of severely biasing the representativeness of the sample towards those forms and decoration attributes that have received more prominent attention in the academic literature. This could severely warp the comparison of proportions or densities of material from one lot to another.

For these reasons, it was critical to develop a classification strategy that would make possible the identification of as many sherds as possible, particularly the large number of ordinary sherds without noticeable diagnostic attributes. This was done by building on the existing typologies and characterizing paste attributes that enabled us to identify even very plain body sherds to a given chronological period.

First, all sherds that had form and decoration attributes that provided diagnostic information about period were separated and given an artifact number. Based on these attributes, these diagnostic sherds were then sorted into three different chronological periods: Formative, Regional Development, and Integration. Formative ceramics were further subdivided into Early and Late Formative as much as possible. Form and decoration attributes were compared against the typologies developed by Damp (1988), Estrada (1958), Meggers (1966), and Marcos (1988) for Early Formative; and by Bischof (1982), Lunniss (2001), and Zedeño (1985) for Late Formative. Regional Development attributes were compared against typologies developed by Bischof (1982), Estrada (1957), Masucci (1992), Mester (1990), and Paulsen (1970). Finally, for the Integration Period, attributes were compared to those of Mester (1990) and Oyola-Coeur (2000). Figures 2-3 and 2-4 illustrate some of the diagnostic sherds most representative of the

Early Formative ceramics types present in the study area and the main features that allowed chronological placement. The same is illustrated in Figures 2-5 and 2-6 for Late Formative ceramics and Figures 2-7 to 2-10 for Regional Development ceramics. Finally, Figures 2-11 to 2-16 illustrate Integration Period diagnostic ceramic sherds.

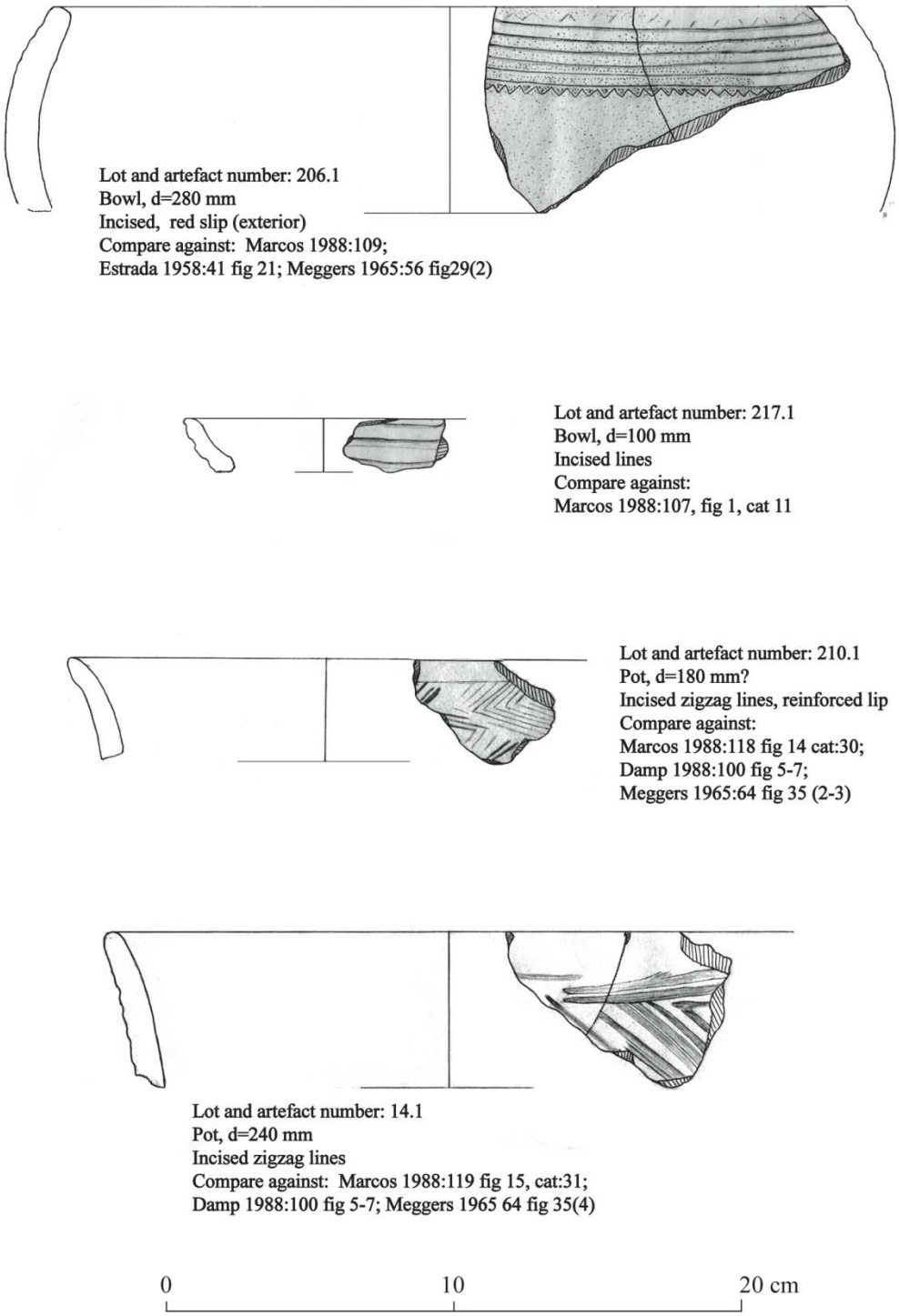
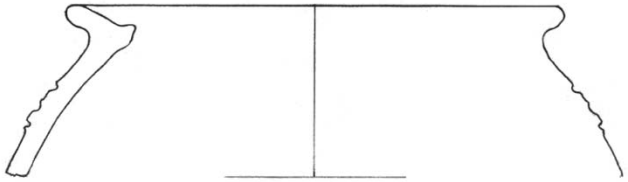
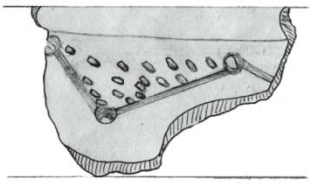
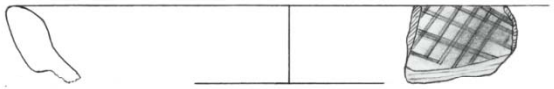


Figure 2-3. Early Formative diagnostic sherds (bowls).

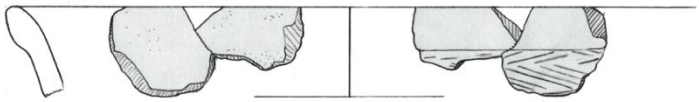


Lot and artefact number: 293.1
Pot, d=160 mm
Incised lines and notches, appliqués
Compare against: Estrada 1958:60, fig 30, art 1;
Meggers 1965:64, plate 77





Lot and artefact number: 168.1
Pot, d=180 mm
Incised lines, red slip (interior)
Compare against: Marcos 1988:116, fig 12, cat 27
Meggers 1965:64, fig 35(6)



Lot and artefact number: 402.1
Pot, d=220 mm
Incised zigzag lines, red slip on lip and interior
Compare against: Marcos 1988:118, fig 14, cat 30;
Damp 1988:100, fig 5-7; Meggers 1965:64, fig 35(3)

0 10 20 cm

Figure 2-4. Early Formative diagnostic sherds (pots).

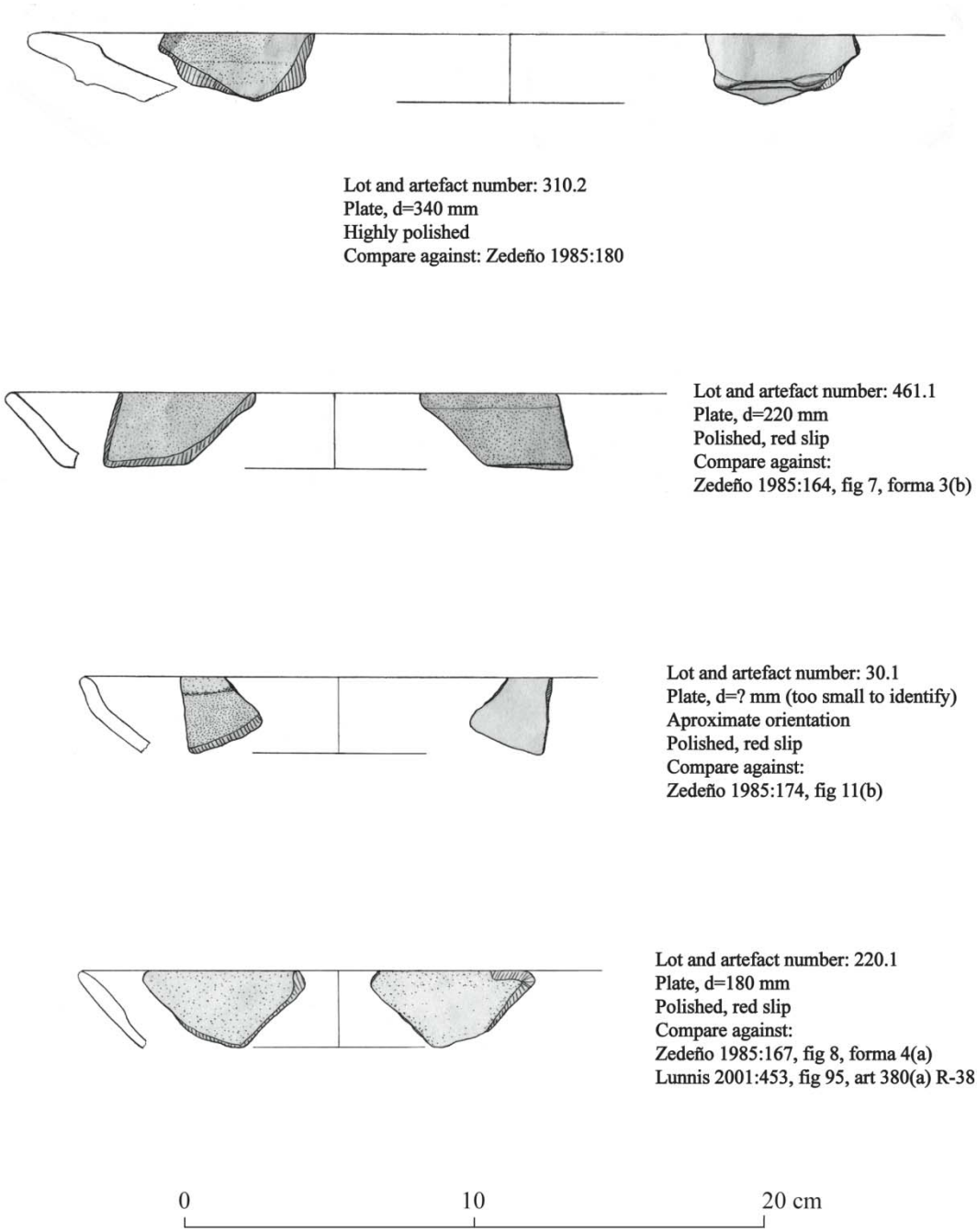
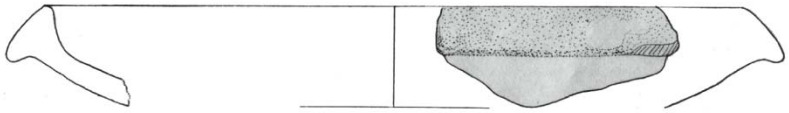
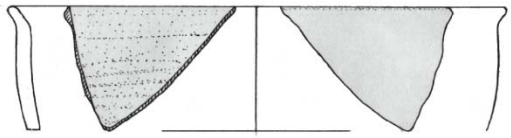


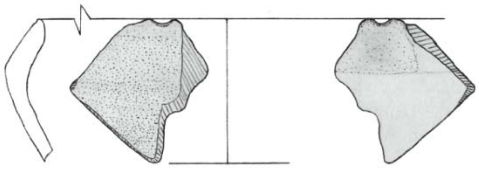
Figure 2-5. Late Formative diagnostic sherds (plates).



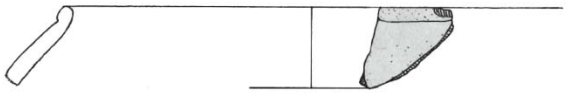
Lot and artefact number: 370.1
Plate, d=220 mm
Interior polish, zonal paint
Compare against:
Lunnis 2001:456, fig 98, art 280(g) R-4035



Lot and artefact number: 41.7
Bowl, d=160 mm
Polished, red slip
Compare against:
Lunnis 2001:474, fig 116, art 400(h) L-4668



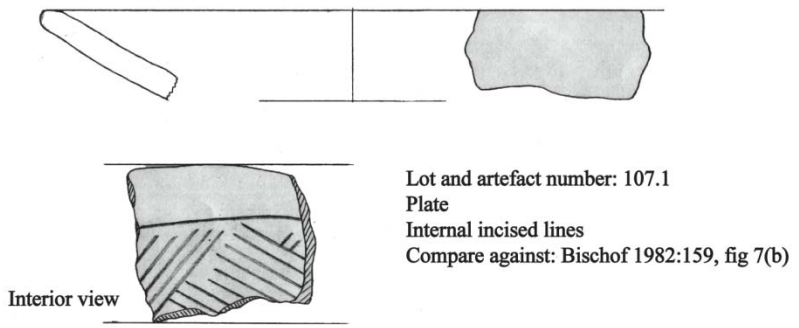
Lot and artefact number: 340.2
Bowl, d=? (too small to identify)
Polished, red slip, appliqué on lip
Compare against: Bischof 1982:147, fig 3(h);
Lunnis 2001:455, fig 97, art 180(a) L-4917;
Zedeño 1985:195, fig 21, form 11(b)

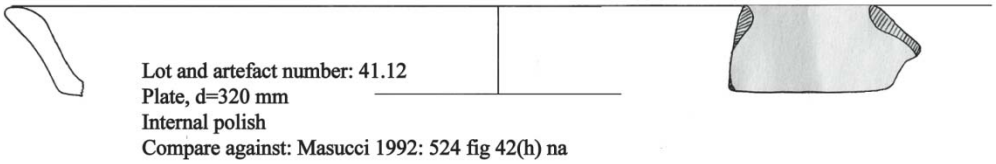


Lot and artefact number: 222.1
Pot, d=160 mm (aprox.)
Polished
Compare against:
Lunniss 2001:491, fig 134, art 30(b) L-5133

0 10 20 cm

Figure 2-6. Late Formative diagnostic sherds (plates, bowls, and pots).





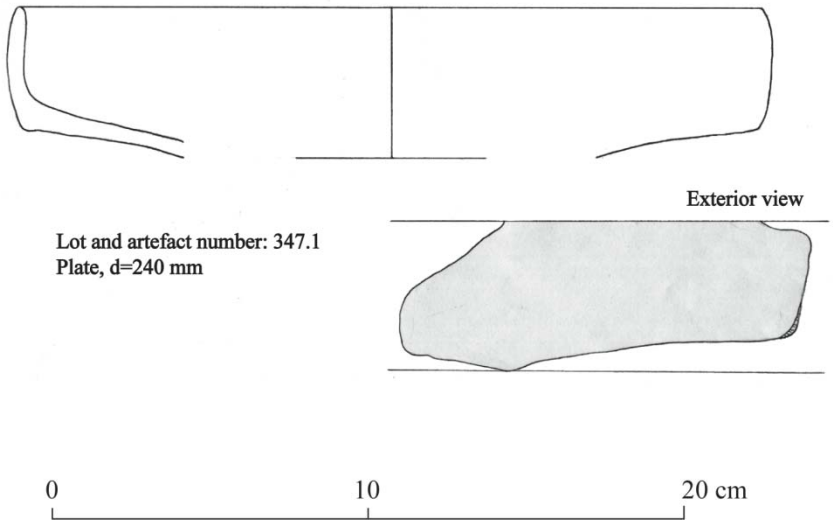


Figure 2-7. Regional Development diagnostic sherds (plates).

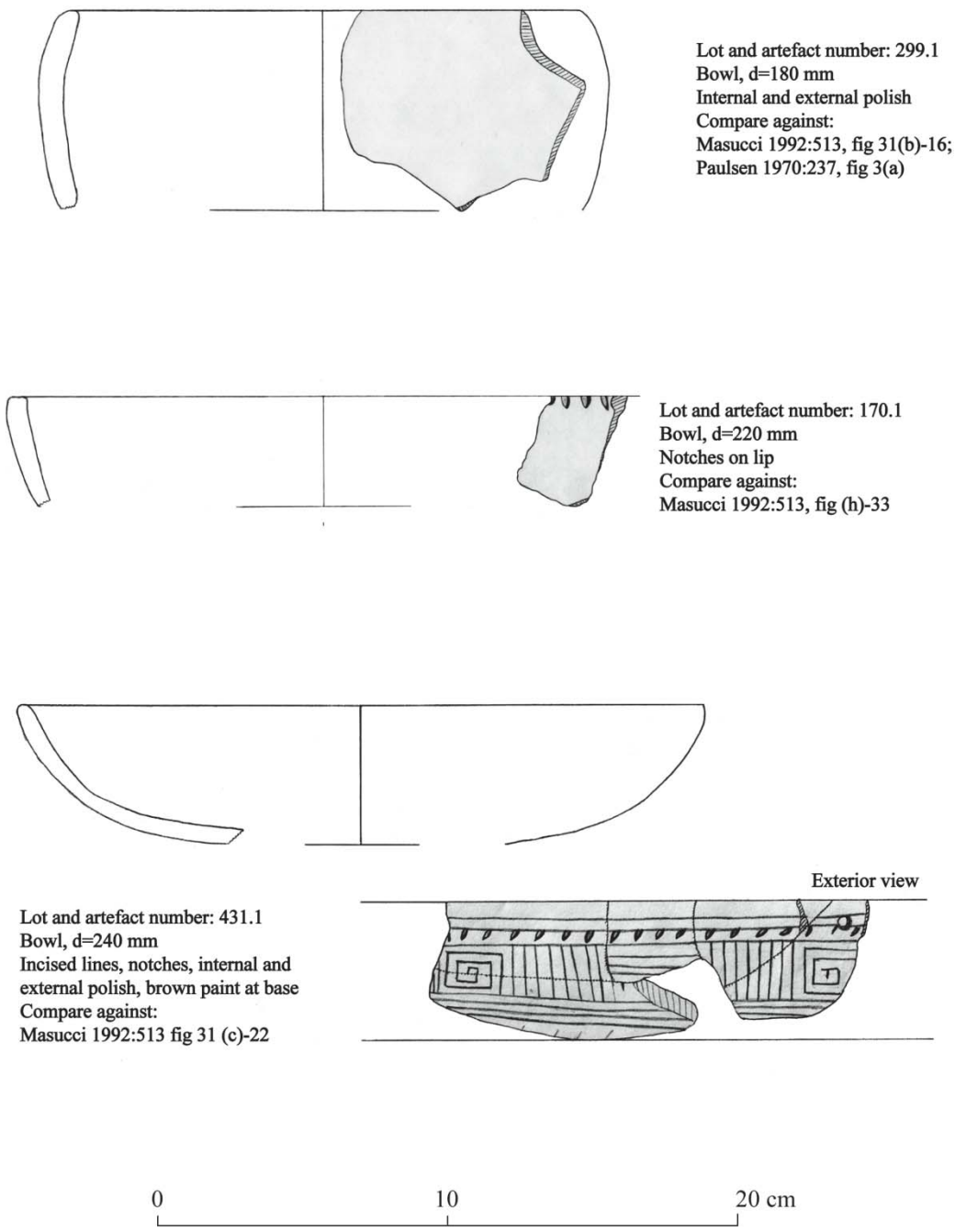


Figure 2-8. Regional Development diagnostic sherds (bowls).

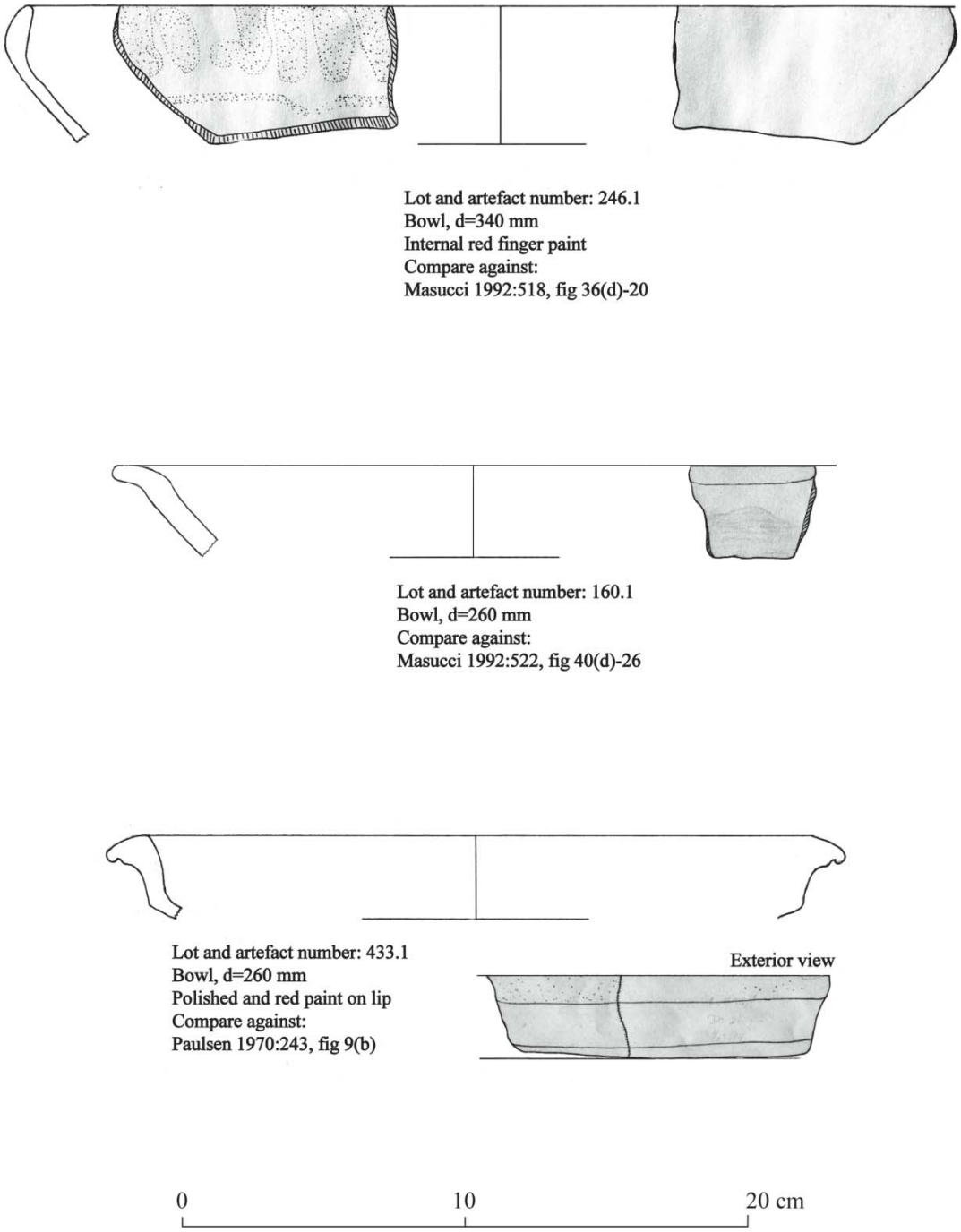
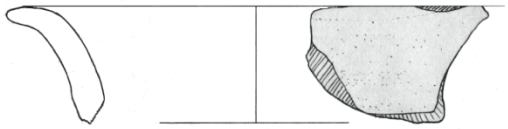
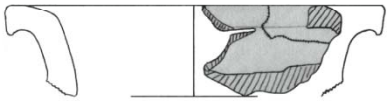


Figure 2-9. Regional Development diagnostic sherds (bowls).

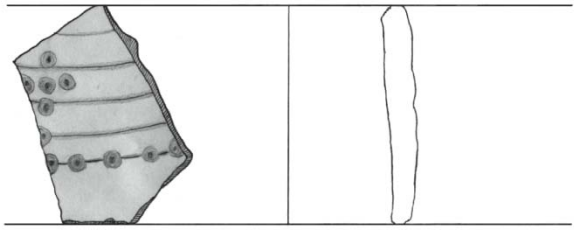
Lot and artefact number: 346.1
Pot, d=200 mm



Lot and artefact number: 41.14
Jar, d=160 mm? (too small to identify)
Compare against:
Paulsen 1970:239, fig 5 (c)



Lot and artefact number: 128.2
Jar, d=120 mm
Compare against:
Paulsen 1970:239, fig 5(a)



Lot and artefact number: 225.1
Pot
Incised lines, appliqué bottons,
exterior polish
Compare against:
Paulsen 1970:238, fig 4(g), p 240 ,fig 6(c);
Mester 1990:515 fig a.71 (3327)

Figure 2-10. Regional Development diagnostic sherds (pots and jars).

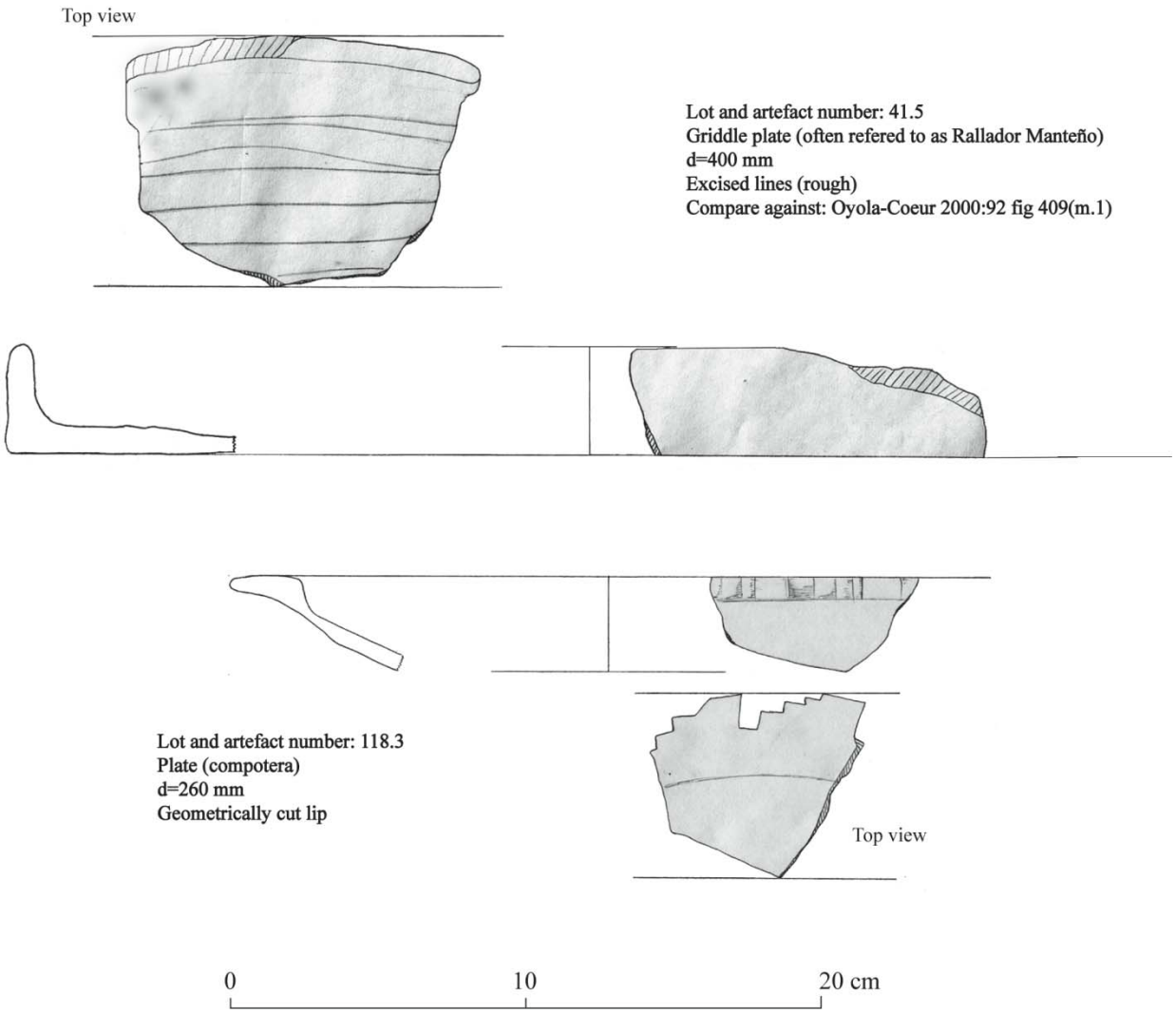


Figure 2-11. Integration Period diagnostic sherds (plates).

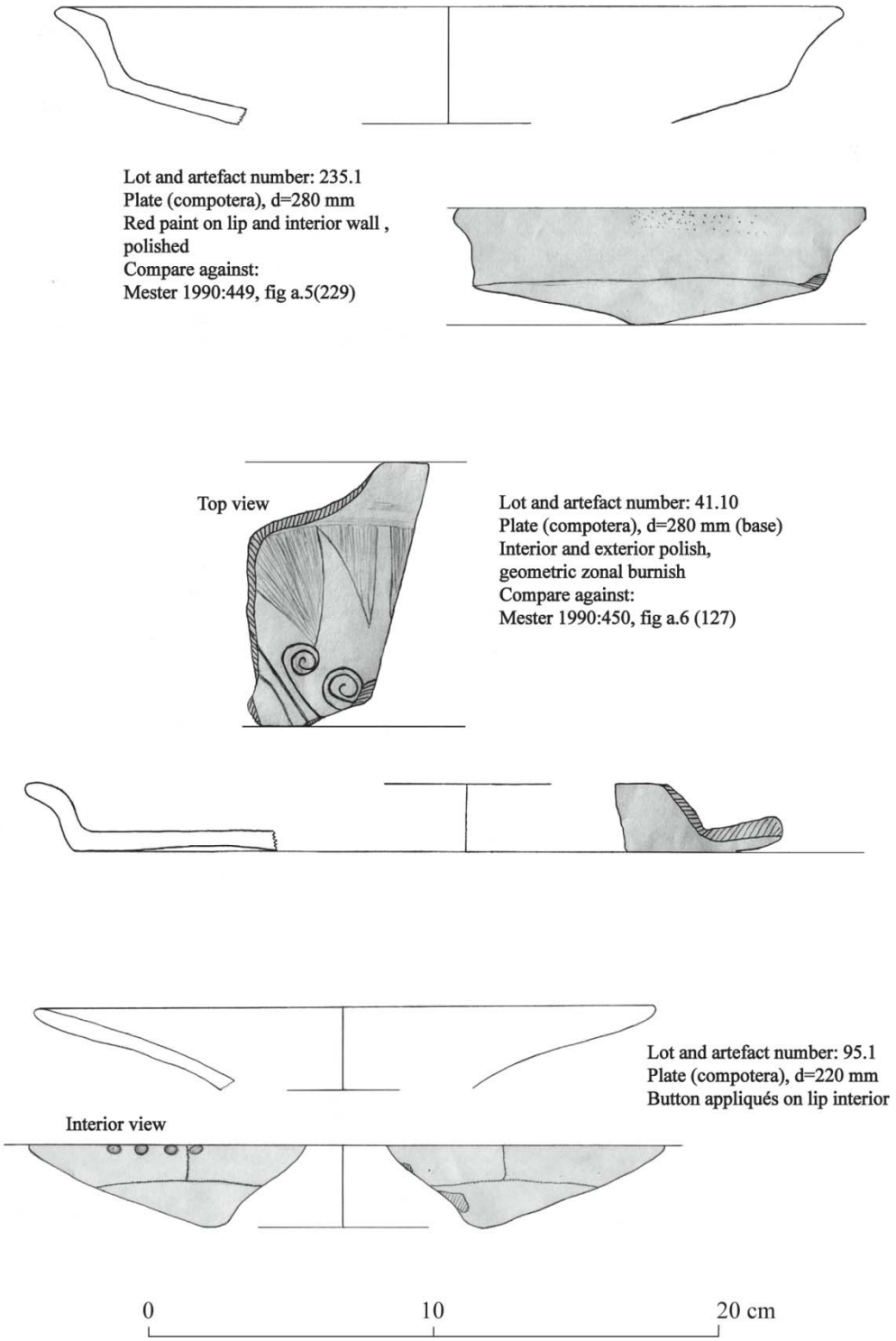


Figure 2-12. Integration Period diagnostic sherds (fancy plates).

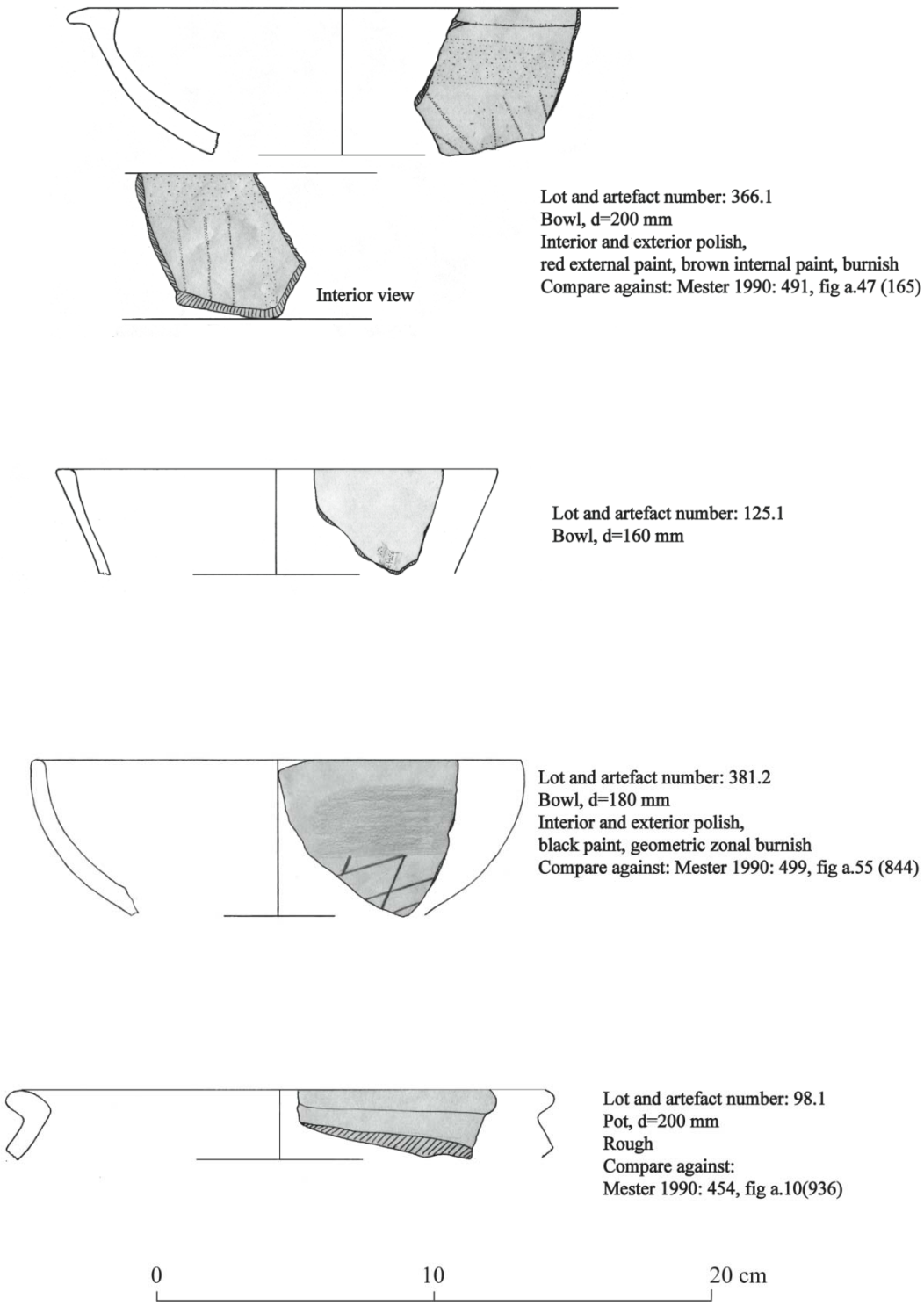


Figure 2-13. Integration Period diagnostic sherds (bowls and pots).

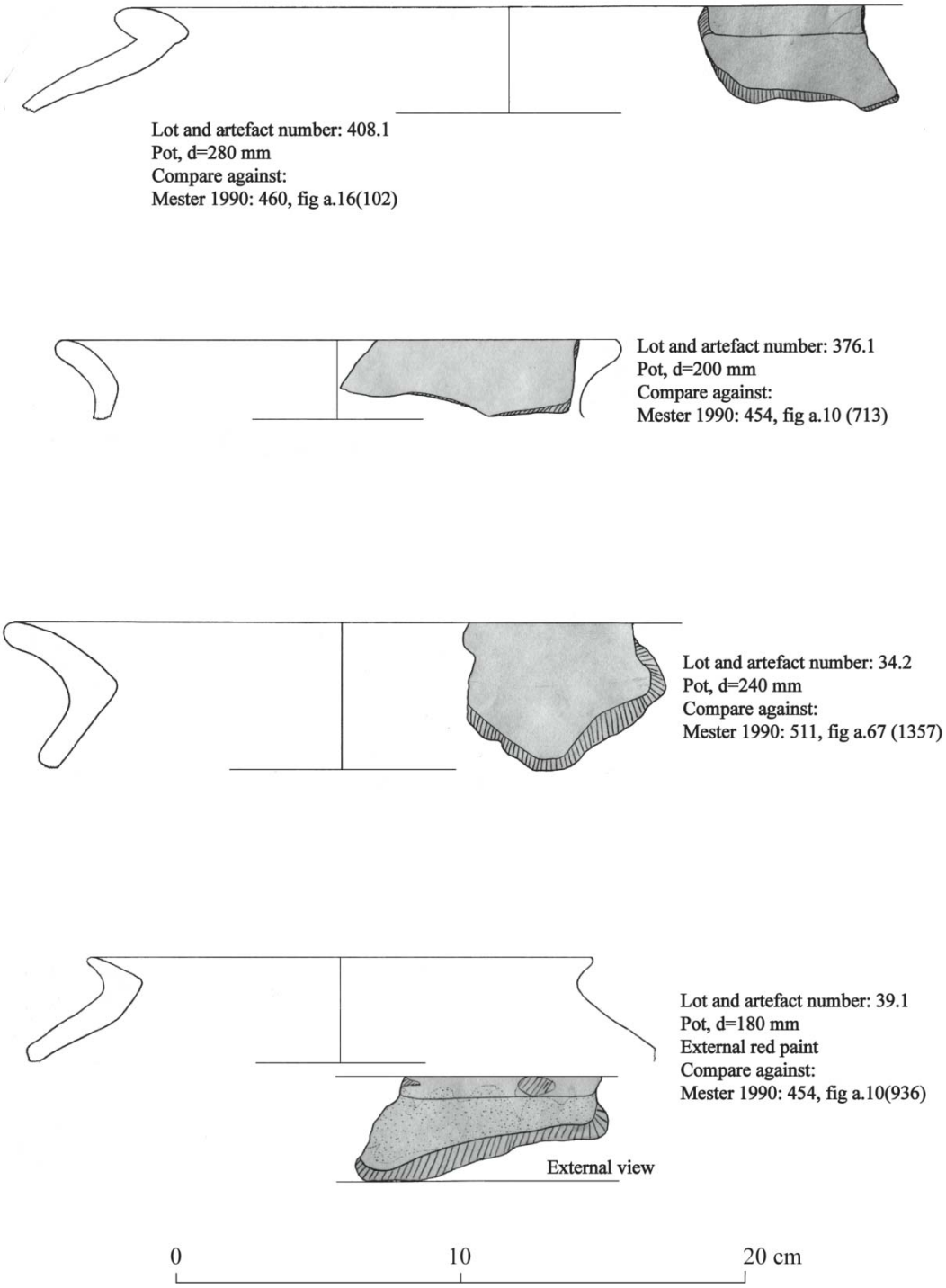


Figure 2-14. Integration Period diagnostic sherds (pots).

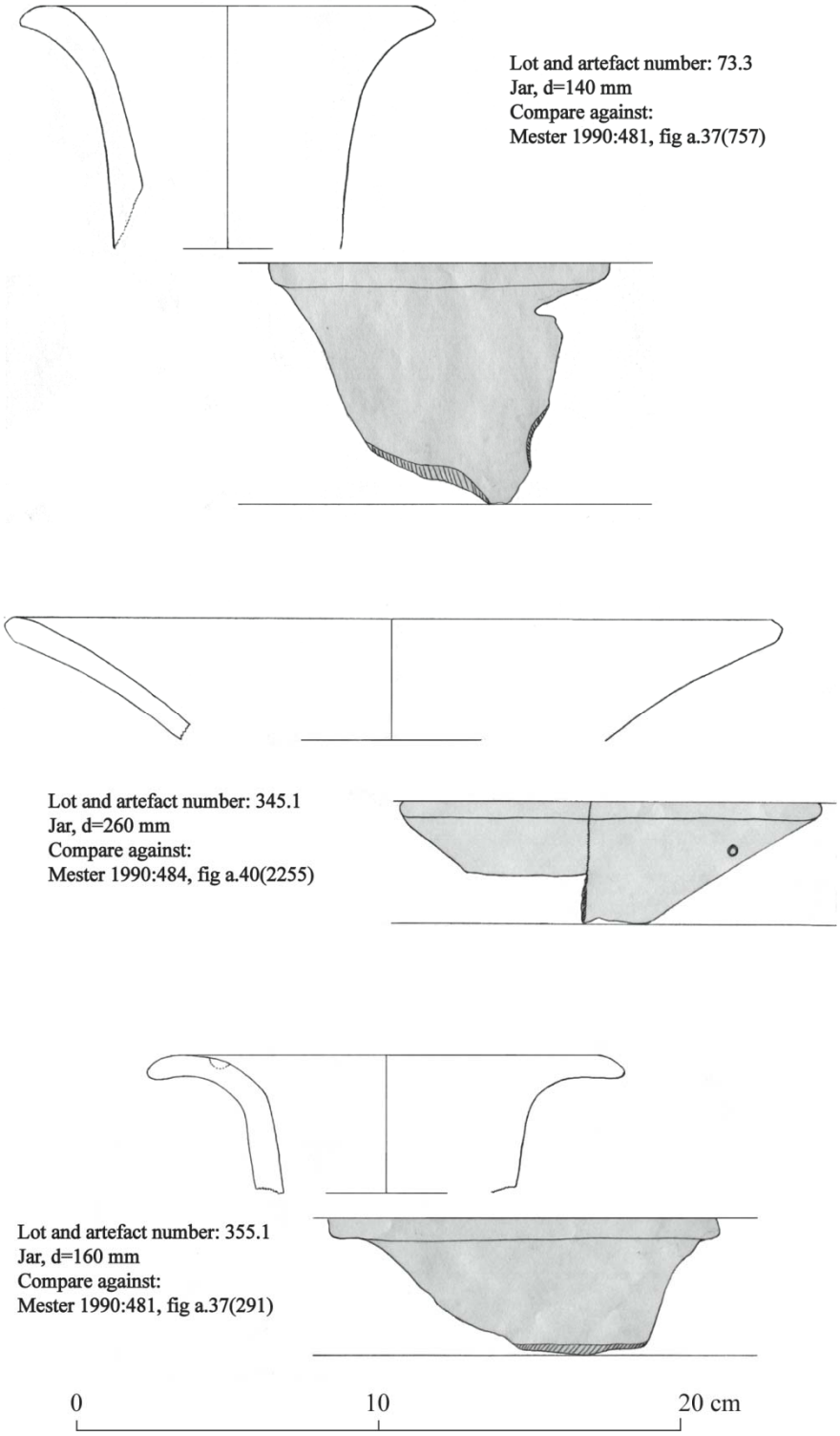


Figure 2-15. Integration Period diagnostic sherds (jars).

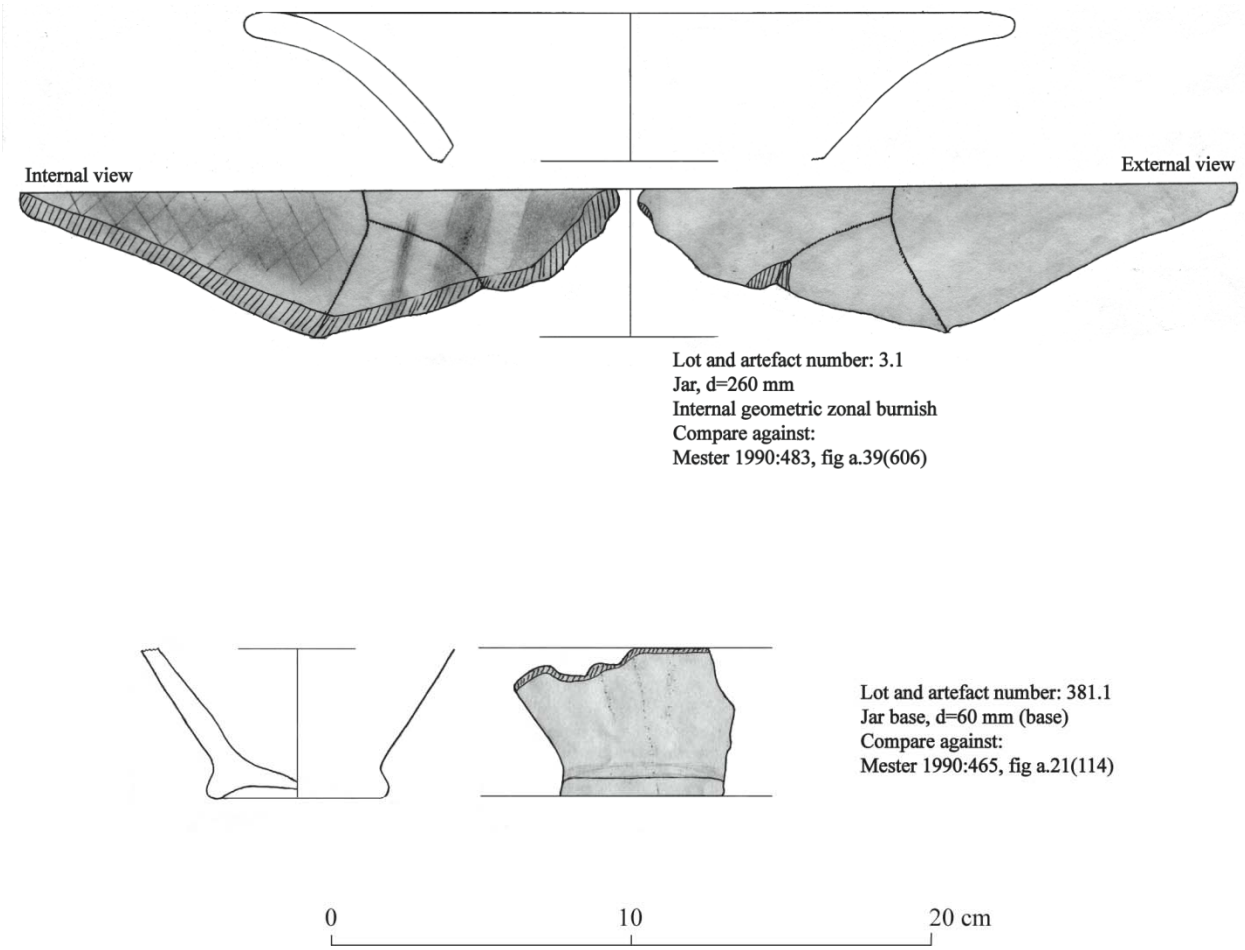


Figure 2-16. Integration Period diagnostic sherds (jars).

Once the diagnostic ceramics had been separated into different chronological periods, they were used to define paste attributes intrinsic to each period. This was done by cutting a cross-section of the most representative diagnostics of each period and analyzing the paste composition under a microscope. The critical paste attributes recorded were: paste type, temper, and porosity. By doing this, a paste typology for each of the three periods was devised. This typology was then used to assign virtually all ordinary plain body sherds to each chronological period. The following paste typology enumerates the paste attributes defined:

EARLY FORMATIVE

Paste

- Fine
- Sandy
- Grain size: .10 mm < x < .50 mm
- Heterogeneous grains
- Color: gray to light pinkish

Temper

- Not uniform
- Temper size: .25 mm < x < .75 mm

Porosity

- Quantity: common (2.00 / mm^2)
- Size: .10 mm < x < .40 mm

Presence of iron oxides, quartz, carbonates

LATE FORMATIVE

Paste

- Very fine
- Clayish
- Grain size: x < .10 mm
- Very homogeneous grains
- Color: grayish (ashy white)

Temper

- Even and uniform
- Temper size: .01 mm < x < .05 mm (some sporadic grains reach .25mm)

Porosity

- Quantity: sporadic (.50 / mm^2)
- Size: .05 mm < x < .15 mm

Fired at high temperatures

REGIONAL DEVELOPMENT (The Regional Development occupation contained two distinct paste complexes. Instead of describing a single, very wide, range of attributes, both paste complexes are described here separately.)

Complex 1

Paste

- Very fine
- Sandy
- Grain size: .05 mm < x < .15 mm
- Homogeneous grains
- Color: beige, grayish brown

Temper

- Slightly heterogeneous
- Temper size: .05 mm < x < .25 mm

Porosity

- Quantity: sporadic (.50 / mm^2)
- Size: .05 mm < x < .15 mm

Complex 2

Paste

- Fine
- Sandy
- Grain size: .10 mm < x < .50 mm
- Heterogeneous grains
- Color: beige, grayish brown

Temper

- Heterogeneous
- Temper size: .05 mm < x < .75 mm

Porosity

- Quantity: common (2 / mm^2)
- Size: .10 mm < x < .50 mm

Presence of iron oxides, quarts, and sporadic fragments of *cantos rodados*

INTEGRATION

Paste

- Fine
- Clayish
- Grain size: .10 mm < x < .25 mm
- Grains slightly homogeneous
- Color: beige, brown, and reddish brown

Temper

- Slightly uniform
- Temper size: .10 mm < x < .30 mm

Porosity

- Quantity: slightly common (1.50 / mm^2)
- Size: .10 mm < x < .30 mm

Once the sherds from all 553 lots had been separated into different periods within each lot, the sherd counts of different forms were also recorded. Formative sherds were separated into undefined sherds, graters, plates/*compoteras*, bowls, and pots. No Formative jar sherds were recovered. For Regional Development, sherds were separated into undefined sherds, fine plate/*compoteras*, utilitarian plates, griddle plates (also called *ralladores Manteño*), graters, bowls, pots, jars, footed plate fragments, pedestal fragments, and figurine fragments. For the Integration Period, sherds were separated into undefined sherds, graters, fine plates/*compoteras*, utilitarian plates, griddle plates (*ralladores Manteño*), bowls, pots, jars (lip flared), jars (regular), *mascarón* jar fragments, pedestals plate fragments, and figurine fragments. Once the sherds were separated by vessel form and each category counted, they were put back together into their respective periods within each lot.

Then, the individual counts of different decoration elements present in the sherds were counted for each period within each lot. Every decorative element was treated separately so that if a single sherd exhibited two or more decoration elements, all the elements present received their own count. For the Formative Period sherds, the counts of sherds with appliqué buttons, appliqué designs, punctate plaster designs, notches, horizontal incised lines, zigzag incised lines, finely incised lines or designs, excised lines, and painted lines were recorded. For the Regional Development Period sherds, the counts of appliqué buttons on lip, appliqué buttons on body (frogware style), plaster notches (on lip or body), rough incised lines, finely Incised lines or designs, finger paint, and burnished lines were recorded. For the Integration Period, appliqué buttons, incised lines, excised lines, burnish, crisscross burnish, and spiral burnish were counted. These decorations are depicted in Figures 2-3 to 2-16. In the same manner, the independent

counts of different slip colors (red, brown, orange or yellow) and of highly polished sherds within each lot and period were also recorded.

Finally, once decoration, slip, and polishing elements had been counted, the sherds were regrouped one last time into their respective periods and lots and separated again, this time into two categories of sherd quality. Sherds that were crudely made and poorly decorated were defined as *coarse ware*. Those that were well made and finely decorated were catalogued as *fine ware*.

2.1.3.2 Lithics

Lithic analysis was carried out concurrently with the malacological analysis within the months of November and December of 2007. Throughout the study area, large geological beds of quartzite provide a plentiful supply of raw material with which to produce lithic tools. Since this material is easy to flake and retouch, and produces sturdy and durable blades, it can be understood why it was used to create over 99% of the lithic artifacts recovered. In fact, imported materials are virtually absent from the assemblage. Out of a total of 3176 lithics recovered, only seven blades made from obsidian were clearly from a non-local source.

Different activities (butchering, cooking, craft production, etc.) often require those who carry them out to produce specialized toolkits that can accomplish specific tasks more efficiently. Because of this, and because of the high durability of lithic tools within the archaeological record, the distribution of lithic artifacts across the landscape frequently provides critical evidence of the division and dispersion of activities that took place within a region. In particular, highly specialized activities such as the different types of craft production are expected to leave very specialized tool kits associated with them. For example, Masucci (1995) and Currie (1995a, 1995b) have noted that shell workshop contexts in coastal Ecuador show higher quantities of

perforating tools such as small drills and burin spalls linked to the manufacture of beads. For this reason, it was important to create a lithic typology that divided the lithic assemblage based on its function as much as possible.

Flaked tools constituted the overwhelming majority of lithic artifacts with a count of 3144 specimens. These were divided into preforms, cutting tools, scraper tools, perforators, burins, points, cores, axes, lithic debitage, and undefined lithics. By contrast, the survey only recovered a total of 32 ground stone artifacts, which were divided between *manos*, *metates*, undefined *mano* or *metate*, river stones, large architectural stones, and other.

Cutting tools were defined as detached flake pieces, less than one centimeter in thickness, with at least one very thin sharp edge (with an acute angle of less than 20°). This category was further subdivided between flake cutters, blade cutters, and obsidian blade cutters. Flake cutters were defined as flakes where the height (from the proximal to distal end) was less than double the width of the flake. This was the most numerous category with 432 artifacts. These cutters appear to be expediently made cutting tools that once detached from a core, received very little extra labor in either retouching or curating. On the other hand, blade cutters were defined as flakes where the height of the lithic was at least double the width. There were 226 blade cutters recovered during survey. By contrast to flake cutters, blade cutters generally had more evidence of retouching to give the tool an elongated symmetrical blade shape. The final category of cutting tools was blade cutters made of obsidian. By contrast to the large numbers of flake cutters and blade cutters recovered, only seven obsidian blades were picked up during systematic collections. Reaffirming that more time and care was taken to create these seven imported specimens, all of these specimens showed evidence of retouching, had very symmetrical shapes, and fit within the blade category where the height was at least double the width.

Scraper tools were defined as detached flakes, more than one centimeter in thickness, with one sharp edge whose angle was greater than 20°. Scrapers were further subdivided into sidescrapers and endscrapers. Sidescrapers were the dominant category with 116 specimens, while there were only 12 endscrapers registered. Very few scrapers showed any substantial evidence of retouching.

Perforators constituted an important category within the lithic assemblage due to their potential role in craft production activities (Currie 1995a, 1995b, Masucci 1995). This category was subdivided into perforating tools (of which 84 specimens were recovered), drills (with 74 specimens), and rimmers (with 9). Perforators whose distal end was reworked to create a sturdy point for piercing were classified as puncturing tools. Small, thin, and elongated lithics that showed considerable evidence of being retouched and whose distal end was fashioned to finish in a sharp point (such as those described by Masucci [1995]) were classified as drills. Reamers constituted the last category of perforators and were defined as drills whose distal end was fashioned to end in a wider point, useful for enlarging the diameter of previously made perforations.

Similarly, burins were subdivided into burins and burin spalls. Burin spalls were generally very similar to drills, yet they were defined based on the lack of further retouching of the spall once it had been detached from the burin core. Only 11 burins and 19 spalls were registered.

Points were defined as lithics that had a leaf-like shape, a pointed distal end, both edges worked, and often exhibited a haft element on the proximal end. These were subdivided into two very different categories. Arrow points were smaller than three centimeters, usually possessed a hafting element, and showed considerable amounts of retouching to produce a symmetrical leaf-

like shape. A total of 69 lithics fell under this category. The second type of points, categorized as spear points, included much larger specimens (larger than ten centimeters) with pointed distal ends, but not as well defined leaf-like shapes and with less evidence of retouching. Many of the 82 examples recovered often showed hafting elements as well. Finally, a total of 254 points that did not fit either of these two specific criteria were categorized as undefined points.

A total of 192 cores and seven axes were also recovered by the survey. Debitage represented the largest category of lithics with a count of 1263 artifacts. They were further subdivided into two categories, general debitage, with a count of 1048, and micro flakes (less than one centimeter in length) with a count of 215. Micro flakes appear to represent debitage produced from finer stages of lithic manufacture such as blade retouching or the production of finer tools like drills, perforators, or arrow points.

Although considerably smaller in number, the other category of lithic material was ground stone. There was a total of 11 *manos*, one *metate*, seven undefined *manos* or *metates*, six small polishing river stones, four large river stones, one stone leg from a pedestal and two fragments of large architectural stones probably belonging to either column bases or Manteño chairs.

2.1.3.3 Shell

Amelia Sánchez from the Escuela Politécnica del Litoral, Guayaquil, Ecuador, analyzed the malacological assemblage. Including the shell concentrations, 243 of the 553 lots recorded during survey contained shell material. Out of the thousands of shells quantified from these lots, only four completely finished artifacts (pendants and beads) were identified.

Virtually all of the gastropods recovered were whole and unworked while a great many of the bivalve species (particularly the four used for export items, *Spondylus princeps*, *Spondylus*

calcifer, *Pteria sterna*, and *Pinctada mazatlanica*) were recovered as small cut fragments. Because bivalves have very few identifiably unique parts (such as the joint of the valves), quantifying by Minimal Number of Individual (MNI) would have resulted in a total count of each of these bivalve species of one in almost all the lots. This presented two clear problems for subsequent analysis. First, it distorted the proportion of bivalves to gastropods since bivalves would be underrepresented. More important, if all the lots registered a total of one individual of every bivalve species regardless of the amount of shell material present in each, it would be impossible to compare the varying degrees of emphasis placed on this resource between different lots in any meaningful way. With MNI, whether a lot had one or one hundred fragments, it would still only register a count of one individual for the purposes of analysis.

This is a problem that researchers along the coast of Ecuador have long recognized. Notably, Clark (2001) has already remarked that within the Río Chico site assemblage (located a few kilometers south of the study area) this phenomenon is responsible for considerably diminishing the number of bivalves counted for analysis as opposed to gastropods. Gastropods, which are not traditionally associated with craft production but rather with food procurement, almost always appear whole.

Drennan (2001:666) clarifies some of these issues by noting that MNI and fragment count are actually opposite ends of a continuum of quantification techniques, each with it own biases and assumptions about the data. On the one hand, MNI assumes maximal *interdependence* of fragments observed. That is to say, it is based on the assumption that any two fragments that could have come from the same individual did come from the same individual. On the other hand, fragment count assumes maximum *independence* of fragments observed. In other words,

by contrast to MNI, fragment count assumes that any two fragments that could have come from different individuals did come from different individuals.

In this sense, the problem is that it is not a good idea to assume maximal interdependence of fragments observed in an assemblage that has explicitly undergone a process that discriminately makes part of the assemblage undifferentiable in terms of the interdependence of the original elements. In this case, the process of targeting bivalves and cutting them in small unrecognizable pieces as part of the export industry, severely affects the basic assumptions that MNI, as a measuring technique, is based on.

For this reason, fragment count serves as a considerably more useful way to quantify the malacological assemblage. While this alternate technique also projects its own biases to the archaeological record (that is, it assumes maximum independence of elements) it permits the quantities of bivalves in different lots to be meaningfully compared, and thus, allows us to gauge the varying degrees of emphasis placed on these resources from one area to another.

Hence, shell remains were divided according to genus and species and further subdivided amongst worked and unworked specimens for each lot. The fragment count of each category was recorded. Within the study area, gastropods were by far the most diverse and largest group with 33 different species and a count of 3038 fragments (only three of which showed evidence of being worked). The most numerous categories were *Thais haemastoma biserialis* with 1042 specimens, *Fissurella virescens* with 242 specimens, and *Turbo saxosus* with 234.

Bivalves constituted the second largest group and were less diverse with a total number of 884 fragments and 23 different species represented. However, with 106 worked artifacts, the proportion of worked to non-worked was considerably higher than for gastropods. In total, 212 *Spondylus* fragments were recorded representing by far the most numerous taxon of bivalve. Of

these, 23 were *Spondylus princeps*,132 were *Spondylus calcifer*, and 57 were catalogued as unidentified. The next most numerous taxa of bivalves represented were *Pinctada mazatlanica* with 125 fragments and *Pteria sterna* with 68.

Only 122 specimens of Polyplacophora were recovered and none were worked. Although not technically part of the malacological assemblage, a total of 331 coral fragments (*Pavona clavus* and *Psammacora stellata*) were also recovered.

2.2 SETTLEMENT AND DEMOGRAPHIC ANALYSIS

Settlement and demographic analysis was based upon the distribution of ceramics of each period across the survey area and on the varying densities of ceramics of each period in different locations. The Formative sherds of every collection lot were separated and the sherd density for all lots was calculated by dividing the number of Formative sherds present in each collection circle by the area of the circle. This step was then repeated for the Regional Development Period and finally for the Integration Period.

The next step was to represent the sherd density spatially for each period so the characteristics of distribution could be more readily observed and changes from one period to the next noted. Following the approach proposed by Peterson and Drennan (2005) these densities were represented as perspective renderings of surfaces for each period in which peaks represent areas of high-density ceramics and low, flat areas represent parts of the survey area where no ceramics were recovered. The surface for each period was based on a GIS raster layer of ceramic densities at a resolution of 1 ha (cells of 100 m by 100 m). The resulting data and images are

shown and described in detail for each of the three periods in Chapters 3, 4, and 5 and they provided the basis of the subsequent shell analysis also carried out in Chapter 5.

For some purposes it is necessary to go beyond the relative terms of distributional studies and comparisons between phases and to provide an approximate assessment of the actual numbers of people in the region and in different settlements.

The approach followed here to reconstructing absolute population numbers traces its roots to the techniques developed for the analysis of the settlement of the Basin of Mexico (Sanders, Parsons, and Santley 1979:20-30), which were further developed for the analysis of the Valley of Oaxaca data (Blanton et al. 1982; Kowalewski et al. 1989). Undergoing further refinements (Drennan 2006; Drennan et al. 2003a), this methodological approach to extrapolating population numbers is the most comprehensive one currently available for making demographic estimates on a regional scale (Fish and Kowalewski 1990; Drennan et al. 2003a, 2003b). It has been used successfully to estimate regional population numbers for many prehistoric societies in the Intermediate Area and around the world, for example Cuellar (2006) and Delgado (2002) for Ecuador, Drennan (2006) and Langebaek (1995) for Colombia, Haller (2004) for Panama, Murillo (2009) for Costa Rica, Kim (2005) for South Korea, Drennan et al. (2003a) for China, etc. The procedures described below are based on the area-density index developed by Drennan et al. (2003a:152-165) where they are also described in more detail.

First, the sherd density of each lot (considering only sherds of a particular period) was multiplied by the exact area of the lot. The resulting area-density index for every lot is a number that represents how much material of a single period was found in a given lot. Lots with an area of one hectare and one sherd per square meter would have the same area-density index as lots that are half a hectare but have two sherds per square meter. In essence, the area-density index is

a number that takes into account not only how small or large occupations are but also how dense is the surface artifact scatter that made these occupations recognizable.

The next step was to take into account the length of each period. For this area of Southern Manabí, the Formative (which includes the Valdivia, Machalilla and Chorrera phases) is about three times longer than the Regional Development Period, and more than four times the length of the Integration Period. Since artifact densities from long-term occupations would be higher than those from short-term occupations, we have to take into account the fact that the Formative densities are the result of a much longer span of time than for the other two periods. This problem is easily solved by dividing the area-density index of each lot by the number of centuries in the corresponding period so that the resulting number represents the densities of material that are discarded per century for each period. This final number (the area-density index/century) is more amenable to comparison between periods because it more accurately represents the average amount of material left by populations at any point in time. Zeidler (2003) has provided a very thorough synthesis of Formative radiocarbon dates and chronology. He notes that for this area of southern Manabí, the Formative sequence appears to begin at Valdivia 2, at around 3,300 B.C. (Norton et al. 1983; Zeidler 2003:515), and has a suggested ending date of 300 B.C. (Zeidler 2003:506). The succeeding Regional Development period continues from that date until it transitions into the Integration Period at roughly A.D. 800 (Mester 1990; Oyola-Coeur 2000; Rowe 2003). The ending date for the Integration Period is set at A.D. 1532 with European arrival. Hence, the density-area index was divided by 30 centuries for the Formative lots, by 11 centuries for the Regional Development, and by 7 centuries for the Integration Period.

The final step to approximating the demographic patterns in absolute terms is to attempt to estimate what number of people living in one place for a century corresponds to the area and

surface density of the artifact scatter their garbage would produce. Towards this end, the rural settlement of our study area provides us with a valuable clue to the average amount of garbage left in the landscape by the typical family unit. As described in more detail in Chapters 3, 4, and 5, the survey revealed quite a sizable scattered rural occupation composed of many small collection lots (less than half a hectare). Most of these small collection lots are located on the flat tops of the small rolling hills that cover the survey area. The character of these small collection lots, both in terms of location and size, is precisely similar to that seen throughout rural Manabí today, where rural families place single dwellings constructed of *caña* bamboo in a sparse pattern taking advantage of the natural topography. This is a pattern that is indeed found in many tropical lowland regions throughout the Intermediate Area and has been well documented for contact and early colonial periods (Rudolf 1999) as well as for pre-Columbian times (Drennan 2006; Murillo 2009). For present-day Manabí specifically, each of these traditional rural farmsteads is composed of a nuclear family (parents and offspring) that often incorporates some members of the younger and older generations (i.e. grandparents and grandchildren) (Yépez 2007), or between five to ten people.

Twelve of these collection lots were selected based on their size, location, and ceramic density to be the most likely representatives of continuous occupations of these isolated nuclear family farmsteads. They were picked from the Integration Period occupation because it is the shortest of all three periods and has much larger quantities of ceramic material, which made it much more likely that the lots in it were occupied continuously throughout the sequence. This would mean that the amounts of material in those lots are more likely the result of continuous occupation and not of sporadic ephemeral households that only lasted one or two generations.

Table 2.1 shows the area-density index of these 12 lots as well as their average area-density index.

Since their average area-density index is 2.079 and the Integration Period is seven centuries long, this would mean that a nuclear family farmstead would leave—on average—an area-sherd density index of about .297 per century.

If the traditional rural farmstead had a minimum of 5 and a maximum of 10 people (and it left on average an area-density index of .297 per century), then, an area-density index of 2.97 would represent between 50 and 100 people per century. Likewise, if a lot has a density-area index of 1, then it represents between 17 and 34 people. Based on this numeric relationship the area-density index per century of any lot can be multiplied by 17 to produce a minimum population estimate and by 34 to produce a maximum estimate. The application of these factors is the basis for the demographic estimates in absolute numbers presented in Chapters 3, 4, and 5.

Table 2-1. Average area-density index for 12 Integration Period sites

Lot #	Area-density index (Integration Period)
109	4.846
129	1.760
132	5.026
114	0.877
174	0.714
216	1.046
326	4.583
333	1.561
335	0.989
337	0.939
510	1.969
550	0.633
Sum of A-D index:	**24.948**
Average A-D index:	**2.079**
Average A-D index by century:	**0.297**

3.0 THE FORMATIVE PERIOD

3.1 DEMOGRAPHIC PATTERNS

To reconstruct the Formative occupation (3300-300 B.C.) of the Machalilla National Park it is useful to start by looking at the distribution of lots across the region. Figure 3-1 shows the location and extent of collection lots containing Formative ceramics throughout the one hundred square kilometers chosen for study. At first glance, what is most evident is the large number of small isolated collection lots that distribute themselves across the landscape. As described in Chapter 2, these lots, which have an average area of slightly less than half a hectare, are predominantly located on the raised flat tops of the small rolling hills that cover the national park. This dispersed settlement pattern is precisely similar to that of present-day rural farmsteads in southern Manabí and is in fact present throughout many of the tropical lowland regions of the Intermediate Area, both archaeologically and in modern contexts (Murillo 2009; Rudolf 1999).

In present day examples, single-family farmsteads, often constructed from *caña* bamboo *(Guadua sp.)*, take advantage of the natural topography and carry out subsistence pursuits directly on their land in a pattern of extensive agriculture (Rudolf 1999:44-6; Yépez 2007:616). For prehistoric cases, but also generally relevant to contemporary ones, Drennan (1988) has commented that this dispersed settlement pattern is often related to forms of productive organization where individual family units control production independently from one another.

Individual households place their residences directly on the land they manage so as to minimize time spent walking to fields that they cultivate and maximize the labor efficiency of the family unit. In this sense, then, the organization of production is seen as responsible for generating the centrifugal forces that push populations into this disperse isolated pattern and inhibiting population nucleation.

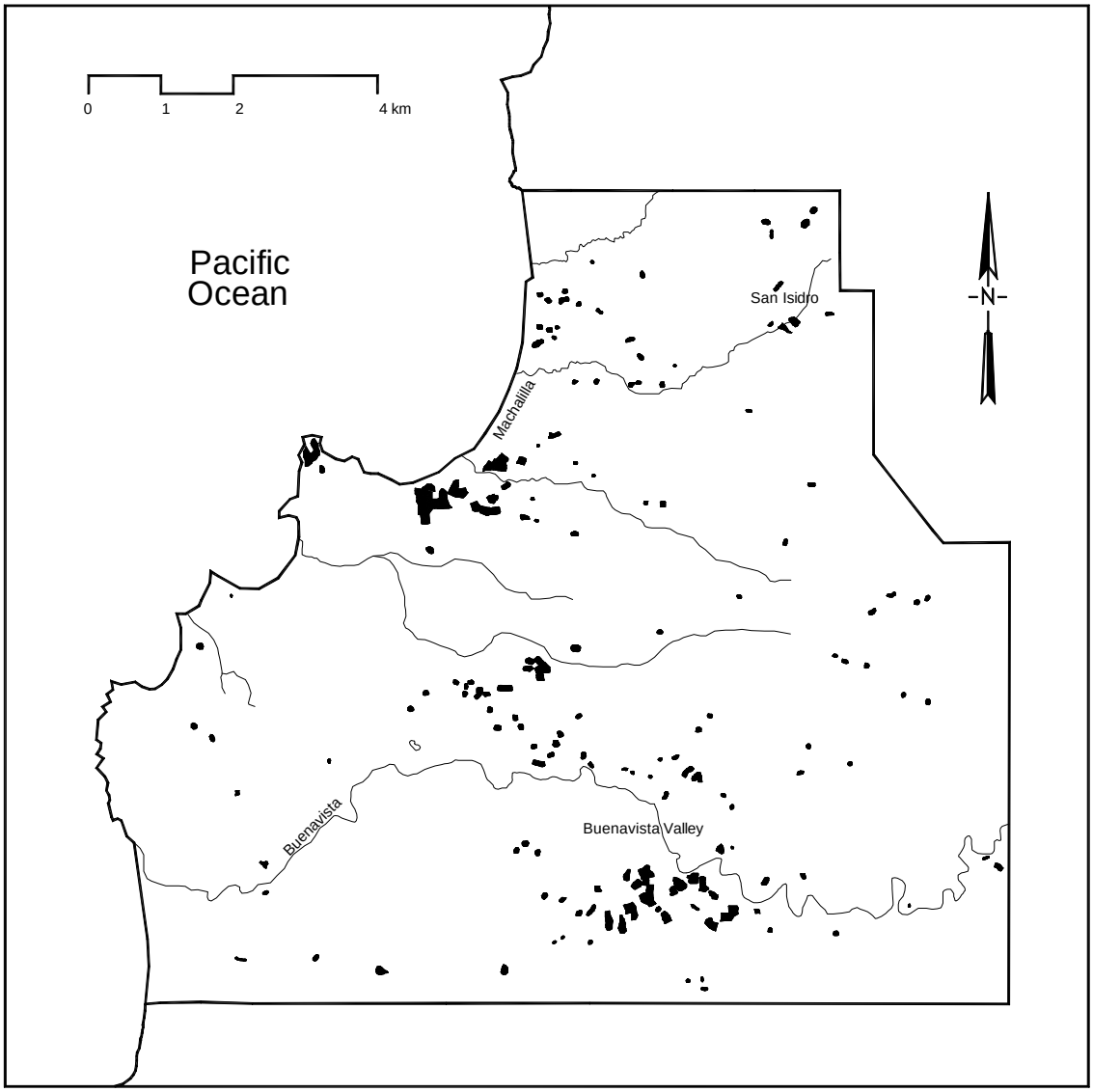


Figure 3-1. Lots within study area where Formative Period ceramics were recovered.

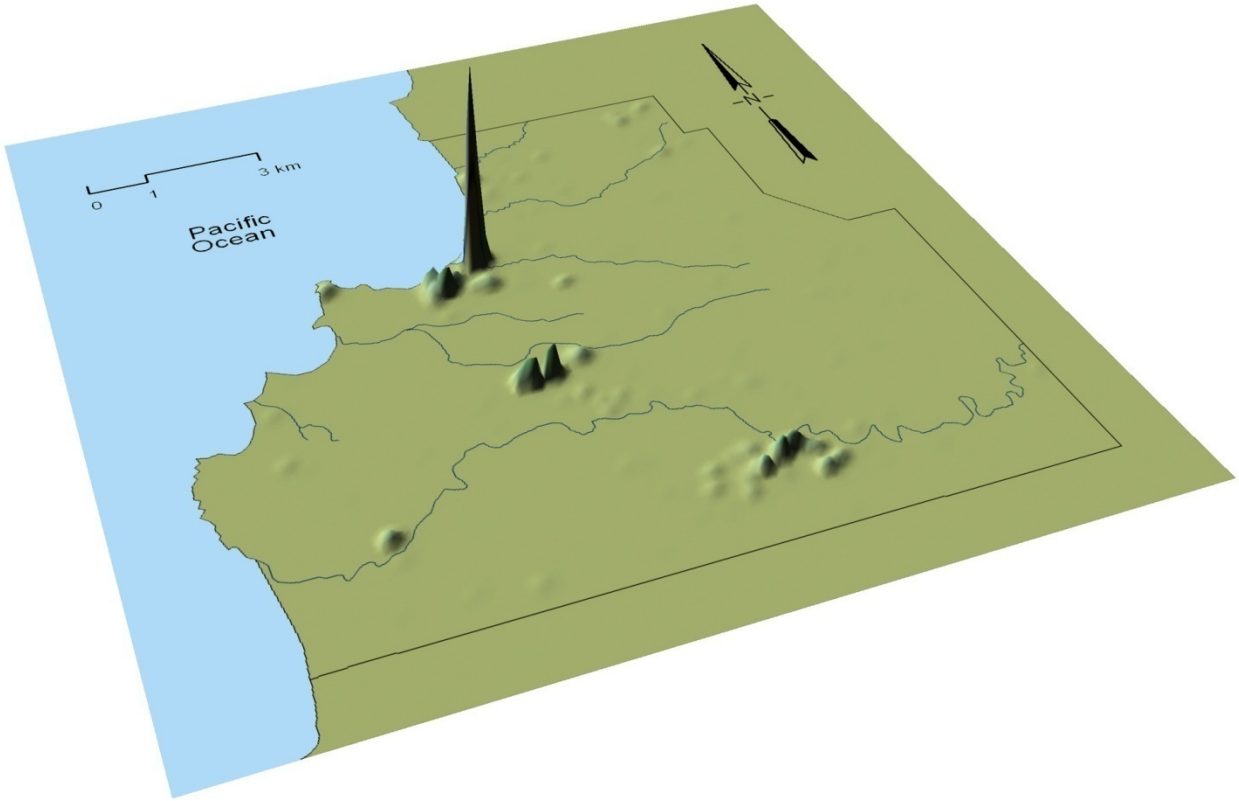


Figure 3-2. Sherd-density perspective rendering of the Formative Period. Peaks represent areas of high-density ceramics and flat areas represent parts of the survey where no ceramics were recovered.

While a quick glance at the Formative settlement pattern does show this generally isolated farmstead pattern, it is also noticeable from Figure 3-1 that some lots tend to cluster slightly at different locations. The most noticeable grouping of Formative lots takes place near present day Machalilla. There is also a slight clustering of lots both to the north and south of the Buenavista Valley. The collection lots to the south of the Buenavista Valley are located adjacent to the present day town of Agua Blanca and archaeologists often recognize that prehistoric occupation by the same name (McEwan 2003; Piana and Marotzke 1997). The clustering that appears to the north of the Buenavista Valley is much less known or discussed in the academic literature and will be referred to hereafter as the North Buenavista occupation (NBv). These

clusterings of lots, particularly the one that takes place near present-day Machalilla, suggest the possibility of more nucleated types of occupations.

In this regard, to explore the Formative settlement more carefully, it is useful not just to examine the distribution of lots across the landscape, but also the density of ceramic material present in each lot. As described in Chapter 2, following the approach proposed by Peterson and Drennan (2005), sherd densities are represented in Figure 3-2 as a surface perspective rendering in which peaks represent areas of high-density ceramics and low, flat areas represent parts of the survey where no ceramics were recovered. Figure 3-2 makes very clear that while Formative lots can be found throughout the study area, the lots around Machalilla have much denser ceramic remains. This suggests that while the Formative inhabitants of the Machalilla National Park often dispersed themselves across the landscape, a large proportion of them also concentrated strongly around this locale.

At this point, it is useful to take into consideration real population numbers. The methodology for absolute demographic reconstructions described in Chapter 2 essentially divides the amount of Formative ceramic material by the number of centuries in each period—30 in the case of the Formative, since it is 3000 years long. This gives us an indication of the average amount of ceramic material produced by Formative populations every century. The amount of people that would have taken to produce that total amount of ceramic material is then extrapolated from the amount of ceramic material discarded by a single-family unit of 5 to 10 people. The absolute numbers that we arrive at, then, are a "snap-shot" of the average population size of the Formative at any given time.

After applying this methodology, one of the things that is most striking is the small size of the total population for this territory. The entire population of these one hundred square

kilometers is likely to have been only between 50 and 100 people at any given time. While Machalilla appears to have been the most prominent locus of occupation, it only has enough ceramic evidence to account for between 25 and 50 people. Since this is a small area with high enough sherd densities to account for about five to ten families, it is reasonable to talk of the Formative occupation of Machalilla as a small hamlet where a few families resided in relative close proximity to each. In two other places, where the clustering of lots occur near Agua Blanca and North Buenavista, ceramic densities are large enough to account for the continued occupation of only two or three families. This suggests that these occupations represent small isolated farmsteads that settled repeatedly around those general areas, but never really formed a nucleated community. In the rest of the study area, ceramic sherd densities are so low that they are likely to indicate non-continuous, more short-lived occupations of single-family farmsteads, probably lasting only a few generations each. We should remember that the area-density index used to arrive at these numbers uses an average of the Formative material left in the landscape per century. As such, it essentially provides an "averaged-out" glimpse of the total Formative occupation at any given point in time. Since the Formative is in reality a long period of 3000 years, which probably increased in population as it progressed, it makes sense to think that during the earlier parts of the period the population was less than this average, and that by the end, it was greater.

Nevertheless, based on these numbers we can note that during Formative times the only area within the study region that shows any evidence for the presence of a nucleated settlement is the prehistoric occupation of Machalilla. Even so, this settlement appears to have been at most a small hamlet of a few families, which lived in closer relative proximity to one another than others in the region. For the remainder of the survey area, the dispersed pattern of occupation, in

conjunction with the very low absolute population numbers for any given locale, reinforce the interpretation that households settled in precisely the same dispersed isolated farmsteads pattern that is present in ethnohistoric and contemporary examples throughout the Intermediate Area.

3.2 SUBSISTENCE

These settlement choices provide valuable glimpses to the fundamental subsistence strategies of the regional population. Based on the demographic reconstructions we can note that the Machalilla settlement is not just the only place where populations came to form a small hamlet, but also where the majority of the population within the study area concentrated.

Certainly, the prime setting of Machalilla in relation to the ocean—with its abundant *r*-type resources—jumps to mind as a potential reason that explains why a large proportion of the regional population would have chosen to settle there. Under the *r*-*k* continuum, *r*-type reproductive strategies are those where biological entities produce large amounts of offspring but invest very little energy in any given one in an effort to increase the chances of as many offspring as possible reaching adulthood and reproductive age. Insects and shellfish are common examples of animals that follow *r*-type reproductive strategies. By contrast, under *k*-type reproductive strategies, animals invest large amounts of energy on a smaller number of offspring that are more biologically complex and require more paternal protection during formative years. Megafuana and large mammals are well-known examples of animals that follow *k*-type reproductive strategies. These traditionally appear in small numbers on the landscape and their habitat range covers large territorial expanses. By contrast, animals that follow *r*-type strategies are usually found in large numbers and can be gathered in more restricted spatial territories (such

as shell fisheries). For this reason, human subsistence strategies that focus on *r*-type resources usually involve low search costs, which not only allow for increased sedentary living but also pressures for more compact and nucleated settlement forms.

In the academic literature, it has long been noted that the exploitation of *r*-type maritime resources allows people to live in closer proximity to one another and results in increased forms of social and communal interaction (Akazawa 1986; Flores et al. 2009; Moseley 1975, 1992; Zvelebi 1986). Maritime resource exploitation also removes the need for families to disperse themselves due to land tenureship. These elements might explain why the ocean front location of Machalilla stands as the only place where people settled more tightly together during the Formative.

It is worth noting that Machalilla is also located adjacent to a small valley where canals drain fresh water during the rainy season and which provides a propitious environment for a moderate amount of seasonal farming endeavors. This is certain to have been in part responsible for making this an attractive locale to Formative populations. Nevertheless, the fact that the only persistent community that appears on the Formative landscape chose to place itself in direct proximity to the ocean, strongly attests to the importance of marine resources during this period.

This is not to say that the regional settlement patterns suggest that agriculture or terrestrial resources were unimportant. The more dispersed inland occupation, where productive emphasis would have been more directly on terrestrial resources, still represents a substantial proportion of the regional population, as much as 40% based on the demographic reconstructions described above. In Figure 3-2 we can also note that it is the areas directly to the north and south of the Buenavista Valley where the highest ceramic densities outside of Machalilla occur. The Buenavista Valley itself, which contains by far the largest level terrains within the survey area as

well as the main seasonal fresh water source, the Buenavista River, is likely to be responsible for the more persistent occupation visible in those areas. Even though it is only during the rainy season when large canals drain enough water towards the ocean to make farming possible, present day settlers do take advantage of their geographic proximity to these resources. As noted above, however, even though these locations do show higher sherd densities than the surrounding hinterland, they are barely large enough to account for a few scattered farmsteads at any given time during the Formative.

All of this suggests that while Formative populations took advantage of the terrestrial resources available to them, often settling inland in a dispersed pattern of occupation, it is a maritime subsistence strategy that appears to be behind the centripetal forces that caused populations to nucleate into what we traditionally refer to as a small local community at that time (Peterson and Drennan 2005).

3.3 SOCIAL STRATIFICATION

Taking into account all the information that has been reconstructed above, we can put into perspective a more coherent picture of the type of society that is represented by the archaeological evidence. The Machalilla occupation stands as the only place within the study area where there is indication of population nucleation. However, since ultimately the sherd density for this locale only accounts for a small hamlet of about five to ten families, it is very unlikely that the forces that brought them together were political in nature. Images of powerful chiefs mobilizing large amounts of labor seem unwarranted when discussing a small hamlet of *caña* bamboo dwellings were kin relations were the most likely realm under which social

stratification might have played itself out. For a society of this size, it is much more likely that a favorable location in terms of subsistence was the prime reason for people choosing to settle continuously and more closely together within this area.

Because of the small nature of this community, It is also unlikely that we might find much evidence of "supra-local" forms of social organization (patterns of interaction which group people into units larger than at the local community level) (Peterson and Drennan 2005). Based on the principles of interaction, Peterson and Drennan (2005) note that a useful way to discern such supra-local forms of social organization is to increasingly smooth the sherd-density perspective renderings like the one in Figure 3-2. This causes the smaller peripheral settlements to group together with the larger, more central ones. The smoothed surfaces make it possible to discern and separate different geographical districts of interaction based on the inherent distributional properties of the settlement itself. Following the approach taken by Peterson and Drennan (2005), Figure 3-3 shows the sherd-density perspective rendering of the Formative Period smoothed by using the *inverse distance* to the powers of 4, 2, 1, .5 and .25. As we can see, Figure 3-3 really does not make it possible to talk about multiple districts of interaction. Machalilla is the only dominant settlement in the landscape; as such, it causes all of the regional occupation to merge with it as the smoothing increases. This supports the basic interpretation that the Formative settlement pattern essentially represents a series of small isolated farmsteads surrounding a single small hamlet, with no real evidence for supra-local forms of social organization.

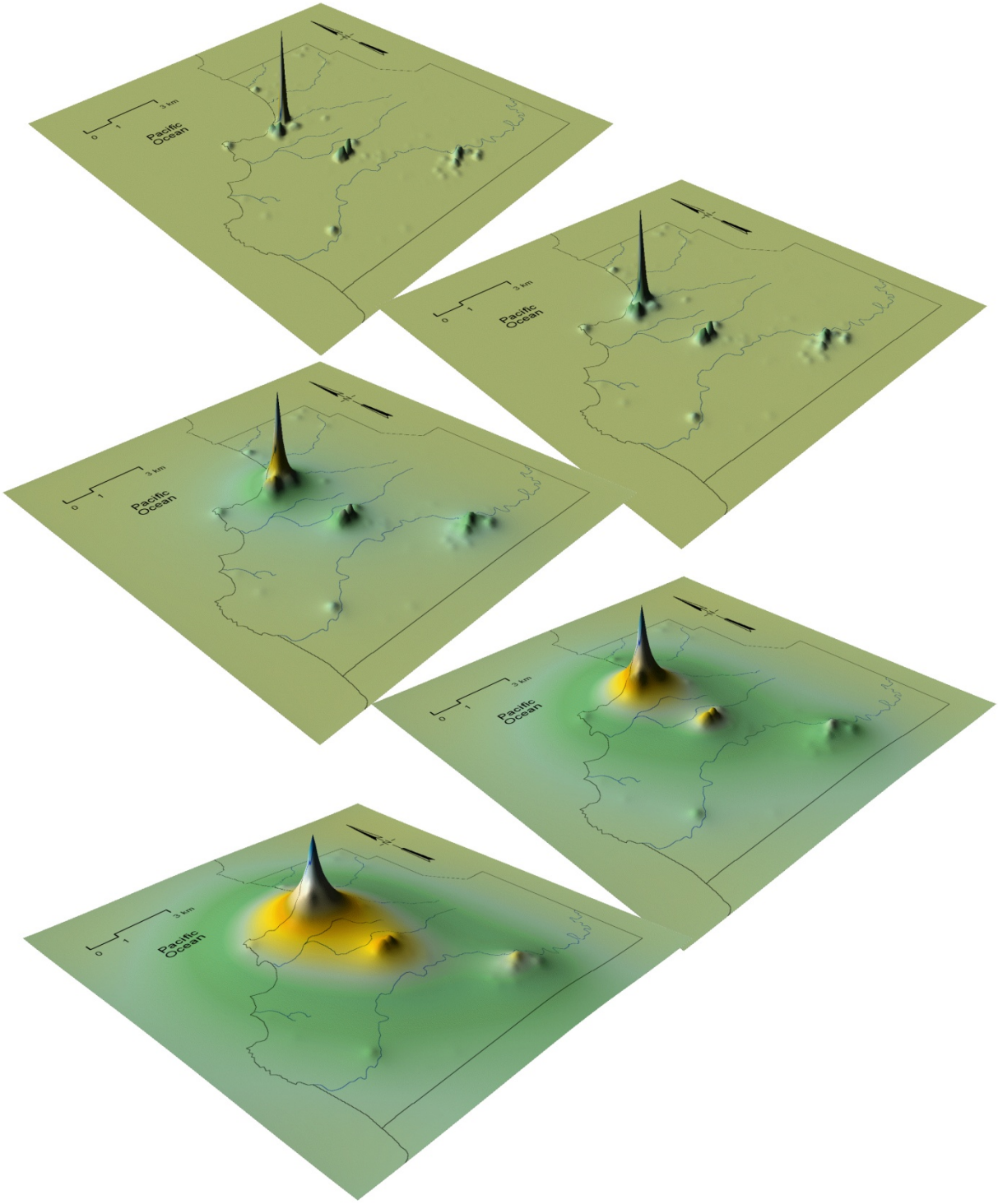


Figure 3-3. Sherd-density perspective rendering of the Formative Period smoothed by using the *inverse distance* to the powers of 4, 2, 1, .5 and .25.

An additional way to understand how the people who settled in Machalilla related to those in the rest of the survey region would be to compare the ceramic assemblages of Machalilla to that of the rest of the study area. Differences in ceramic material might reveal further clues about the basic differences behind these two settlement types; both in terms of the types of activities carried out in them, as well as in the wealth and status differences that those activities might suggest. Unfortunately, the nature of the Formative ceramic assemblage poses problems towards this kind of comparison. As noted in Chapter 2, the recognition of Formative material was based on a paste analysis, which made it difficult to further subdivide this long period into its three constituent phases, Valdivia, Machalilla and Chorrera with a relative degree of certainty. The inherent differences in these ceramic phases, both in terms of style and function, would make it difficult to be certain that any noted discrepancies were the result of real economic or political factors, or simply due to larger or smaller amounts of Formative materials from different phases in one place or another. These kinds of ceramic comparisons are carried out more successfully and with more certainty in Chapters 4 and 5 for the Regional Development Period and the Integration Period respectively. The subsequent two periods comprise much shorter spans of time and more delineated ceramic cultures that can be compared in more meaningful ways.

Nevertheless, the settlement data noted here for the Formative is not ambiguous about the type of society that it represents. We are essentially talking about very small populations with little in the way of evidence for social stratification and where kin relations were the most likely matrix for social organization. At the local level, the minor population nucleation that takes place around Machalilla appears to be fundamentally linked to basic subsistence strategies. At the regional level, low regional population numbers and a simple two-tier settlement pattern (where

Machalilla stands as the only hamlet in the Formative landscape) suggest a further lack of any type of supra-local level of social organization. The increasingly smoothed perspective rendering shown in Figure 3-3, where only a single district of interaction can be discerned, further corroborates this. This type of evidence is fully compatible with simple egalitarian forms of social organization. At most, it might represent what is often referred to in the academic literature as a "big man" society (Sahlins 1963) and authors such as Zeidler (1991) have proposed that this is the most appropriate way to characterize the maximum degree of social stratification attained by Formative Manabí populations.

It is also important to note that for this period there is no significant central Andean evidence for any substantial demand of *Spondylus* objects. At this time, the most notable archaeological evidence of *Spondylus* in present-day Peru are a few fragments from Initial Period sites such as Los Gavilanes, Aspero, La Paloma, La Galgada, and Kotosh. These are fundamentally small ornamental objects appearing sporadically in very minute quantities. A few *Spondylus* fragments also make their appearance in Middle Horizon sites such as Malpaso and Chavín de Hantar, where the shell is also depicted iconographically at the *Tello Obelisk* and the *Smiling God* stela (for a fuller description of these *Spondylus* specimens and their specific quantities see Blower 1995; Carter 2008; Martín 2007; and Shimada 1994). However, by comparison to the massive quantities of *Spondylus* remains that start appearing in large numbers of sites throughout the north coast of Peru at about A.D. 600 (and which sometimes contain thousands of specimens per site), these small sporadic finds fundamentally illustrate the general lack of demand for this resource by Peruvian societies during earlier periods. The distribution of *Spondylus* remains throughout Peru for the Initial Period and the Early Horizon suggests that the few *Spondylus* fragments that did reach the central Andes at this time apparently did so through

the simple uncoordinated *down-the-line* trade of only a small number of specimens (Martín 2007).

Throughout coastal Ecuador, no clear evidence of *Spondylus* shell manufacturing work areas has been unearth yet for Formative contexts (see Carter 2008), although the presence of Formative beads in several coastal Ecuadorian sites of this period does attest to the fact that Formative populations did carry out this industry to at least some degree. Nevertheless, the fundamental lack of any unearthed Formative *Spondylus* work areas to this date appears to show the modest character that this industry had during the Formative Period. As noted in Chapter 5, within the study area, the shell manufacturing evidence also suggests that most production of shell items in coastal Ecuador took place, not during the Ecuadorian Formative (roughly contemporaneous with the Peruvian Initial Period and Middle Horizon), but rather during the much later Integration Period. In this sense, it is interesting to note that sociopolitical development within the study region remained minimal during the long span of time when foreign demand was not present and evidence of this industry is clearly visible in the Ecuadorian coast.

This is not to say that no manufacturing of shell items took place during Formative times. Manufacturing of shell goods for local consumption is sure to have been an activity with immense chronological depth. In this sense, a small manufacturing industry for local exchange might very well have complemented the large array of marine resources that made the Machalilla bay a prime settlement choice. Nevertheless, the lack of sociopolitical development in the area evidences that a small industry for local consumption would not have been a powerful catalyst of sociopolitical development.

4.0 THE REGIONAL DEVELOPMENT PERIOD

4.1 DEMOGRAPHIC PATTERNS

As for the Formative, it is useful to start exploring the settlement distribution of the Regional Development (300 B.C.-A.D. 800) with a visual inspection of the lot dispersal across the landscape (Figure 4-1). A quick glance at the settlement distribution reveals that the fundamental settlement emphasis visible in the previous period continued for the Regional Development. Most notable is the large number of small scattered collection lots that suggest the presence of productive organization where individual family units controlled production independently from one another in a pattern of extensive agriculture (Drennan 1988; Rudolf 1999:44-46; Yépez 2007:616).

What differs somewhat from the Formative, however, is the number of lots visible in the Regional Development occupation. A comparison of Figures 3-1 and 4-1 shows a slight increase in the number of collection lots that contained Regional Development ceramics. This increase in the amount of territory occupied by Regional Development populations is the first suggestion that population numbers increased during this period. It is also noticeable from this comparison that the clustering of lots that appeared around Machalilla during Formative times not only continued for the Regional Development but also became more pronounced. In other words, there are higher numbers of lots clustering more tightly together around that locale. We can also

observe that the slight clustering of lots at Agua Blanca and North Buenavista continue during this period and an additional clustering seems to form to the Northeast corner of the study area where the present-day town of San Isidro, in the small valley of the same name, is located.

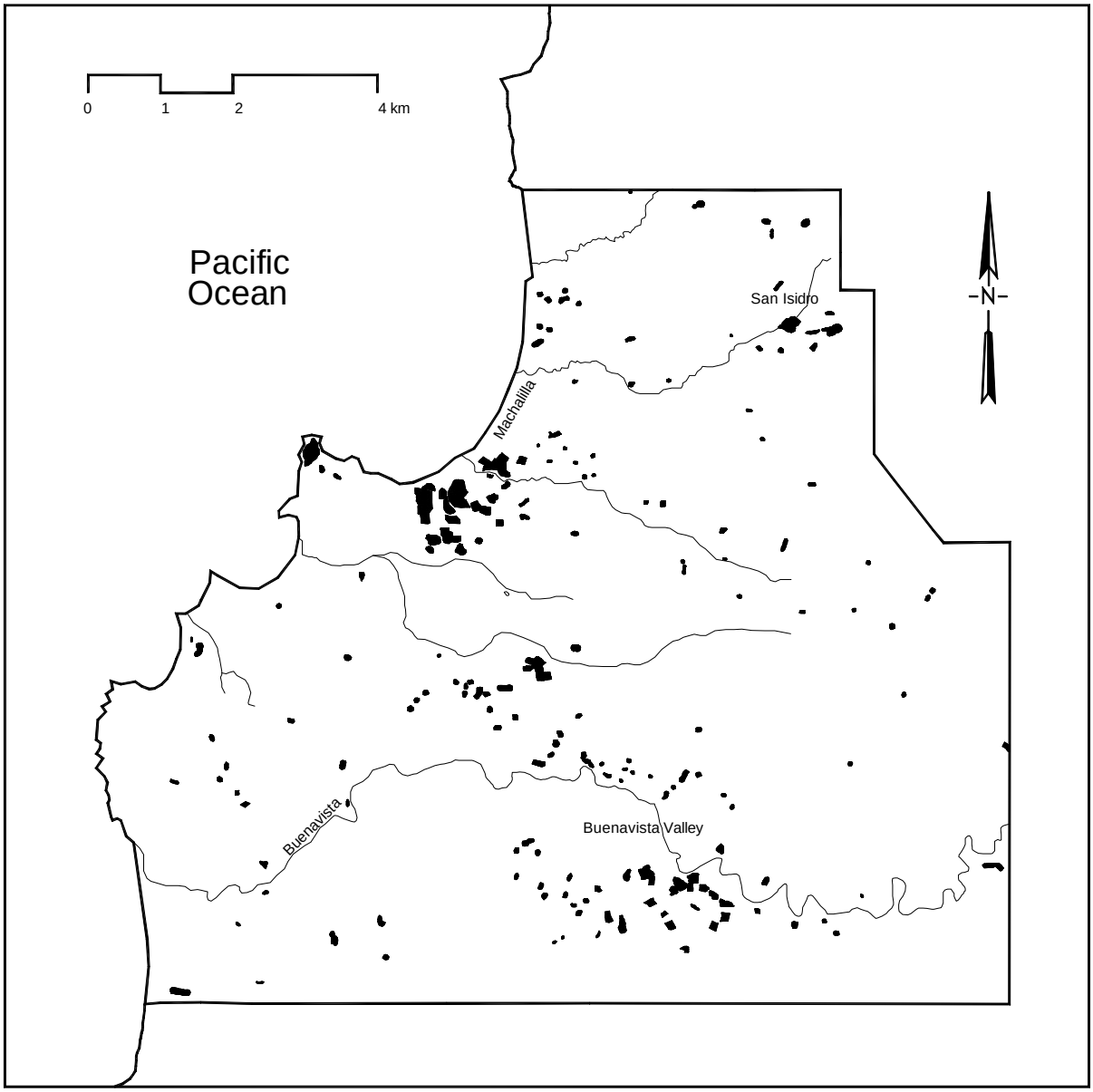


Figure 4-1. Lots within study area where Regional Development Period ceramics were recovered.

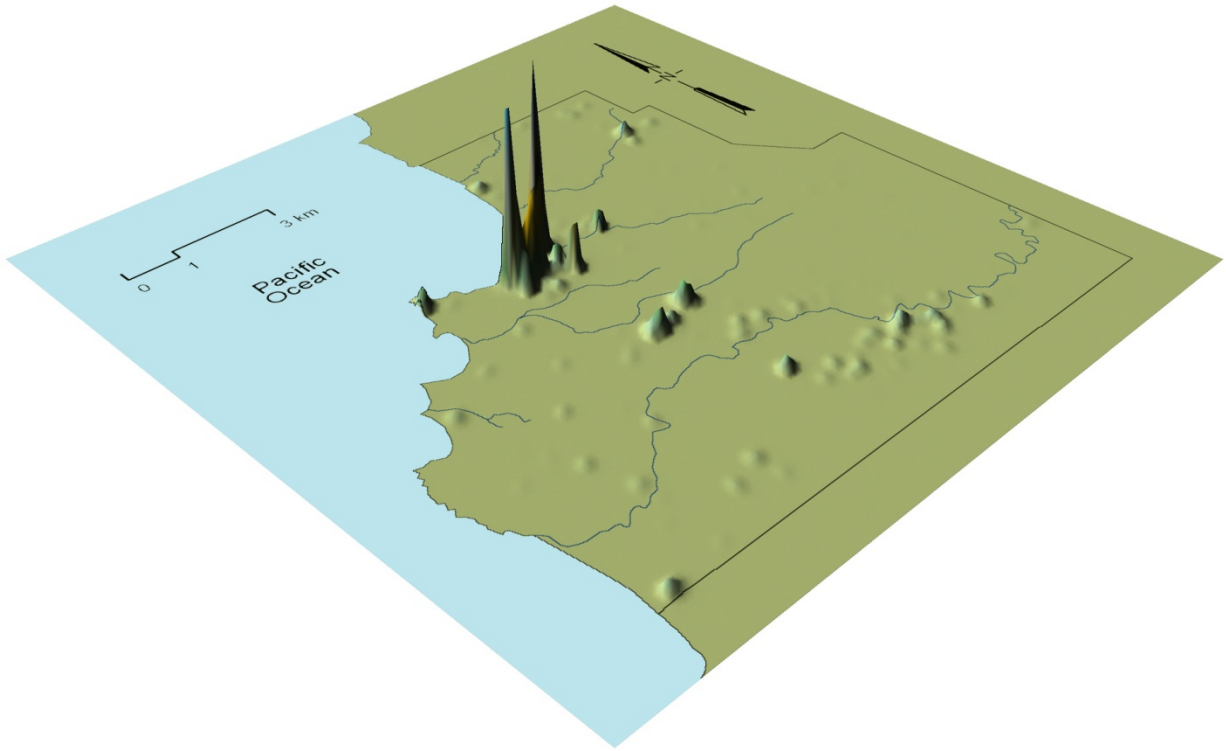


Figure 4-2. Sherd-density perspective rendering of the Regional Development Period. Peaks represent areas of high-density ceramics and flat areas represent parts of the survey where no ceramics were recovered.

In broad terms, it seems that the Regional Development occupation followed the same general pattern that was visible during the Formative, although there is at least some indication of slight population growth. When the sherd densities of these lots are taken into account (Figure 4-2), as was done for the Formative in Chapter 3, the similarity with the preceding period becomes even more apparent. As in the Formative, Machalilla is again the overwhelming locus of occupation concentrating the largest amount of people. Other areas show only modest sherd densities in relation to this oceanfront site.

If we attach real population numbers to this settlement distribution we note that ultimately the entire study area saw only modest population growth during the Regional Development, with total estimates ranging between two to four hundred people for the entire

area. What is interesting about the population distribution, however, is that whatever population increase did take place appeared fundamentally concentrated in Machalilla. During the Regional Development, Machalilla grows to become a burgeoning village of a couple hundred people, or about 30 families. By contrast, the occupations of Agua Blanca and North Buenavista experience marginal growth and continue to show relatively scattered lot dispersals containing barely enough ceramic evidence to account for only two to three families residing within each of those areas at any point in time. The rest of the survey region only sees modest population growth with high enough sherd densities for about a half-dozen isolated farmsteads scattered throughout the study area in different places at any point in time.

The varying regional demographic changes noted through this reconstruction suggest that while the region as a whole did not experience any notable population boom, the changes that took place in Machalilla do appear to have transformed the small hamlet into a qualitatively larger, more nucleated settlement type; which is likely to have experienced increased social interaction as well as more aware sense of community.

4.2 SUBSISTENCE

The changes seen in the settlement patterns of the Regional Development Period provide us with important information about the fundamental subsistence strategies of the regional population. The distribution of lots suggests that the basic settlement emphasis of this period was still founded on the same general principles as the Formative. While a number of households units took advantage of the landscape through the exploitation of terrestrial resources and extensive agriculture, a sizable enclave appears to have exploited the maritime resources that the

Machalilla bay had to offer. The most fundamental difference with the Formative, however, comes from the increased dominance of Machalilla as a settlement choice. While the surrounding hinterland saw only marginal growth, retaining population numbers very similar to those seen during the Formative, the characteristics of Machalilla provided a propitious environment for even greater population nucleation than was seen during the preceding period.

The question that arises, then, is what is it about that particular locale that seemed to not only allow for more population concentration than others in the study area, but also permitted larger population growth relative to the surrounding hinterland? In terms of subsistence, we can mention the same elements already noted for the Formative, namely the prime setting of Machalilla in relation to the ocean, with its derived access to numerous *r*-type resources, as well as the relative proximity of seasonally irrigated valley terrains.

As noted for the Formative, the exploitation of *r*-type resources traditionally involves low search costs, which not only allow for increased sedentary living but also pressures for more compact and nucleated settlement forms. This has long been noted in the academic literature to not only foment an increase of social and communal interaction but also pressure for more complex forms of social organization (Moseley 1975, 1992). More specifically, the concentration of large amounts of nutrients within a small, localized area will encourage populations to group together more compactly and this increased nucleation might pressure the appearance of the managerial political formations necessary to organize larger groups of people living in closer proximity to one another. In this case, the large amounts of maritime resources available to the Machalilla settlers certainly could explain not only why people concentrated there more strongly since Formative times, but also why this is the only area to sustain higher levels of population nucleation and demographic growth.

It should be noted that just as many people as in the Formative—and perhaps even with a modest increase—continued exploiting terrestrial resources during the Regional Development. However, this moderate growth does not compare to the sizable enlargement visible for the Machalilla occupation. Whatever was responsible for the demographic increase of Machalilla, the village became a much more dominant locale in the Regional Development landscape than it ever was on the Formative. Based on the demographic reconstruction noted above, the village might have grown to encapsulate as much as three quarters of the population of the study area. This doesn't so much suggest that the exploitation of terrestrial resources declined, but that the characteristic of Machalilla created much stronger centripetal forces which provided avenues for sustaining larger, more concentrated populations and their subsequent expansion.

It is possible of course that the population increase that Machalilla experienced could be the result of factors not related to its prime access to concentrated resources. The appearance of political elites (whether their power be based on ideological, military, or economic control) is often cited as a potential catalyst for the development social complexity and a resulting increase in population nucleation based on the need of populations to reside in close proximity to these individuals (see for example Blanton et al. 1996; Earle 1997; Vaughn 2006). For this reason, it is important to explore more fully the settlement pattern evidence to clarify the degree of social stratification present during the Regional Development. This would give us an indication of whether or not these populations show evidence of developed forms of social stratification or if they are more concomitant with more egalitarian types of organization.

4.3 SOCIAL STRATIFICATION

From Formative times, Machalilla is the only occupation within the study area in terms of its size and density that may be appropriately called a small local community (Peterson and Drennan 2005). For the Regional Development specifically, this community surely reached a sufficiently large demographic threshold (about 30 families) where we might suspect the appearance of at least some degree of social stratification. A couple of hundred people is a large enough local community where day-to-day interaction might require at least a modest amount of hierarchical stratification or political control. Nevertheless, this demographic scale still does not conform readily to the type of local community were one should pre-assume the presence of powerful chiefs whose political power (whatever it is based on) was the engine that pressured populations to nucleated into denser communities.

If we examine how this community integrated itself with the surrounding hinterland, we discover a fairly straightforward two-tier settlement hierarchy consisting of a series of small, scattered farmsteads surrounding a single relatively large village. In terms of evidence for social organization based on interaction spheres larger than the local community, the settlement pattern also shows an apparent lack of "supra-local" organization. Figure 4-3 shows a sherd-density perspective rendering of the Regional Development Period smoothed by using the *inverse distance* to the powers of 4, 2, 1, .5 and .25. As described in Chapter 3, increasingly smoothing the distribution of ceramic sherd densities causes smaller occupations to merge with larger, more central settlements. Based on the principles of interaction, Peterson and Drennan (2005) have noted that this type of smoothed settlement aggregation makes it possible to discern the various districts of interaction present in the landscape. Figure 4-3 shows that in the Regional Development landscape there is no evidence of multiple districts of interaction or other more

complex forms of settlement organization. Rather, a simple settlement hierarchy causes all of the regional occupation to merge with Machalilla as the smoothing increases. The settlement evidence, then, really does not provide support for any form of integration that organized people into supra-local patterns larger than those based around the village or local community.

An additional way to explore the degree of social stratification within the study region is to determine if there are discernable status differences amongst the different settlements. In particular, if the Machalilla occupation shows more evidence of higher status it might signal the presence of elite individuals or more wealth concentration. By contrast, homogeneous artifact evidence in terms of status would indicate that the populations were not highly stratified and that the patterns of nucleation that formed around Machalilla might not have been related to the presence of political elites who differentiated themselves from the rest of the populace.

Comparisons of ceramic assemblages are commonly used to explore these potential status differences. This has traditionally been done along two main axes, evidence of fancier ceramics and evidence of more feasting. The idea that fancier ceramics might indicate the presence of higher status individuals is based on the assumption that, all things being equal, elaborate ceramics require more labor and are thus more socially "expensive" to produce than cruder ones. On the other hand, ceramic evidence of feasting (traditionally measured by the amounts of serving ware present within an assemblage) is often used to indicate the presence of surplus production, and by extension wealth concentration (see for example Boada 2007; Taylor 2009).

In order to carry out a comparison of the ceramic evidence of Machalilla to the rest of the study area, I separated the collection lots belonging to that community following the approach taken by Peterson and Drennan (2005). They propose that in order to distinguish the boundaries of local communities it is useful to choose a particular topographic contour line from the

unsmoothed sherd-density perspective renderings (Figure 4-2) that encapsulates the sherd-density peak used to define that community. Based on this approach, Figure 4-4 shows the delimitations of the Machalilla settlement for the Regional Development as well as the lots that fall within its boundary. The lots within these limits were grouped together to arrive at the proportions of different ceramic types for the Machalilla settlement as a whole. The rest of the lots were then added to come up with proportional averages for the isolated rural farmstead occupation. Error ranges for these proportions were calculated using a cluster sampling formula (Drennan 1996:247-51).

The comparison of the Machalilla average to that of the isolated farmsteads is particularly useful because the farmstead occupation is likely to represent scattered single-family dwellings more detached from the economic and political forces that might have caused populations to nucleate. In this sense, it serves as a useful baseline against which to compare the assemblages of more complex settlement types since the rural occupation likely represents basic domestic units subsistence assemblages without many elements that result form the intervention of a political economy.

Figures 4-5 and 4-6 use two different criteria to measure the proportion of fancy ceramics for both Machalilla and the scattered rural farmstead occupation. Figures 4-5 shows the proportion of finely made sherds (fine ware) to total sherd count. While isolated rural farmsteads average about 31% finely made sherds in their assemblage, Machalilla averages 45%. Figure 4-6, on the other hand, shows the proportion of highly polished and shined sherds to total sherd count. Again, while isolated rural settlements have an average of 9% highly polished sherds, Machalilla has an average of 16%. As we can see, both show that Machalilla has somewhat higher proportions of fancier ceramics than the isolated rural farmstead occupation. The error ranges in

Figures 4-5 and 4-6 show that because the sample of Regional Development ceramics is small we can only be moderately confident of the differences in proportions observed.

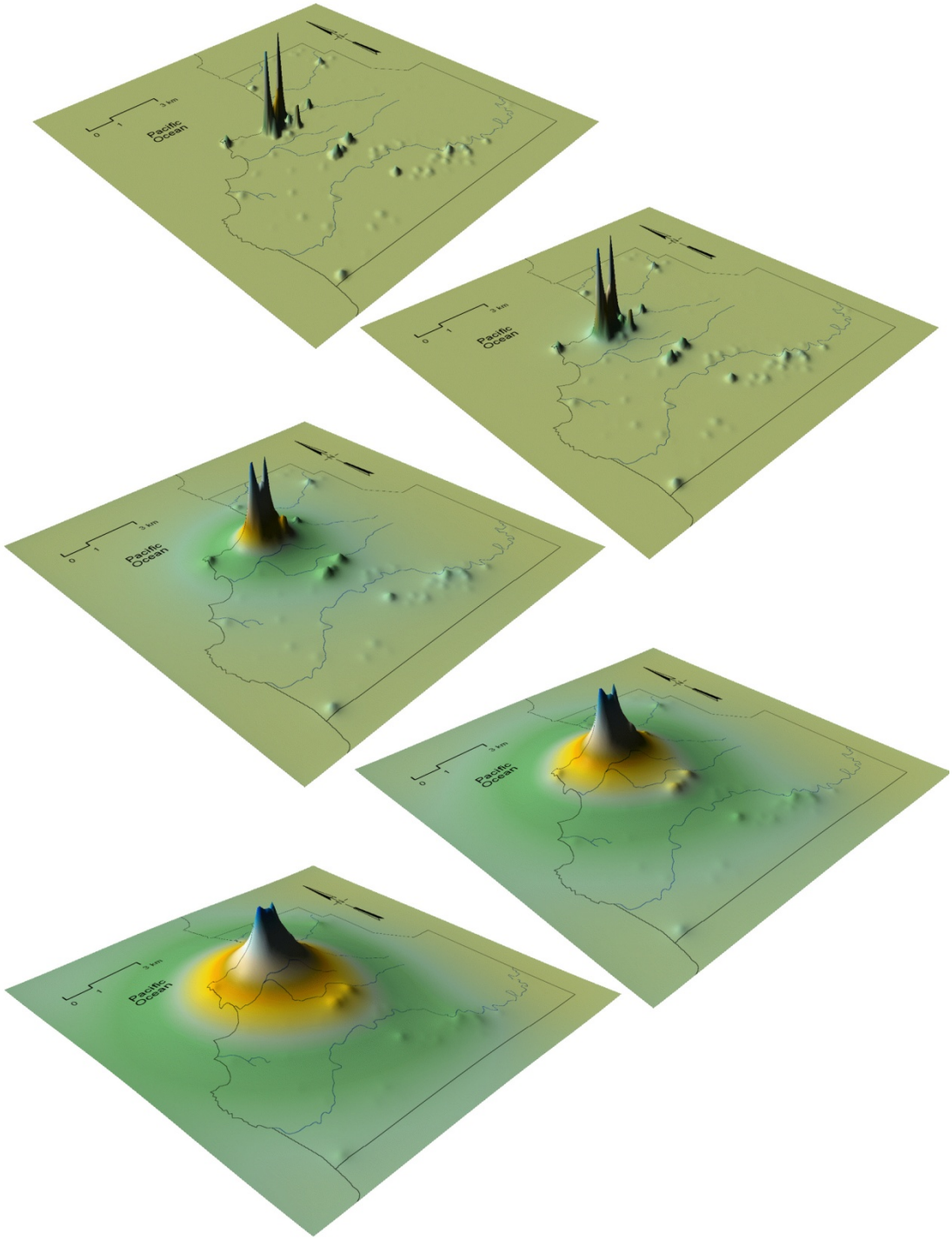


Figure 4-3. Sherd-density perspective rendering of the Regional Development Period smoothed by using the inverse distance to the powers of 4, 2, 1, .5 and .25.

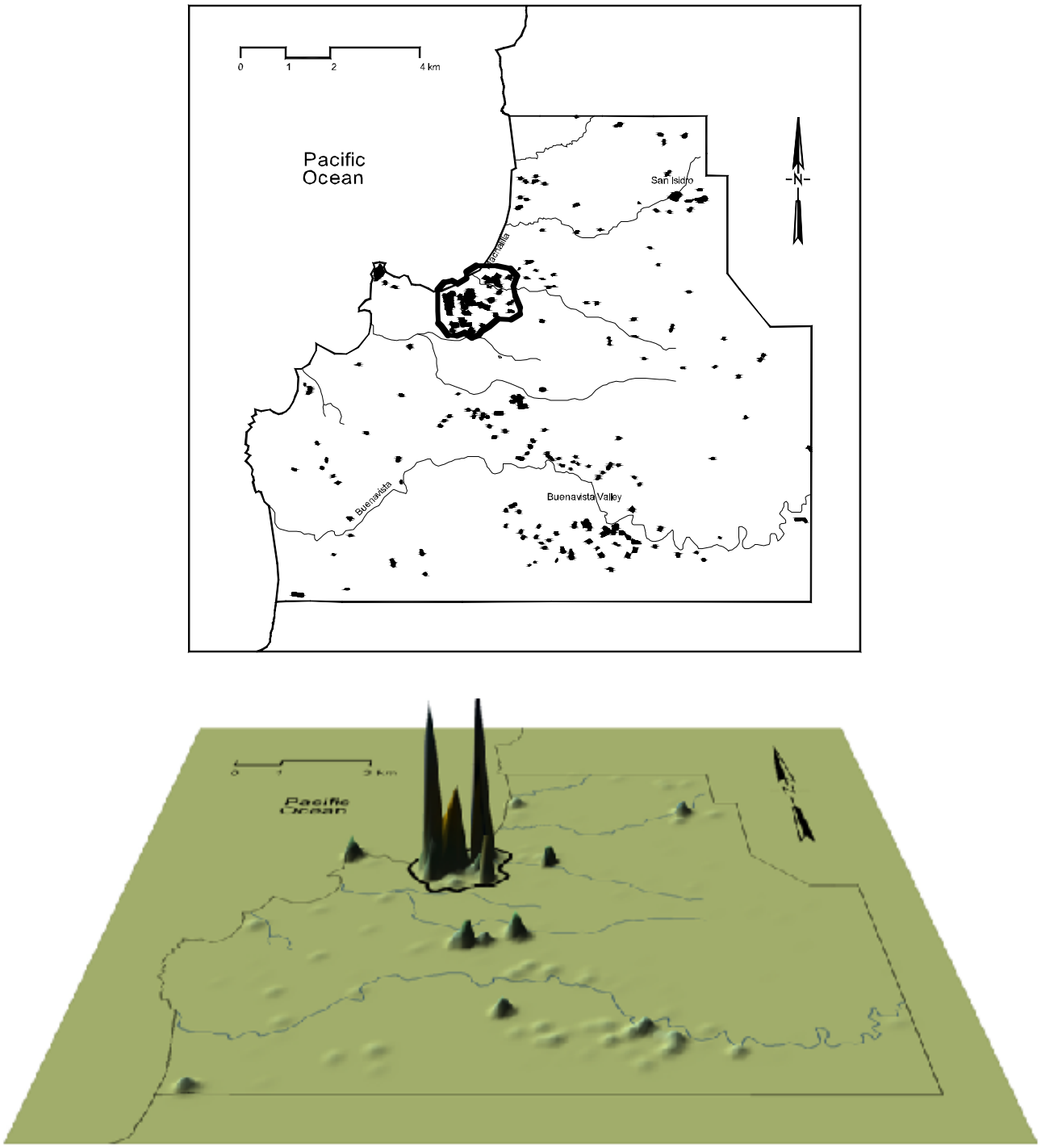


Figure 4-4. Delimitations of the Machalilla community for the Regional Development Period as well as the lots that fall within its boundary.

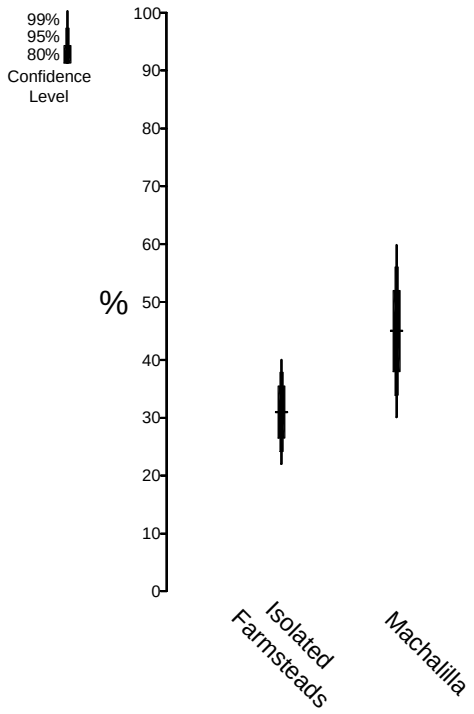


Figure 4-5. Proportion of "fine ware" sherds within total sherd count (Regional Development Period).

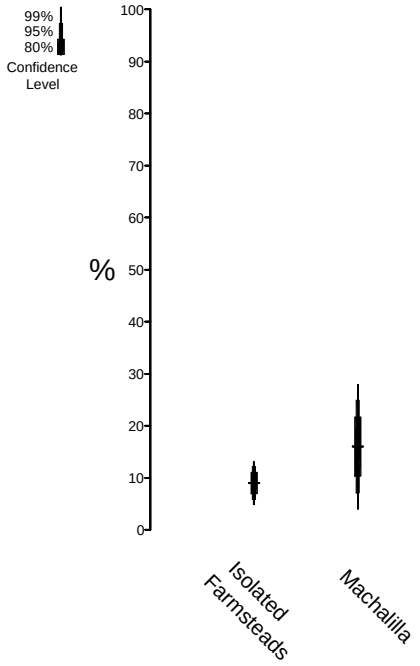


Figure 4-6. Proportion of highly polished sherds within total sherd count (Regional Development Period).

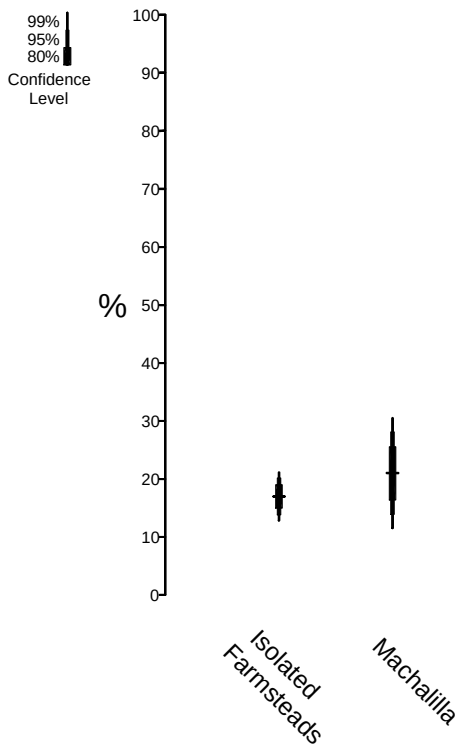


Figure 4-7. Proportion of "serving ware" sherds within total sherd count (Regional Development Period).

In the case of surplus, Figure 4-7 shows the proportion of serving ware (which includes *compotera* saucer plates, rough plates, and bowls) within the total ceramic assemblage. Again, a similar pattern emerges, a total of 21% of the sherds recovered from Machalilla were recognized as used for serving and only 17% of the isolated farmsteads sherds fit this category (although the large error ranges indicate that we can only be somewhat confident of this assertion).

Both of these criteria suggest that the Machalilla occupation contains moderate evidence for the presence of higher status individuals than the isolated rural farmsteads based on access to elaborate ceramics and at least marginal evidence of higher surpluses. This supports the interpretation that at least a modest type of social stratification was present within the study area during the Regional Development.

However, it is important to distinguish between forms of hierarchical stratification where status differences are institutionalized from birth (often referred to as societies with "ascribed" status) and less hierarchical societies where status need to be "acquired" during an individuals lifetime from a basically egalitarian social matrix (also called "big man" societies) (Fried 1967). This distinction is important because under big man scenarios, the level of political control of an elite individual is so low that the big man must essentially work at a loss in order to exert any type of social or political coercion. By contrast, scenarios where the elite position is an established institution that exists beyond the lifetime of any given person permit considerably greater amounts of social coercion to be wielded since power has become institutionalized. Because of this, it is the latter of these two that is often associated with the types of strong social coercion that would cause population nucleation.

In this sense, the evidence reconstructed above indicates very marginal levels of social complexity for the entire region both in terms of small absolute demographic numbers and a simple two-tier settlement hierarchy. The only local community that appears on the landscape is a small village located in precisely the same area where people concentrated more persistently during Formative times for subsistence reasons. While this settlement does grow, the overall regional settlement pattern does not become qualitatively different and retains an overall lack of evidence for any supra-local forms of organization. Even though ceramic comparisons suggest that by the Regional Development times Machalilla did possess at least some degree of social differentiation, there is no other evidence in the settlement pattern that would suggest institutionalized forms of leadership. Under this scenario, still the most likely explanation for the persistent and increased demographic emphasis of the Machalilla settlement is its prime proximity to the ocean and its derived resources. It is perfectly reasonable to expect that this

increased nucleation would be coupled with the appearance of some level of status differentiation for its inhabitants, but it is unlikely that in a local society this small such differentiation would have been very pronounced or institutionalized.

As noted in the preceding chapter, the manufacture of shell items for local consumption is an industry that is sure to have existed and is likely to have had vast chronological depth. However, starting at around A.D. 600 (roughly two centuries before the end of Regional Development) changes in the ritual complex of Moche V society began demanding the use of *Spondylus* paraphernalia in considerably larger quantities than had ever been seen before, and which continued until European arrival (Martín 2007; Taylor 2009; Shimada 1994). The bulk of this traffic took place during the early and middle Ecuadorian Integration Period (A.D. 800-1300) as succeeding north coast Peruvian states (such as Sicán and Chimú) consumed these resources in ever increasing quantities (Carter 2008).

During most of the Regional Development period, however, localized excavations on the coast of Ecuador have not provided much evidence for shell manufacturing (Carter 2008:137-40). The one notable exception for this period is the Guangala sites of the El Azúcar Valley dating to A.D. 100-650 and located in present day Guayas Province (Masucci 1995; Reitz and Masucci 2004). Horizontal excavations at El Azúcar have revealed a small shell bead manufacturing industry that was carried out within the domestic unit as part of a secondary subsistence strategy which helped supplemented agricultural endeavors (Reitz and Masucci 2004; Martín 2009; Masucci 1995). Carter (2008:137,152) has noted that El Azúcar currently stands as the only locale with clear evidence of shell manufacturing within the Ecuadorian coast during the Regional Development. To this evidence we should also add the Bahía occupation of the Río Chico site (Clark 2001; Harris et al. 2004; Martínez 2001), which based on its high

proportion of discarded *Spondylus* cores has been identified as an exotic shell bulking station for the early stages of craft production. Based on the heterogeneous faunal assemblages, both of these sites have been recognized as low-intensity work areas where families worked at craft production on a part-time basis alongside other subsistence pursuits (Harris et al. 2004; Martín 2009; Masucci 1995).

While we cannot be precisely sure where the items manufactured at these locales ended up, it is not likely that the assemblages of these sites represent shell manufacture for long distance trade. While Carter (2008:138) does note that some of the manufactured beads roughly correspond in shape and size to the types used in Moche pectorals, most of the beads produced at "El Azúcar were large and white whereas the beads from Sipán…tend to be much smaller and include numerous ROP [Red Orange and Purple] beads" (Carter 2008:512). For this reason, he proposes that it is not likely that the production that took place at El Azúcar was driven by foreign demand and argues that a place responsible for the production of the North Peruvian *Spondylus* objects is still notably absent in the archaeological record of Regional Development coastal Ecuador. Considering that prehistoric Ecuadorian populations had been using *Spondylus* objects in their local assemblages for a vast expanse of time, it is much more likely that the marginal evidence of Ecuadorian shell working present for the Regional Development represents production for local consumption. We should also note that the shell production evidence within the study area, discussed in more detail in Chapter 5, indicates that most of the shell working activity in the study region is associated with the succeeding Integration Period, when the bulk of Peruvian consumption took place.

In this sense, the relatively marginal evidence for shell manufacturing during the Regional Development, in conjunction with the general lack of any substantial degree of social

stratification within the study area suggests that whatever industry of shell manufacture did exist during this period was not a powerful catalyst of sociopolitical complexity; either because it was for a small quantity of local consumers or because Peruvian consumption was still at its infancy.

For this period, the evidence of social development for the populations of the study area support a scenario where the appearance and moderate increase of demographic nucleation was fundamentally based on the exploitation of maritime resources. This subsistence strategy is surely to have been complemented by an array of other activities, which would have included supplemental exploitation of terrestrial resources (Harris et al. 2004) as well as the production of the sumptuary goods necessary for local cultural reproduction. The appearance of a qualitatively different type of consumer would not be clearly visible in the archaeological record until the subsequent Integration Period, when the ethnographically known Manteño league of merchants would connect the large consumer states of the central Andes to the producer populations of southern Manabí.

5.0 THE INTEGRATION PERIOD

5.1 DEMOGRAPHIC PATTERNS

The Integration Period (A.D. 800-1532) marks a radical departure from the preceding two periods both in terms of the intensity of occupation as well as in the general layout of the settlement. Where the preceding periods showed a continuation of the same demographic distribution based on subsistence emphasis, with little to no evidence of political complexity, the Integration settlement shows a drastic demographic boom with an associated increase in evidence for social and political stratification.

Figure 5-1 shows the Integration lot dispersal and makes evident not only the general increase in the number of lots that cover the landscape, but also the clear clusterings that take place in the areas of Machalilla and Agua Blanca. By this period, Machalilla has become so intensely occupied that Integration ceramics are dispersed in continuous surface scatter for an area of over 100 hectares—considerably over this amount if we consider that the artifact scatter continues well into present day Machalilla town, which was not included in the survey due to the modern occupation. If we take into account the sherd densities for the entire study area (Figure 5-2), we can see that Machalilla retains its clear position as the main locus of occupation, although we can note in passing that for this period the Agua Blanca occupation has grown

considerably and Machalilla has stopped being the only locale where large groups of people resided in close proximity to one another.

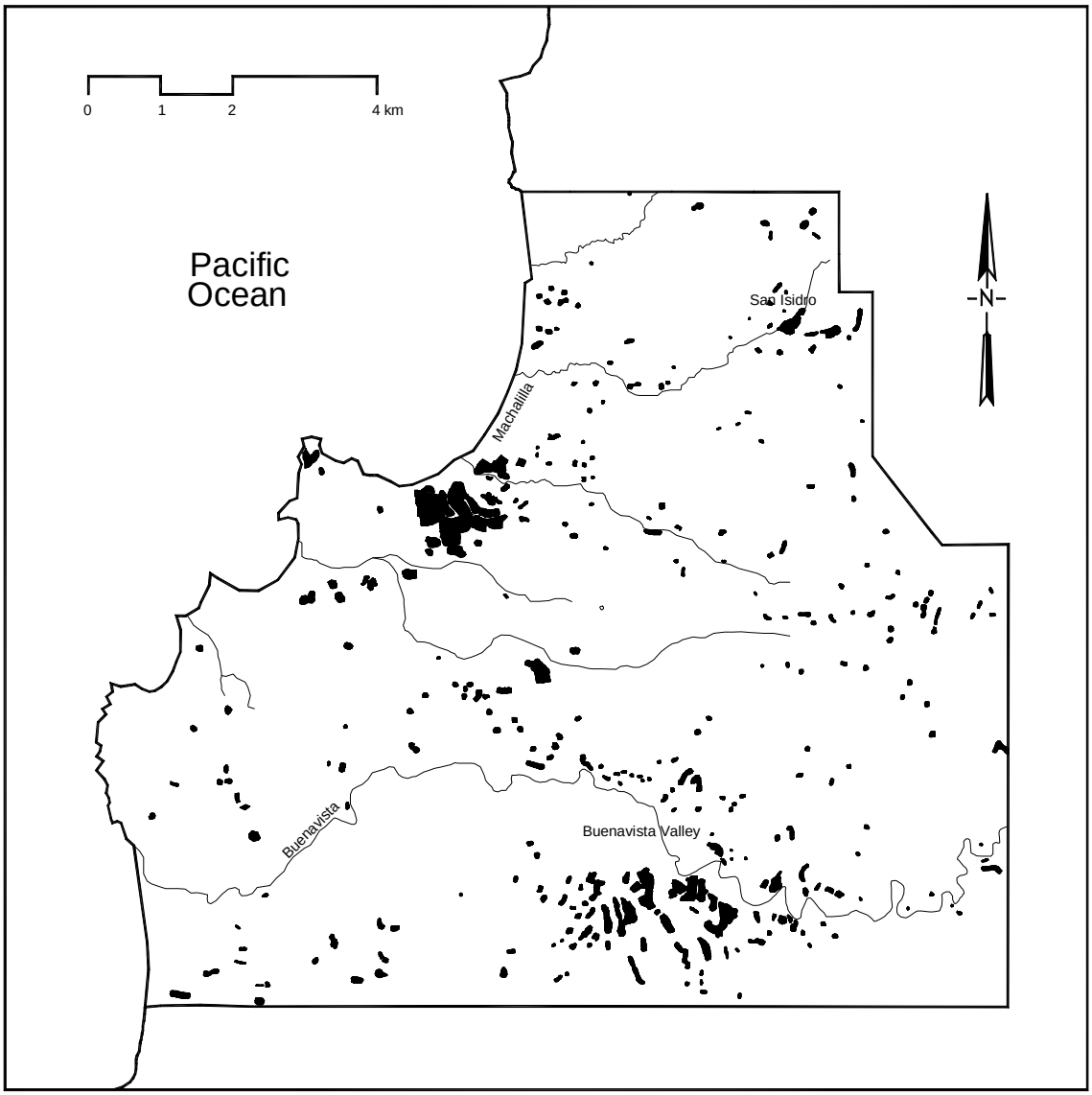


Figure 5-1. Lots within study area where Integration Period ceramics were recovered.

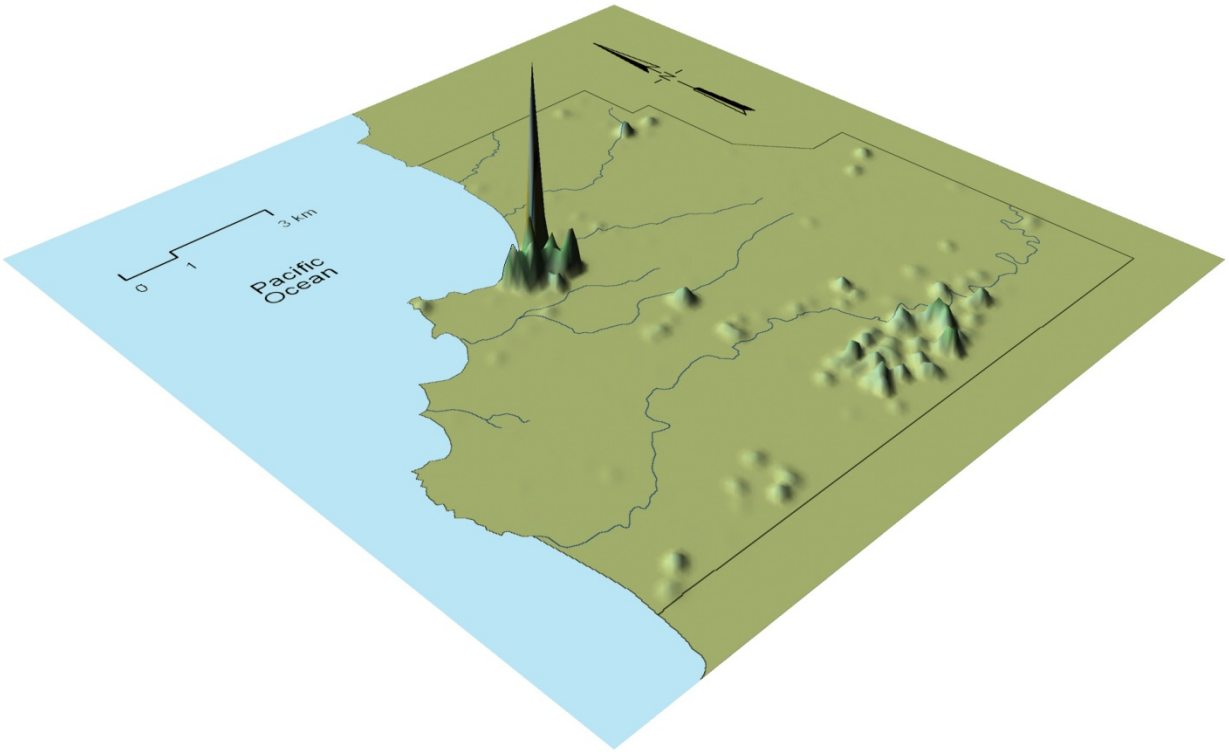


Figure 5-2. Sherd-density perspective rendering of the Integration Period. Peaks represent areas of high-density ceramics and flat areas represent parts of the survey where no ceramics were recovered.

Based on absolute demographic reconstructions, Machalilla contains enough ceramic evidence to account for between 1700 and 3500 people, or around 350 families. Because of these population numbers and their restricted dispersal, it is easy to define Machalilla as a good-sized local community (as described by Peterson and Drennan 2005), although it is not very densely packed as communities of this size go—every hectare contained about three or four families. This would mean that each domestic unit would have had access to only about a third or a fourth of a hectare within the residential zone itself. While this is not an exceedingly high density by prehistoric standards (see for comparison Dillehey 2007:304-5; Drennan 2006; Haller 2004:118; Murillo 2009; Peterson 2006), it is the highest occupational density seen up to this time in the

study area. This degree of occupation dispersion still leaves enough territory between houses for garden plots, and Machalilla's inhabitants presumably cultivated land in the area around the settlement as well. However, there were clearly centripetal forces of some kind that now drew larger numbers of households together into a large local community.

In contrast, while clearly representing the second largest grouping of people within the study area, the Agua Blanca occupation shows a very different picture in terms of settlement structure. Occupation on the Buenavista Valley is fundamentally restricted to the low elevation foothills (*lengüetas)* that flank the river plain (McEwan 2003; Piana and Marotzke 1997). According to the absolute population reconstructions, somewhere between 900 and 1800 people resided in the southern foothills of the valley. As noted in Chapter 2, these *lengüetas* usually rise only about a couple of meters above the flood plain and provide excellent natural platforms that keep domestic structures above the damaging inundations associated with the rainy season and cyclical ENSO events. Today, though largely restricted by the oversight of the national park, moderate seasonal farming may be found in both the flood plain and the *lengüetas*. On the other hand, domestic structures are never erected in the flood plain since seasonal inundations make the placing of permanent living structures hazardous as well as impractical. Likewise, not a single prehistoric occupation has been recorded for the flood plain by either this or past surveys in the region (McEwan 2003; Piana and Marotzke 1997). In contrast, virtually all the *lengüetas* to the south of the Buenavista Valley are covered with Integration Period ceramics. In this sense, while this occupation does not appear in Figure 5-1 as a single continuous surface scatter, settlers did take advantage of essentially all available living space where permanent structures could be built along a large area of about 280 hectares. It is this collective grouping of adjacent, although

not technically contiguous, artifact scatters that is commonly referred to as the Agua Blanca archaeological complex.

Figure 5-2 shows that the Agua Blanca occupation covered a wider territorial extent but was less dense at any given locale than Machalilla. Stated another way, while the Agua Blanca settlers covered more territory than those of Machalilla, there were fewer of them per hectare than in the ocean front settlement. Taking into account the demographic reconstructions, if about 180 families resided through an area of 280 hectares, it would mean that, on average, each family would have had access to about one and a half hectares each, or about four to five times more territory in between them than the families of Machalilla had.

Since the Agua Blanca occupation is so extensive in terms of its layout—covering about two to three kilometers from east to west—it seems too large to call a single local community. It is unlikely that, at such long distances, all Agua Blanca settlers would have been in daily face-to-face interaction with one another. At the same time, Figure 5-2 does show that people chose to congregate around this location more densely than they did in other areas of the study region (with the exception of Machalilla). The relatively contiguous occupation meant that households in this area would have been in much closer proximity to their neighbors than other households in the study region—again, not including Machalilla. While it is unlikely that the entire occupation was in daily face-to-face interaction with one another, the higher occupation densities for this area do suggest more interaction between immediate neighbors, and perhaps some associated sense of social cohesiveness. Furthermore, the settlement layout of this occupation, which restricts itself to this particular group of *lengüetas* to the south of the Buenavista Valley, appears visually to represent a distinct settlement type not present elsewhere in the study region (see Figure 5-2).

Two other areas in the study region show large enough populations concentrated in small enough areas to single out: North Buenavista and San Isidro, although both of these have substantially smaller populations and areal extents than either Machalilla or Agua Blanca. For North Buenavista, there is enough ceramic material to account for only between 80 and 160 people living in an area of about 20 hectares. San Isidro's population is slightly lower, with between 70 and 140 people in an area of about 15 hectares. These settlements can be considered small dispersed villages, with about one family per hectare. In addition to Machalilla, Agua Blanca, North Buenavista, and San Isidro, around 60 families (between 300 and 600 people) lived scattered throughout the study region in dispersed farmsteads.

The regional picture, then, shows that all areas appear to have experienced considerable population growth during the Integration Period, with total demographic estimates reaching between 3000 and 6000 people for the entire survey area. The increased packing of the landscape, the appearance of new communities at North Buenavista and San Isidro, as well as the more intense occupation of the foothills of Agua Blanca are all developments associated with this regional population growth. In this regard, we should note that even though by this period other communities do increase in size, Machalilla continues to be the overwhelmingly largest demographic center, capturing over half of the total regional population. Even though the number of people living in this community increased radically from the preceding period, they did not disperse themselves across large areas like the settlers of Agua Blanca did. Machalilla clearly exerted stronger centripetal forces drawing larger numbers of households closer together than occurred elsewhere in the survey area.

5.2 SUBSISTENCE

The settlement distribution of the Integration Period attests to the growing importance of terrestrial resources through a visible increase in inland settlements (Figure 5-2). The more intense occupation of the Agua Blanca foothills—in prime location with regard to the seasonally irrigated Buenavista Valley—is largely responsible for this shift, but the appearance of new inland communities at North Buenavista and San Isidro is also a notable change in the landscape. San Isidro, specifically, is located in a small valley that receives seasonal fresh water as channels drain precipitation from then nearby mountains and permit a modest amount of farming endeavors. The number of families in scattered farmsteads also increases by as much as a factor of ten. Many more people than ever before seem to have based their settlement choices on inland subsistence strategies.

Even though inland settlement emphasis increased substantially, it paled in comparison to the vigorous growth experienced by the ocean front locale of Machalilla. The large population of this settlement—in the range of 1700 to 3500 people—not only places it at the clear top of the settlement hierarchy within the study area, but also makes it a fairly large local community. At the regional level, Machalilla dominated the landscape to such a degree that based on demographic reconstructions it captured over 55% of the total population for the study area. By contrast, Agua Blanca—with only between 900 and 1800 people—held less than 30%. The other two inland communities, San Isidro and North Buenavista, appear as marginal settlements within the settlement hierarchy with only about 2 and 3% of the total regional population respectively. Finally, fewer than 10% of the families in the study region lived in scattered farmsteads. The combined populations of all inland settlements are still smaller than the number of people who chose to live at Machalilla in direct proximity to the Pacific Ocean.

As noted above, at Machalilla each family would have had sufficient space for household gardens. Furthermore, Machalilla is located in conveniently close proximity to seasonally well-watered areas that permit a moderate amount of farming a few months out of the year. However, as stated above, most of the year the study area receives little precipitation and, today, the erratic timing and short life of the rainy season do not provide a highly propitious environment for persistent or large scale farming endeavors. For this reason, most modern residents of Machalilla base their livelihood on fishing (Bauer 2007). For the Integration Period, the fact that the most populous community to emerge within the study region situated itself in direct relation to the ocean is strong supporting evidence that marine resources where a critical component influencing settlement choice.

By contrast, Agua Blanca is much more sparsely settled, with every family having access to, on average, one and a half hectares, a number much more suggestive of agricultural endeavors organized around individual land tenure. Considering that these foothills are located precisely where the largest seasonally well-watered lands within the study area are found—the Buenavista Valley floor—it seems likely that, in the Agua Blanca occupation, each family lived on the plot of land they farmed. This location, then, was probably more densely occupied than other inland areas of the study region (as seen in Figure 5-2) because it offers the best setting for (non-maritime) productive strategies within the survey zone.

The picture that emerges is one in which, while the proportional importance of inland subsistence strategies grew somewhat, it was the maritime settlement of Machalilla that headed regional population growth by attracting large numbers of people into a denser pattern of settlement. It is natural to expect that as overall regional population numbers increased, people would have spread out and taken advantage of other resources in the study area outside of

Machalilla. The increase settlement emphasis on inland locations—and especially in the foothills of Agua Blanca—can be understood as a natural outgrowth of increased regional population numbers caused by the demographic expansion of Machalilla. In the preceding two periods, the more pronounced population nucleation at this location could be explained in terms of subsistence strategies based on the acquisition of *r*-type resources, which allow for more nucleated settlement forms. However, this explanation seems insufficient to explain the substantial increase in this community's population since relatively low and stable population numbers had been maintained for over four thousand years, throughout which *r*-type resources were always available.

What is different for the Integration Period, is both the appearance on the north Peruvian coast of large states that created demand for exotic shell items and ample evidence within the study area for the manufacture of such items. This surge in external demand appears at the right moment in time to have played an important role in the changes seen in the settlement pattern of this period. To explore these possibilities more fully, the next sections investigate Integration Period evidence for political stratification and for the organization of craft production within the Machalilla National Park.

5.3 SOCIAL STRATIFICATION

Ethnohistoric sources at the time of European arrival attest to a substantial degree of social stratification for southern Manabí. The political structure of the study area is described as a single political entity called Çalangome united under a single lord that controlled four large settlements, Çalangome town, Çalango, Tuzco and Seracapez (Pizarro 1527, 1571). As noted in

Chapter 1, these four settlements have been tentatively identified as present day Agua Blanca, Salango, Machalilla, and López Viejo (Silva 1984). This would suggest that the settlement landscape of the study region (which includes two of the aforementioned towns) formed part of a larger political unit, at least by European arrival. The radical changes seen in the settlement patterns of the study area for the Integration Period seem to corroborate this scenario. Settlement evidence for this period shows noticeably more complex forms of regional organization, more pronounced functional and status differences amongst settlements, and increased evidence for political hierarchy. Taking into account the fact that the archaeological evidence of the preceding two periods showed a notable absence of social differentiation and political stratification, it would seem that the level of political complexity witnessed by arriving Europeans in A.D. 1532 developed quite rapidly (sometime during the 700 or so years that the Integration Period lasted).

At the local level, the drastic increase in demographic numbers within the Machalilla and Agua Blanca occupations are the first indication of social changes during the Integration Period. For the Machalilla community, a couple of thousand people living within an area of about one hundred hectares would be expected to create at least some degree of social friction that could require the development of mechanisms to permit smoother social articulation (Service 1962). For Agua Blanca, the relatively dispersed population pattern might have made social interaction less intense and generally require less political integration. Nevertheless, substantial amounts of complex architectural remains attest to the presence of political institutions within this settlement. The Agua Blanca archaeological complex is perhaps best known for its prehistoric surface structures called *corrales,* which consist of a stone wall-foundation (similar to cattle "corrals") over which walls of *caña*, *bahareque* and plaster stood under thatched roofs. Many of these have been identified as domestic structures but several communal houses have also been

identified (McEwan 2003). The most notable of these communal structures are located in what today is called the "ceremonial center," which is an area of roughly 40 hectares to the south of the present day Agua Blanca town. This area not only contains more than 28 separate structures, but also houses the most architecturally complex *corrales* of the National Park. One of these is a large structure of roughly 50 x 15 meters that contains in situ remains of nine intricately carved stone "seats of power." Since chairs of this type can be found throughout the valley, McEwan (2003) has suggested that they were used by the elites of distinct corporate groups as part of sun ritual ceremonies.

It is unclear precisely what was the relationship of these communal structures to the political makeup of Manteño society. As mentioned above, ethnohistoric sources do note that by European arrival the populations of the study area were unified under a single ruler. For this reason the architecture of the ceremonial center has often been interpreted to be elite structures for high prestige individuals from throughout the chiefdom, including areas outside of our study region (McEwan 2003). It is also possible that these communal structures answered to political dynamics that were more restricted to the Agua Blanca occupation. What is more certain, however, is that these types of high labor investment structures, along with their methodically carved seats of power, have not been identified for earlier periods. This suggests at least some degree of change in the political institutions that the general population was willing (or forced) to support.

At the supra-local level, we can point out that for the first time the settlement arrangement shows some evidence of forms of organization beyond the local community. Figure 5-3 shows a sherd-density perspective rendering of the Integration Period smoothed by using the *inverse distance* to the powers of 4, 2, 1, .5 and .25. As described in the previous chapters,

increasingly smoothing the distribution of ceramic sherd densities causes smaller occupations to merge with larger, more central settlements. Based on the principles of interaction, Peterson and Drennan (2005) have noted that this type of smoothed settlement aggregation makes it possible to discern the various districts of interaction present in the landscape. This can be used as supportive evidence that the distribution of settlements was not simply organized around the principles of local communities where people are in daily face-to-face interaction, but rather on principles that are more supra-local in nature. We can see from Figure 5-3 that, as smoothing increases, the Agua Blanca occupation appears to remain separate from that of Machalilla as an independent interaction district. It also captures nearby settlements as the entire Buenavista Valley population merges with it. Even the most pronounced smoothing (.25) produces two distinct districts of interaction, each with its own central focus. The first is centered around the dispersed Agua Blanca occupation, and the second has the denser community of Machalilla at its center. This stands as a generally more complex settlement formation than the more simple settlement distribution of earlier periods (Figures 3-3 and 4-3). By European contact, ethnographic sources indicate that these two districts (along with others outside the study area) were integrated into a single political unit.

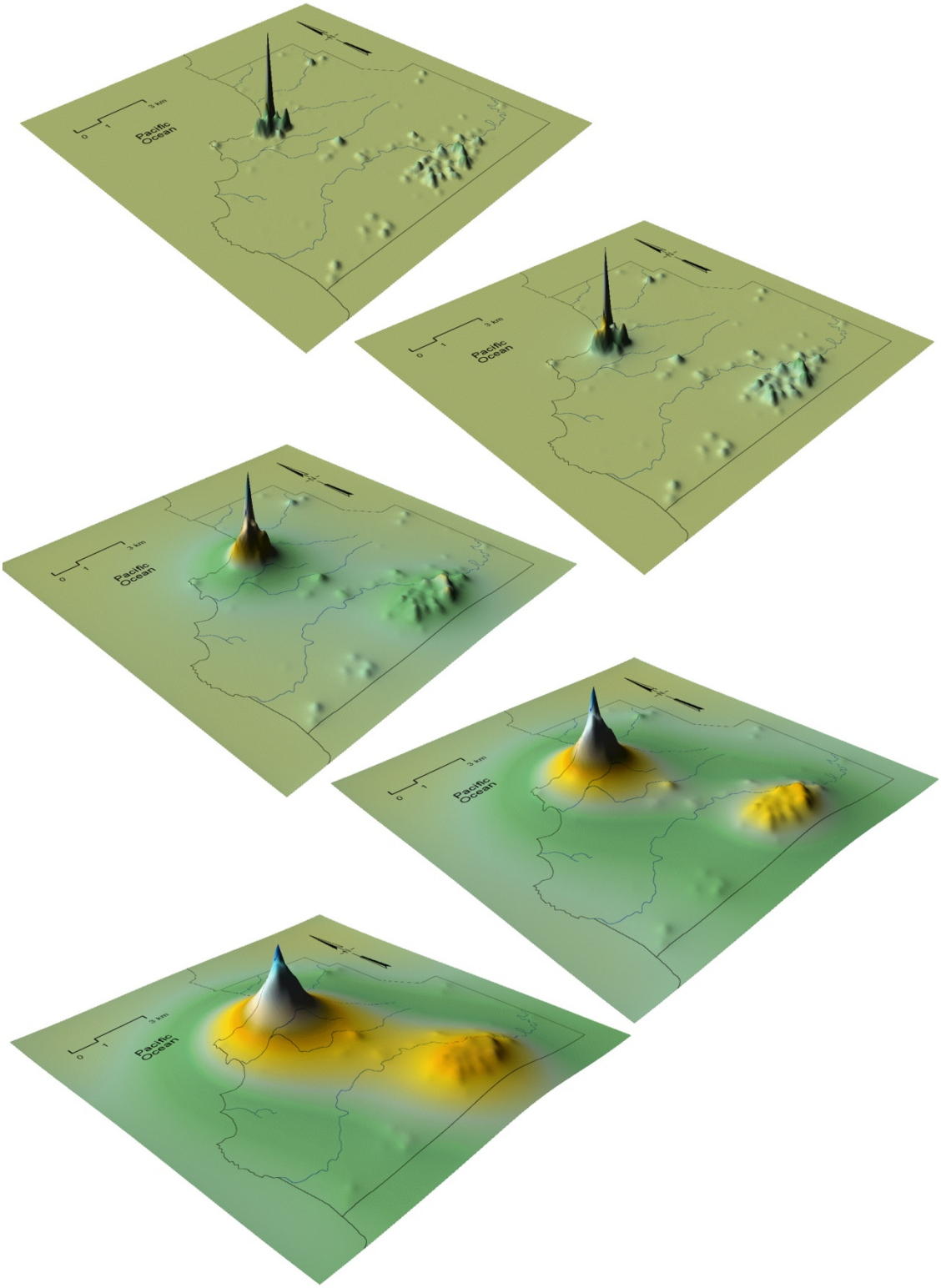


Figure 5-3. Sherd-density perspective rendering of the Integration Period smoothed by using the inverse distance to the powers of 4, 2, 1, .5 and .25.

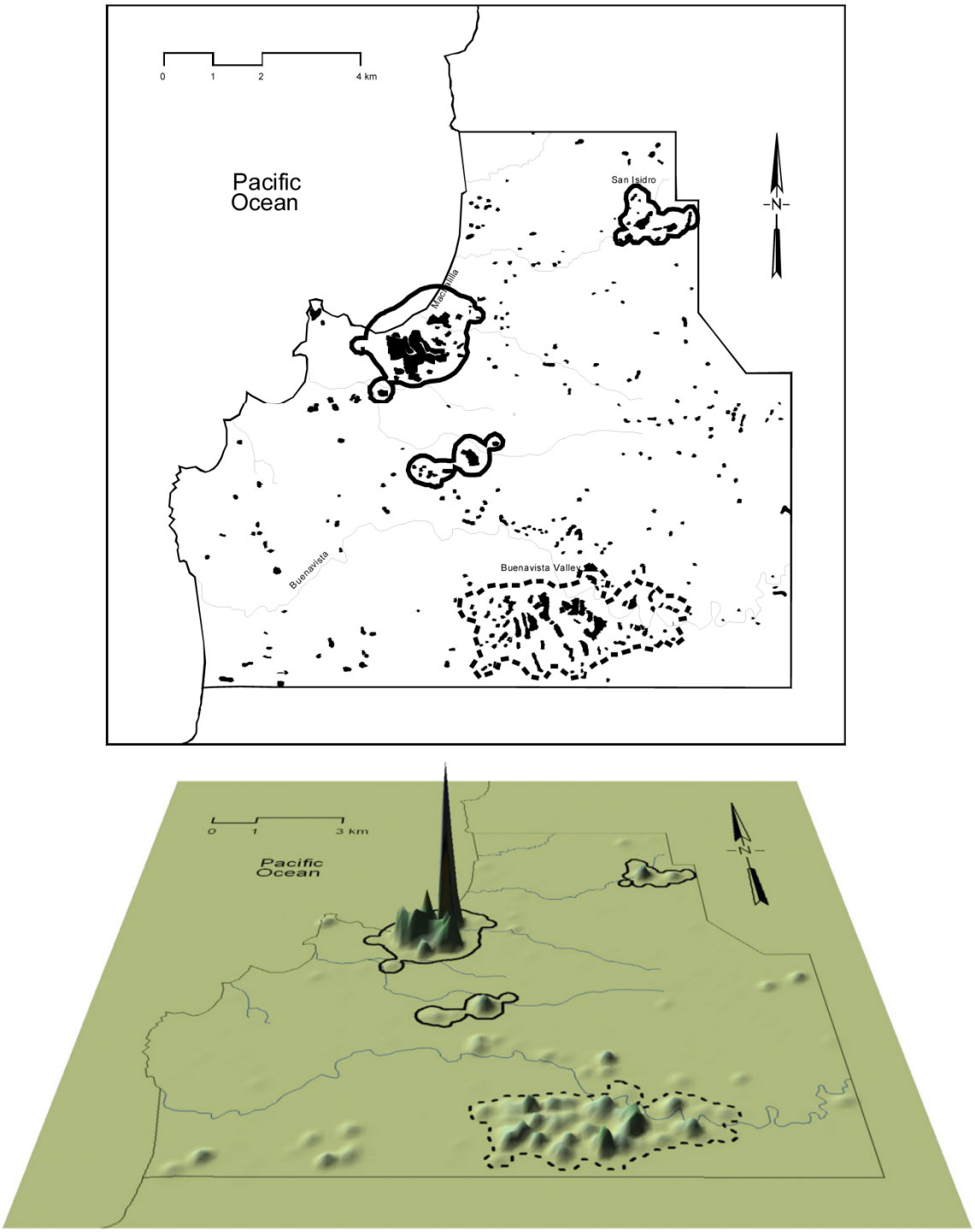


Figure 5-4. Delimitations of the different settlements of the Integration Period as well as the lots that fall within their boundaries.

If we examine the artifact assemblages of the different communities, we also see noticeable evidence of social differentiation between them. To compare the differences in the assemblages of different settlements, boundaries were drawn that separated the lots belonging to each community (Figure 5-4). These boundaries were defined following the approach taken by Peterson and Drennan and using a topographic contour line from the unsmoothed sherd-density perspective renderings (Figure 5-2) that encapsulated the sherd-density peaks used to define each community. Since the Agua Blanca occupation is too dispersed to be accurately described as a local community, where all its inhabitants were in daily face-to-face interaction with one another, the contour line that encapsulates the Agua Blanca foothills is depicted as a dashed line. The lots within the boundaries of each community (as well as those for the Agua Blanca foothills) were grouped together and the proportions of different ceramic types in each community were quantified. The remaining scattered lots were then also added as a separate total to come up with proportional averages for the isolated rural farmstead occupation. Error ranges for these proportions were calculated using a cluster sampling formula (Drennan 1996:247-51).

Figures 5-5 to 5-7 use three different criteria to measure the proportion of fancy ceramics for the different settlements within the study region. This type of evidence is expected to indicate the presence of higher status individuals based on the assumption that, all things being equal, elaborate ceramics require more labor and are thus more socially "expensive" to produce than cruder ones (for example, see Boada 2007). The comparison of the status differences of all the communities to the isolated rural farmsteads is particularly useful because the farmstead occupation is likely to represent scattered single-family dwellings more detached from the economic and political forces that might have caused populations to nucleate. In this sense, the isolated farmstead occupation serves as a useful baseline against which to compare the

assemblages of more complex settlement types since that occupation likely represents the basic suit of domestic subsistence assemblages without many elements that result form the intervention of a political economy.

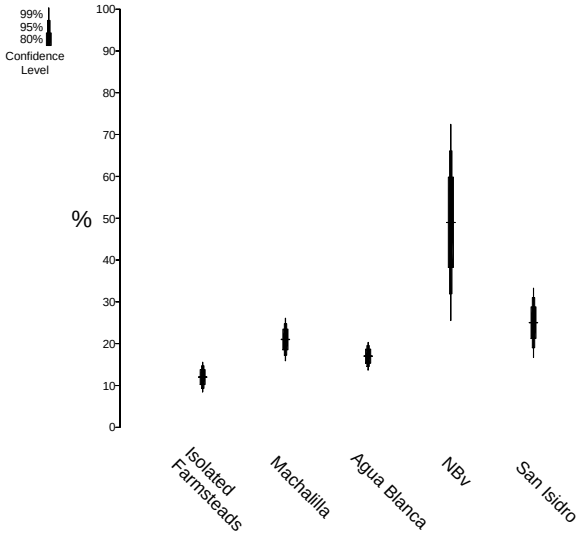


Figure 5-5. Proportion of "fine ware" sherds within total sherd count (Integration Period).

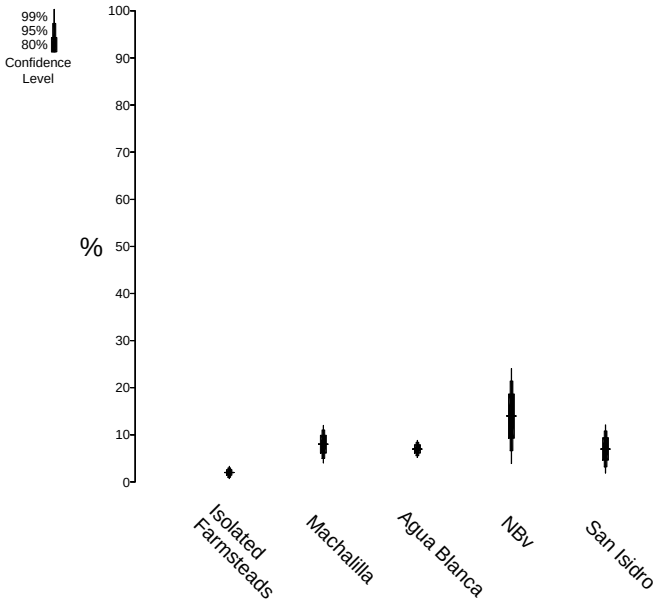


Figure 5-6. Proportion of highly polished sherds within total sherd count (Integration Period).

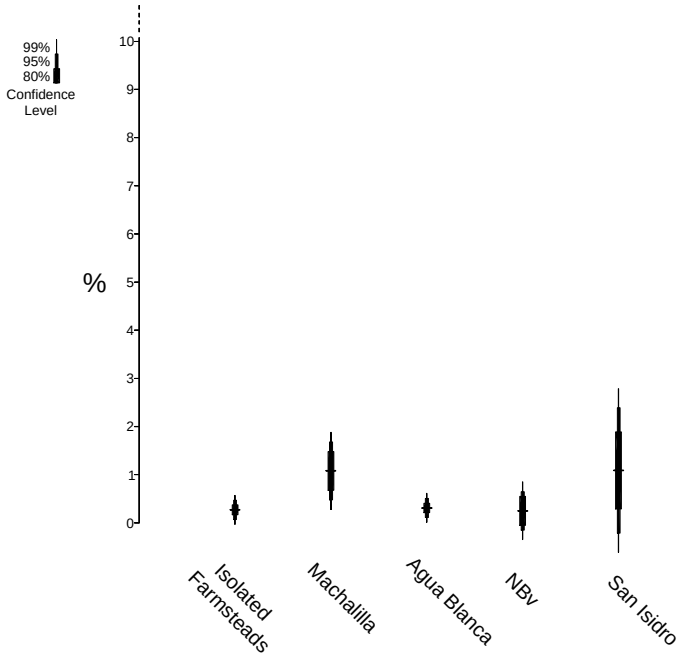


Figure 5-7. Proportion of *compotera* sherds within total sherd count (Integration Period).

Figure 5-5 shows the proportion of finely made sherds (fine ware) out of the total sherd count for the different occupations. As might be expected, the scattered rural farmsteads, which on average only have 12% finely made sherds in their assemblages, have the lowest proportion of any occupation. For the largest two settlements, Machalilla has 21% finely made sherds while Agua Blanca has 17%. The San Isidro community has slightly higher numbers than this with 25%. The small community of North Buenavista, on the other hand, shows a very high proportion with 49% fine ware sherds within its assemblage. Although the sample sizes are not terribly large, the error ranges depicted in Figure 5-5 let us know that we can be highly confident that the proportion of fine ware in the Agua Blanca and isolated farmstead occupations was not as high as that shown by the Machalilla sample. Likewise, we can be highly confident that no settlement had a proportion of fancy sherds as high as the North Buenavista community.

Figure 5-6 shows the proportion of highly polished sherds within the assemblages. As we can see, a similar pattern appears, the rural occupation has the lowest proportion of highly polished sherds with only 2%. Machalilla and Agua Blanca have higher proportions with 8% and 7% respectively. The small North Buenavista settlement again has the highest proportion with 14%, while San Isidro, with 7%, has comparable proportions to the large settlements. Again, the error ranges depicted in Figure 5-6 let us know that we can be highly confident that no settlement had a proportion of polished sherds as high as that exhibited by the North Buenavista sample. Although the same cannot be said about the differences between the Machalilla, Agua Blanca, and San Isidro samples. However, the error ranges of the isolated farmstead occupation do suggest that we can be highly confident that its low proportion of polished sherds is due to more than just the vagaries of sampling.

The third criterion used to measure fancy ceramics is the proportion of sherds belonging to elaborate saucer plates with pedestal (*compoteras*) (Figure 5-7). Since there are very few of these elaborate *compotera* plates in any given assemblage, and the sherds that can be accurately recognized as such are even fewer, it has the effect of making the proportion of sherds belonging to this category very small and hence making the differences in proportion seem weak. The general pattern that emerges from this comparison, nevertheless, is useful as an added exploratory route through which we can acquire clues about status differences between occupations. As we can see, with over 1% fancy *compotera* plates in its assemblage, Machalilla has a noticeably higher proportion of plates of this type than any other occupation, with the exception of the small San Isidro community, which shows similar proportions to Machalilla. The error ranges depicted in Figure 5-7 show that we can actually be highly confident that Agua Blanca, North Buenavista, and the isolated rural occupation truly did not have as high a

proportion of *compotera* plates as the Machalilla sample shows. However, the same cannot be said about San Isidro, which has much too large error ranges for us to be confident that is proportion is truly as high as that of Machalilla.

While these three criteria do show some moderate differences, the general picture that emerges consistently shows the same pattern. As might be expected, the scattered rural occupation has the lowest proportions of high status indicators. Between the two large settlements, all three criteria showed Machalilla with greater indication of higher status individuals than Agua Blanca. The small community of San Isidro has status indicators somewhere in the range of Machalilla and Agua Blanca. We should note, however, that because of the small size of San Isidro, a direct comparison with Machalilla and Agua Blanca might be inappropriate. This is because in a community of between 10 and 15 families like San Isidro, the presence of even a single elite household would create very high proportions of ceramic status indicators for the community as a whole. It would take much more elite presence (in absolute terms) to make that type of impact in the archaeological assemblage of demographically large settlements like Machalilla or Agua Blanca. The same can be said of the North Buenavista community, although the distinctly higher proportions of fancier ceramics at that small location—in particular of finely made sherds—do suggest that this settlement might have been a particular locus of elite activities.

In general, then, changes in the settlement patterns of the study area for the Integration Period suggest the development of at least some degree of sociopolitical complexity. While ethnohistoric sources already attested to the existence of sociopolitical stratification within the study area for the Integration Period, what is most useful about this reconstruction is that it allows us to compare the degree of this complexity to what was present for earlier periods.

In the preceding periods, we saw evidence for very low population numbers, relatively homogeneous artifact assemblages, and no evidence of supra-regional forms or organization. A relatively small number of families appeared to be arranging themselves based on subsistence strategies with minimal need to develop supra-local political institutions. For the Integration Period, however, not only do we see the appearance of large, more demographically dense communities, but also the settlement pattern shows that the landscape was organized around two supra-local districts of interaction, one around Machalilla, and another around Agua Blanca. Also, it is in this period that we see the development of architecturally complex *corrales* and the appearance of the renowned Manteño seats of power, commonly cited as indicators of factional elite activities (McEwan 2003; Piana and Marotzke 1997). The ceramic assemblages of the different communities also show consistent status differences between settlements. While the isolated farmstead occupation appears to be a collection of domestic units without much evidence of high status individuals, the more nucleated settlement of Machalilla has notably higher proportions of fancier ceramics, suggesting elite presence. The assemblage of the small community of San Isidro suggests that it was similar to Machalilla but at a much smaller scale. North Buenavista, on the other hand, shows notably higher proportions of fancier ceramics and highly polished sherds than any other settlement in the study region. The small size and strong proportional differences in the ceramic assemblage of this community suggest that it may represent a particular locus of elite activity.

All the evidence that has been reconstructed suggests a more complex supra-regional picture and settlement organization that is usually associated with political formations that encompass areas beyond the local town or village (Carneiro 1981). This reinforces the

ethnohistoric characterization of the study region where a single political unit controlled four separate towns.

It is worth noting that, while generally all the communities have more evidence of high status than the scattered rural occupation, those that have the highest densities and are less territorially expansive, such as Machalilla and San Isidro, consistently show higher status evidence than the more dispersed occupation of Agua Blanca. This is what we would expect if populations were nucleating around productive locales that permitted surplus and its derived financing of elite activities.

The ocean location of Machalilla seems to have been an important factor in promoting modest amounts of nucleation during earlier periods. However, maritime resources existed for over 4000 years through which they accounted for only a very minimal clustering of people. The drastic demographic expansion seen for the Integration Period, on the other hand, occurs suddenly and is difficult to explain by the same factors that permitted a small village to form at that location during earlier times. As noted above, what is different during the Integration Period is the existence of a sizable consumer market for *Spondylus* objects in the north coast of Peru and large amounts of archaeological evidence within the study area for the manufacture of such items at that time. In this respect, Carter (2008) not only points out that most of the shell working evidence that has been excavated from the Ecuadorian coast dates to between A.D. 700 to 1300, but that this period also saw a notable increase in craft standardization of shell bead production as Peruvian states demanded these resources more and more.

Starting with Moche V, but becoming even more accentuated in the subsequent Sicán and Chimú occupations (Cordy-Collins 1985, 1990; Martín 2001, 2007; Pillsbury 1996; Shimada 1994), the ritual complexes of central Andean states began requiring notably larger quantities of

Spondylus objects as ritual paraphernalia. Based on ice core analyses, Shimada (1994) has linked the beginnings of this complex to a catastrophic mega-El Niño event that occurred in the transition between Moche IV and V. He proposes that at that time a Peruvian water ritual that centered on the *Spondylus* shell developed and generated demand for the mollusk. It is also precisely during this transition that Richardson and Heyerdahl (2001) note that Moche iconography begins for the first time depicting larger seafaring vessels capable of undergoing longer sea voyages and which illustrate double decks and separate holdings for prisoners and cargo. From this point on, in the north coast of Peru, worked and unworked *Spondylus* remains appear in notably larger quantities—often reaching upwards of a thousand specimens per site (see Martín 2007; Pillsbury 1996; Shimada 1994).

In this respect, the evidence of shell craft production from the study area can be used to delineate more precisely how the growth of this industry related to the social and political development evidenced by the archaeological record of the study area during Integration times.

5.4 CRAFT PRODUCTION DURING THE INTEGRATION PERIOD

For earlier periods, horizontal excavations have provided only scant evidence of shell manufacturing work areas in coastal Ecuador. The most notable exceptions are the Guangala occupation (A.D. 100-650) of the El Azúcar Valley from present-day Guayas province and the Bahía occupation of the Río Chico Site located in present-day Manabí (Harris et al. 2004; Martínez 2001; Masucci 1995). In both of these cases, the shell manufacturing evidence suggests that shell working was carried out within the domestic unit as a secondary activity that generated

supplemental income used to buffer environmental uncertainty in years of low agricultural returns (Martín 2009; Masucci 1995).

In contrast to the scant numbers of excavated sites that show evidence of shell manufacturing for the Regional Development a whole array of localized excavations have yielded evidence of shell bead production after A.D. 700, both within the study region and throughout the central coast of Ecuador (Carter 2008; Currie 1995a, 1995b; Harris et al. 2004; Martín 2009; Martínez 2001). Outside the study region, in southern Manabí, the sites of Río Chico, López Viejo, and Salango all show evidence of shell craft production. Farther south, in Guayas province, we can also add the sites of Mar Bravo, and Loma de los Cangrejitos (see Carter 2008). Inside the study region, Mester (1990) has uncovered shell manufacturing work areas at the site of Los Frailes (see Figure 2-1) dating to the early Integration Period. The location of all these sites is depicted in Figure 5-8.

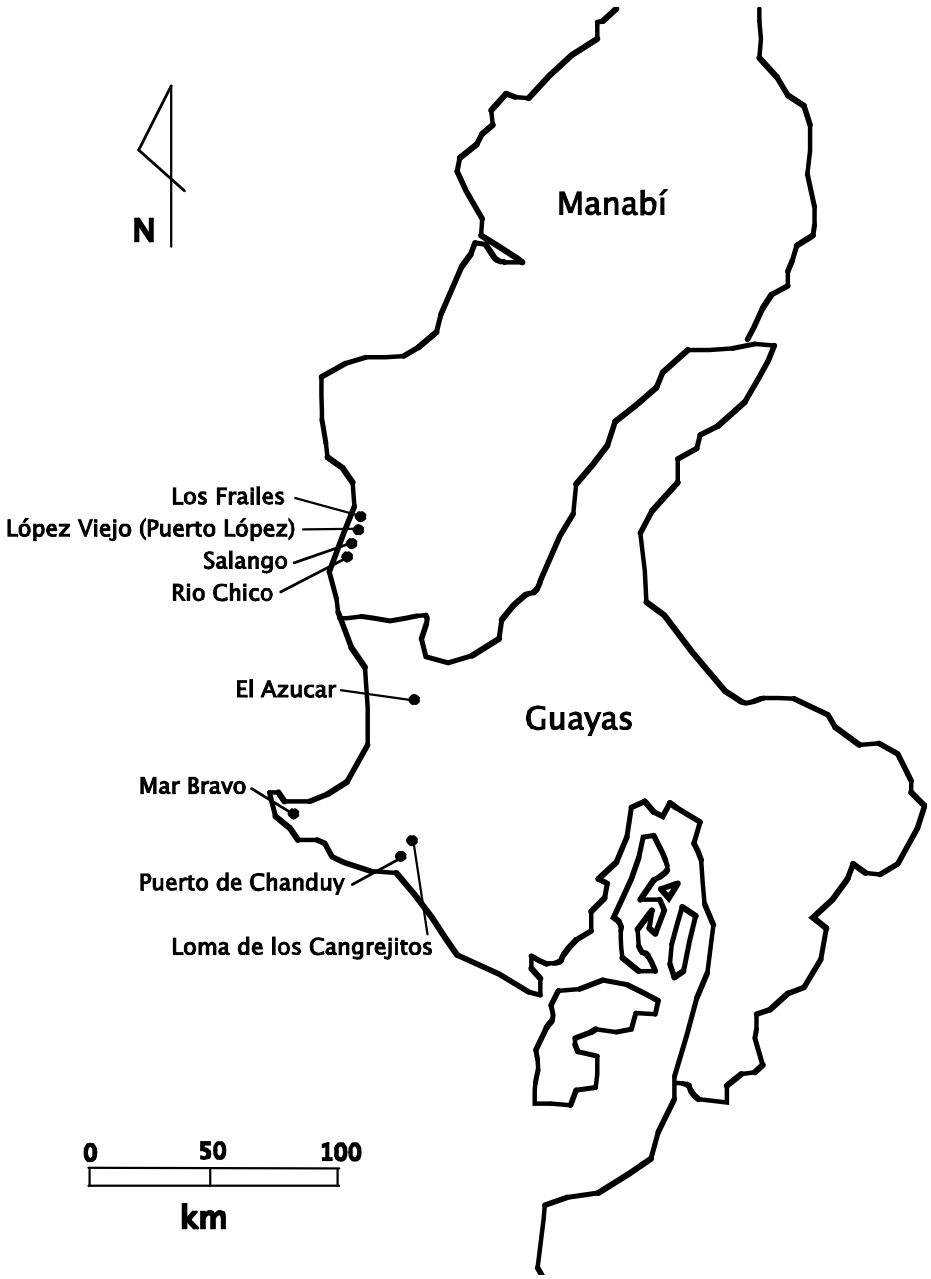


Figure 5-8. Exotic shell workshops along the central coast of Ecuador.

From a very useful comparison of previously excavated shell beads and lithic artifacts across coastal Ecuador, Carter (2008) notes that particularly the period between A.D. 700 to 1300 saw a marked increase in craft standardization of shell bead production. Not only does he find evidence for a more labor-intensive operational chain, but he also presents quantified data

that indicates that beads become more symmetrical and standardized amongst different sites of this period, even in locations far removed from each other. He proposes that this increased standardization was directly related to the appearance of large consumer states in the north coast of Peru during that time.

For our study area, malacological evidence was dispersed throughout the territory, from coastal settlements to inland areas as many as ten kilometers away from the ocean. Most of the shell data that this section deals with came directly from the same collection circles that were used to recreate the sherd densities, population numbers, and artifact assemblages for the one-hectare lots. The shell assemblages contained in the regular collection lots serve as a useful way to reconstruct the overall dispersal of shell evidence throughout the settlements and to clarify more fully the relation of this resource to the different communities.

A second line of evidence was acquired through special collections that were carried out in noticeable shell concentrations. Also called *concheros,* these concentrations appear throughout the length of the study area, are usually not larger than a few square meters in area, and can be recognized on the surface by having extremely high densities of shell material. At the time of survey, it was difficult to assign a specific role to these shell concentrations, although it seemed likely that if craft specialist were working at shell manufacture within the study area, they would represent middens associated with craft production. This idea was reinforced by the frequent presence of cut and worked *Spondylus* fragments amongst the different shell varieties present in the concentrations. The common occurrence of small lithic drills typically used to manufacture *Spondylus* shell beads also corroborated the interpretation that these concentrations were in some way associated to shell production. As described more thoroughly in Chapter 2, every time a shell concentration was recognized, an extra collection circle was placed directly on top of it.

Altogether, survey recorded a total of 39 shell concentrations. In as much as these shell hot spots represent shell-working middens we can expect them to provide even more direct glimpses into the nature of the manufacturing industry due to the closer spatial association between manufacturing activities and shell remains.

The evidence gathered from the study area corroborates the information coming from localized excavations and supports the interpretation that most of the shell manufacturing that occurred within the region essentially took place during Integration times. Figure 5-9 depicts the quantities of sherds belonging to different periods within the shell concentrations. It shows that over 93% of the ceramic materials within the concheros were Manteño pottery (dating to the Integration Period). This overwhelming dominance of Integration Period material within the shell middens associated with shell manufacturing not only indicates that most shell craft activities were taking place in the last phase before European arrival, but also serves as further indication that this manufacturing industry was in some way related to the social and political changes that took place in southern Manabí at that point in time.

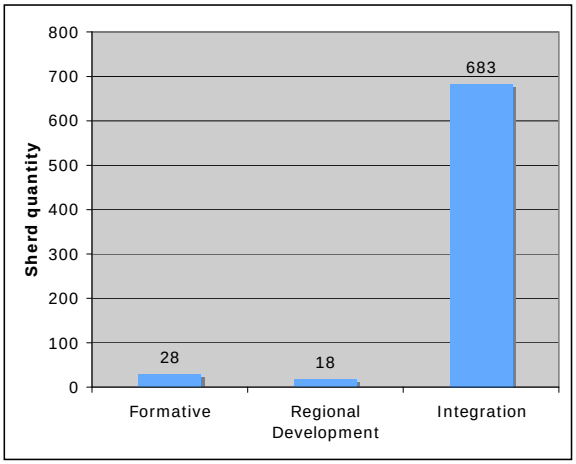


Figure 5-9. Total number of sherds from different periods within the 39 shell concentrations recorded in the study area.

In order to reconstruct the organization of shell working at the population level it is important to take into account two different criteria, the *intensity* and *scale* of production (Costin 1991; Feinman and Nicholas 2000). Intensity applies at the individual production level and it refers to how devoted given workers are to their craft. Is it a full or part-time activity? A high-intensity level of production is one where people devote their entire time to craft production. These are sometimes referred to as highly specialized producers (Smith 2004:82-3). A typical example of a high-intensity producer is a full-time blacksmith within an urban European medieval setting who performs this task (and only this task) in exchange for resources from the subsistence sector of the economy. Alternately, low-intensity levels of craft production refer to situations where an individual works at a particular craft activity only some of the time. A good example of low-intensity production is domestic-level ceramic production within a Neolithic village where each household devoted a small proportion of its time to the manufacture of utilitarian wares for everyday use.

Scale is the other side of the coin; it refers to how many people within a population are involved in a given craft activity. A population that has a large-scale level of craft production is one in which just about everybody is involved in production. Arrow manufacture for the daily hunt within an egalitarian hunter-gatherer village would be a clear example of this because all hunters are in charge of making their own projectiles. On the other hand, a small-scale level of production would be one were only a few people in a given society are involved in the specialized task. Again, the example of a blacksmith in an urban setting is a useful one because they are among only a few specialists performing that task.

Taken together, intensity and scale capture a range of variation on how a society might structure craft production. The entire society might have smaller or larger scales of production,

but at the same time, the individual producers can be more or less intensely specialized at this activity.

5.4.1 Intensity of Production and the Coast of Ecuador

5.4.1.1 Shell Evidence from Past Horizontal Excavations

It is obvious that in prehistory specialists such blacksmiths or ceramicists existed, when that was the only activity that those individuals carried out, they are good examples of intense production. If, however, production is a marginal activity in their daily routine they can be described as having low-intensity levels of production. In other words, high-intensity work areas should show a clear emphasis on the manufacture of a given item and should not show a full range of activities such as domestic or other subsistence endeavors. Archaeologically, then, high-intensity work areas would be expected to leave fairly clear markings that would indicate that a single activity has predominated in them.

While it is important to note the spatial separation inherent in the different stages of craft production (Moholy-Nagy 1990), it has also been well established that the manufacture of craft items should be interpreted as a systemic activity so that wherever indicators of the activity appear (debitage, tools, etc) they can be taken to signal the existence of the activity as a whole. In this respect, the midden area, as an integral and interconnected part of the work area, is a useful indicator of the activities that occurred throughout the manufacturing sequence (Hester and Shafer 1992). Hence, middens from work areas where high-intensity production took place will produce debitage from a single activity in higher proportions than low-intensity work areas. A useful modern analogy for this phenomenon would be to think of the difference between the trash of someone who knits blankets for a couple of hours a day and the trash dumps of a factory

where the only activity is to produce blankets. While the person's trash will show the full range of activities that take place in his daily routine, with only a small part of the total assemblage being the discards from blanket production, the trash dumps of a blanket factory will be overwhelmingly dominated by refuse from blanket manufacturing. The same patterns appear archaeologically in prehistory. The garbage middens of high-intensity work areas within cities such as Teotihuacán repeatedly show the same byproduct, whereas domestic structures where somebody worked part-time at an activity are substantially more mixed (Feinman and Nicholas 2000; Moholy-Nagy 1990; Shafer and Hester 1991; Widmer and Storey 1994).

Regarding shell manufacturing, the site of Ejutla, Mexico, contains a good example of a high-intensity work area characterized by a very homogeneous shell assemblage. In that site, the middens associated with shell manufacturing workshops were overwhelmingly dominated by the refuse from the exotic shell types associated with trade. The seven genera associated with exports (which include *Strombus*, *Pinctada*, and *Spondylus*) accounted for 95% of all identifiable shell (Feinman and Nicholas 2000:127). This overwhelming dominance of the shell types associated with export represents a good indicator that the activity dominated the work area.

In coastal Ecuador, because of the ethnohistoric importance attributed to *Spondylus*, a substantial amount of research has been undertaken to understand the nature of shell manufacturing work areas. Systematic excavations at the sites noted above have helped us reconstruct and clarify more precisely the contexts under which coastal Ecuadorian populations manufactured these items (Carter 2008; Currie 1995a, 1995b; Clark 2001; Harris et al. 2004; Martín 2009; Martínez 2001; Masucci 1995; Mester 1990).

For example, thanks to the detailed excavations at an Integration Period midden within the site of López Viejo (Currie 1995a, 1995b) we can get a good glimpse at the intensity of

production. The high absolute quantity of shell remains related to the manufacture of exotic items (including 749 finished shell artifacts) and the recovery of specialized tools found at the midden clearly signal the presence of a shell working area focused on the manufacture of exotic export-oriented items. However, the midden also produced enormous amounts of shell remains from varieties not traditionally associated with exports, and which show no evidence of human manipulation (in particular small gastropods, presumably consumed for their meat). Proportionally, the MNI of the four species associated with exports (*Spondylus princeps* and *calcifer*, *Pteria sterna* and *Pinctada mazatlanica*) only comprise 3.47% of the total MNI of all shell species in the Lopez Viejo midden (Tables 5.1-5.3). This sample proportion represents the population proportion within an error range of ± .3% (at a 99% confidence level). This proportion does not include finished artifacts. Nevertheless, Clark (1995:40) notes that even though high in absolute terms, because of the very large amounts of shell material recovered from the midden, finished artifacts represented such a minuscule proportion of the total shell assemblage that its effects on the results of analysis are negligible.

Table 5-1. MNI of shell species associated with exports (López Viejo)*

Pinctada Mazatlanica	174
Pteria sterna	751
Spondylus calcifer	12
Spondylus princeps	45
Total MNI**	982

*From Clark (1995:43)
**Does not include finished artifacts

Table 5-2. MNI of all shell material (López Viejo)*

Pelecypoda (Bivalves)	1928
Gastropods	25041
Schaphoda	5
Polyplacophora	1308
Total MNI**	28282

*From Clark (1995:42-7)

**Does not include finished artifacts

Table 5-3. Total number of finished artifacts made from shell (López Viejo)*

Shell discs	109
Shell squares	39
Crescents, ornaments, and figures	144
Shell beads	457
Total finished shell artifacts	749

*From Currie (1995b:19-24)

Likewise, Mester (1990) has also published useful and detailed data on a shell workshop floor with an associated midden from the site of Los Frailes (located within the study area and to the south of present day Machalilla) for the early Integration Period (A.D. 700-1200). She classifies the living floor as a workshop based on the presence of tools and shell debitage associated with manufacture. However, the proportions of shell debitage within the site show similar patterns to those of López Viejo. The four species associated with exports constituted less than 1% of total MNI count at the midden and only 7.3% at the workshop. Tables 5.4-5.6 summarize the shell counts for the midden area and Tables 5.7-5.9 for the workshop. These proportions represent the population proportions within an error rage of ± .09% at the midden and ± .15% at the workshop floor (both at a 99% confidence level). The Los Frailes shell assemblage is also overwhelmingly dominated by small gastropods, likely consumed for their meat.

Table 5-4. MNI of shell species associated with exports from the Los Frailes midden (MH108F)*

Pinctada Mazatlanica	51.5
Pteria sterna	128.5
Spondylus princeps and calcifer	22.0
Total MNI**	202.0

*From Mester (1990:296)
**Does not include finished artifacts

Table 5-5. MNI of all shell material from the Los Frailes midden (MH108F)*

Pelecypoda (Bivalves)	417
Gastropoda	41864
Total MNI**	42281

* From Mester (1990:296-7)
**Does not include finished artifacts

Table 5-6. Finished artifacts from the Los Frailes midden (MH108F)*

Beads	7
Pteria Plaque	0
Total	7

*From Mester (1990:324)

Table 5-7. MNI of shell species associated with exports from the Los Frailes workshop*

Pinctada Mazatlanica	199.0
Pteria sterna	1899.0
Spondylus calcifer**	12.5
Total MNI***	2110.5

*From Mester (1990)
** No princeps reported
***Does not include finished artifacts

Table 5-8. MNI of all shell material from the Los Frailes workshop*

Pelecypoda (Bivalves)	2842
Gastropoda	25899
Total MNI**	28741

*From Mester (1990:308-10)
**Does not include finished artifacts

Table 5-9. Finished artifacts from the Los Frailes workshop*

Beads	55
Pteria Plaques	72
Total	127

*From Mester (1990:324-5)

These low proportions of export species within the shell assemblages are strikingly similar to those of the Regional Development workshop midden from the El Azúcar Valley, where Masucci (1995) has argued that the manufacturing industry essentially took place within the domestic unit. In it, export species only accounted for 3.8% of the total MNI at the midden, which also included the presence of finished beads, ornamental objects, and the small drills for making them (Table 5.10). This proportion represents the population with an error range of ± 1.7% (again at a 99% confidence level). The makeup of the assemblage led Masucci to characterize the industry as part-time and secondary to the subsistence economy. She has noted that such a heterogeneous assemblage is not representative of a highly intense mode of production, but rather that shell working was a secondary activity within the domestic mode of production that generated supplemental income to help buffer environmental uncertainty in years of low agricultural returns.

Table 5-10. Summary of shell findings at El Azúcar*

Finished and in-process beads	634
MNI of export species	33
MNI of all shell species**	872

* Form Masucci (1995:75-7), zone B
**Does not include finished artifacts

Perhaps the best contender for a workshop that does show a high proportion of the shell species used for export is found at the Río Chico site. Clark (2001), Martínez (2001), and Harris et al. (2004) note that the Río Chico assemblage is indicative of a workshop/processing floor based on an unusually high proportion of exotic shells (*Spondylus* and mother of pearl) and a high concentration of bivalve leftover "cores" (discarded after the orange or purple lip had been removed for processing) during the Regional Development occupation. Even though the

assemblage shows clearly that exotic shells were being worked at the site, the proportion of shells belonging to the four species used for exports is still very minor in relation to the overall shell assemblage. The MNI of the four shell species only comprise 20% of the total MNI for the Regional Development (Bahía) occupation (± 10.7%, at 99% confidence) (Tables 5.11 and 5.12). Harris et al. (2004:39-40) also point out that it is likely that the settlers of Río Chico followed a diversified subsistence strategy that took advantage of a varied range of microclimates and that included maritime exploitation, use of estuaries, as well as inland agriculture.

Table 5-11. MNI of shell species associated with exports (Río Chico, Bahía occupation)*

Spondylus calcifer	8
Spondylus princeps	1
Spondylus unidentified	3
Pteriidae	7
Total MNI**	19

* From Clark (2001), Bahía occupation, Appendix pp. 1-2, 14-15
**Does not include finished artifacts

Table 5-12. MNI of all shell material (Río Chico, Bahía occupation)*

Total MNI (all species, units 6 and 7)**	95

* From Clark (2001), Bahía occupation, Appendix pp. 1-2, 14-15
**Does not include finished artifacts

Figure 5-10 graphically depicts the proportions of shell species used for export within the total shell assemblages of these four sites. The data counts used to create Figure 5-10 have been synthesized from Tables 5-1 to 5-12. This graphic comparison shows, in a very conspicuous way, that even though all of these sites have contextual evidence of shell manufacturing (such as lithic drills, shell cores, etc.) none of these work areas remotely approximates the highly homogeneous assemblages that are expected of high-intensity production (as seen in Ejutla, Mexico, for example). Even the Río Chico site, which is the best contender for a specialized

workshop area in coastal Ecuador, is very unlikely to represent a truly intense manufacturing center. A one sample t-test reveals that there is less than 1% chance of getting a random sample like the one from Río Chico (with a proportion of 20% export species) from a population that actually had a proportion of 90% or more export species in it (t= 17.07; $p < .001$).

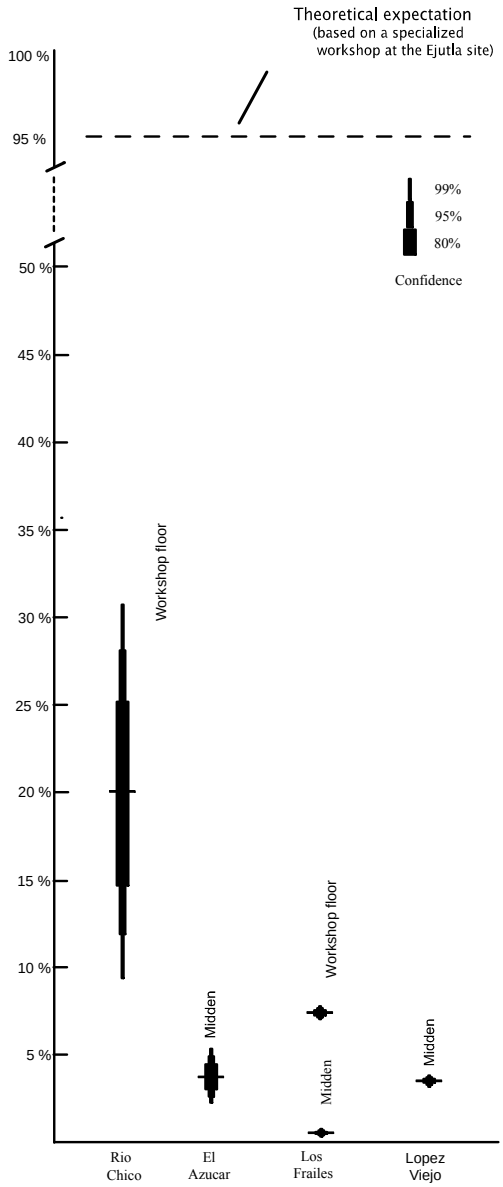


Figure 5-10. Proportion shell species used for export within the total shell MNI of four previously excavated shell workshops along the central coast of Ecuador.

Instead, these stand out as heterogeneous shell assemblages tremendously dominated by small gastropods, which result from basic domestic food procurement strategies. The workshop floors and middens show only marginal evidence of production for export. In spite of all the importance attributed to *Spondylus* trade and all the detailed excavations that have been carried out at the shell workshops of coastal Ecuador, this region has yet to produce a single example of a high-intensity work area of production with a highly homogeneous shell assemblage that would indicate that a single activity predominated in it (Martín 2009).

5.4.1.2 Shell Evidence from the Study Area

The isolated localized excavations described above provide information about four individual cases. Unfortunately, in and of themselves, it is difficult to determine if these are good representatives of all the shell work areas of the Ecuadorian coast or if they are unusually high intensity (or low intensity) work areas. In this sense, survey data systematically gathered across large territories can provide a valuable complement to help us understand how representative the level of intensity that was uncovered at a few horizontal excavations truly is.

Specifically, the shell assemblages recovered in the ordinary lot collections of the present study provide valuable insight to the general proportions of shell material dispersed throughout the different communities. They make it possible to determine if—at the community level—shell assemblages are also largely heterogeneous, as well as the degree to which exotic shells (or gastropods for direct sustenance) dominated assemblages. Following the same methodology used to compare ceramic proportions, Figure 5-11 shows the proportion of the four shell species used for export within the total shell count of each of the settlements of the study area as well as for the scattered farmstead occupation. We should note that unlike the horizontal excavations described above, the shell analyses presented in this section are based on fragment counts rather

than MNI since it was decided during laboratory quantification that fragment count would be a more faithful representative of real shell proportions (see Chapter 2 for a fuller description). As we can see, all of the settlements have shell assemblages with very low proportions of export species, which oscillate around 10% (not counting North Buenavista because of its dramatically large error ranges caused by its virtually nonexistent shell assemblage). We should note that, in contrast to the scattered rural occupation, it is the more nucleated communities that have the highest proportion of export species, although the error ranges suggest that we can only be moderately confident that this is not just the result of the vagaries of sampling. Another important pattern that emerges is that both coastal and inland settlements have very similar proportions of export species in their shell assemblages. Even the rural occupation, with 8% export species is very close to the 13% exhibited by coastal Machalilla. In all the settlements, it seemed that whenever people exploited maritime resources (and whether they consumed them inland or by the coast), they did it in much the same way. Shell assemblages in all settlements essentially show the same pattern already discovered from horizontal excavations, they are soundly dominated by small gastropods for consumption and craft production appears as a minor or secondary activity within the shell middens.

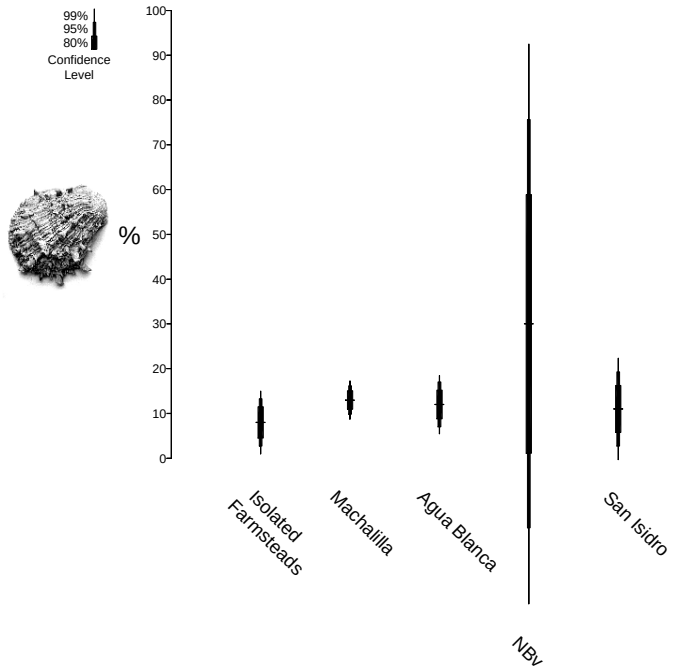


Figure 5-11. Proportion of the four shell species used for exports within the total shell fragment count of each of the settlements of the study area as well as for the scattered farmstead occupation (regular collection lots).

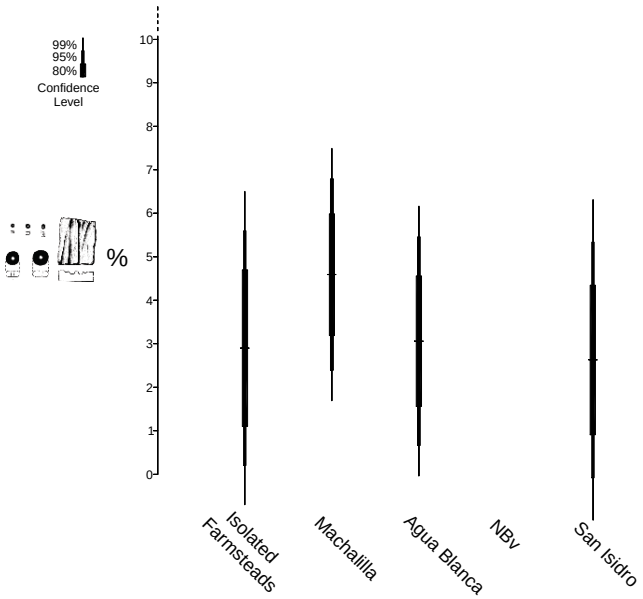


Figure 5-12. Proportion of worked shell to total shell fragment count from the collection lots.

The very small proportion of any type of worked shell within the shell assemblages also corroborates this. Figure 5-12 shows the proportions of worked shell artifacts to total shell counts (with the exception of North Buenavista which did not have any worked shell artifacts, and only ten shell fragments for the entire community). As we can see, only a minuscule proportion of the total shell assemblage of any community showed evidence of being worked (between 2.6 and 4.6%). While only a very weak difference, we should again notice that the community that has the highest proportion of worked shell—with 4.6%—is the coastal settlement of Machalilla.

The second line of shell evidence comes from the shell concentrations. Because of the presence of exotic shells and lithic tools for manufacture, their restricted space, and overall high shell density, these *concheros* stand as the best potential candidates for the shell middens derived from more intense craft production work areas. In this sense, while the regular collection lots might not show any particular focus on the four export species, if full time artisans were working more intensely at shell craft production within the study area, it is in restricted shell middens such as these that they would leave evidence of their more intense emphasis on craft activities. Figure 5-13 shows the proportion of the four export species to total shell count in all the shell concentrations of each of the communities (excluding North Buenavista which did not have any shell concentrations). Again, the same pattern emerges. The shell concentrations of all the settlements contain only small amounts of the exotic shell species used for export, likewise oscillating around 10%. This suggests the shell concentrations are fundamentally similar in makeup to the shell assemblages recovered from the regular collection lots throughout the study area. Like the shell proportions from the lots, there are no fundamentally large differences between coastal and inland levels of intensity; but again, the large nucleated community of Machalilla had the highest proportion of exotic shell with about 12%.

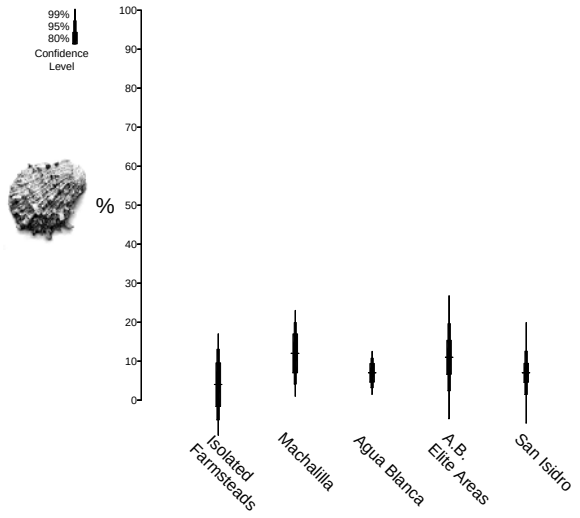


Figure 5-13. Proportion of the four shell species used for exports within the total shell fragment count of the shell concentrations of different occupations in the study area.

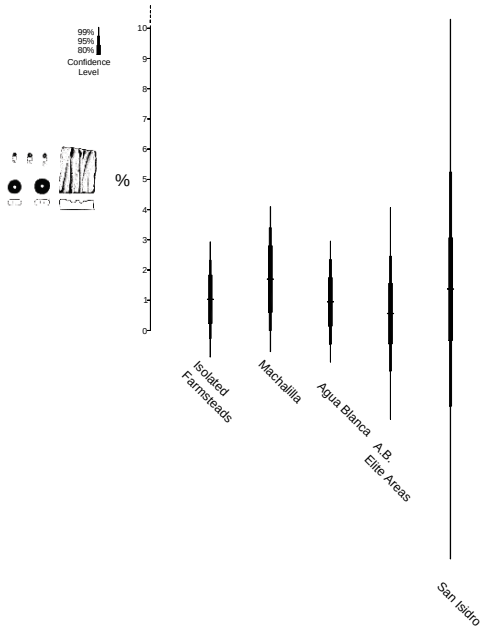


Figure 5-14. Proportion of worked shell to total shell fragment count from the shell concentrations of the different occupations in the study area.

The shell concentrations of the different communities, just like the shell assemblages from the regular collection lots, are essentially *concheros* dominated by small gastropods. In fact, if looked at individually, not a single one of the 39 shell concentrations recorded during survey diverged from this trend and all had very low quantities of export species.

This suggests that, even though during field work it was tempting to interpret these *concheros* as the results of intense craft production, they cannot be taken as archaeological indicators of full time production of shell export items. They are essentially shell middens that resulted from normal domestic subsistence pursuits based on shellfishing, mostly for small gastropods. As is common in domestic middens of this type, other domestic activities are sure to be represented in the assemblage. In this case, the sporadic presence of some worked exotic shell suggests that a part time shell manufacturing industry supplemented the domestic economy in a moderate way. This is in perfect accordance with the way that Masucci (1995) has characterized the shell industry for earlier periods.

The fact that the shell concentrations are primarily shell middens associated with food consumption is further reinforced by the exceptionally small amounts of any type of worked shell in them. Figure 5-14 shows that with the exception of Machalilla, the shell concentrations of each of the settlements had less than 1% worked artifacts (again North Buenavista is not included since no shell concentrations were recorded for it). The shell concentrations of Machalilla, again, were only slightly higher than this amount with a little over 1%.

As noted in Chapter 1, it has often been proposed that one potential catalyst for sociopolitical development is the elite control and financing of full time craft producers of sumptuary goods. Under this scenario, elites finance full time *attached* specialist (or if the elites themselves are the craft producers the term *imbedded* specialization is used [Smith 2004]), but

retain control of the prestige or economic benefits associated with the trade of these items. This allows them to gain prestige or surplus and to cement their differential access to resources (see for example Blanton et al. 1996; Earle 1997; Kipp and Schortman 1989; Stanish 2003, 2004; Vaughn 2006; etc). If full time *attached* or *imbedded* specialists were present within the study area, a good place to look for them would be in proximity to the large, architecturally complex, *corrales* of the ceremonial center, which have often been proposed to be elite structures of some kind (McEwan 2003; Piana and Marotzke 1997). There are four shell concentrations that occur within these "elite areas" and are located in direct proximity to some of the largest and more complex *corrales* of the Machalilla National Park. For this reason, the proportions of export shells in these four shell concentrations were also computed and presented separately in Figures 5-13 and 5-14. As we can see, these also have very low proportions of export shell species and of worked shell artifacts. Just like any other shell concentrations within the study area, these essentially stand as shell middens primarily resulting from food consumption with only minor emphasis on exotic shells.

We may also consider that because of the close proximity of the survey area to the ocean, such high proportions of gastropods for sustenance are to be expected, and could potentially obscure more homogenous middens dominated by the four export species which would better evidence the presence of intense craft specialization. After all, the example of Ejutla, Mexico, whose assemblage clearly demonstrates intense craft production, is more than 80 kilometers away from the coast, while the eastern edge of our study area is only about 10 kilometers from the Pacific Ocean. In this regard, while it is certainly inappropriate to expect a shell pattern perfectly analogous to the Ejutla data, we should also note that it is the whole picture that is being reconstructed that most strongly attests to the complete lack of any degree of intense

production in the area. If intense craft production of shells for export was taking place, and the heterogeneity of shell middens was simply the result of proximity to the ocean, we would expect that as settlements move farther away from the ocean they would progressively have less and less of the shells used for sustenance (and progressively show more emphasis on the export species). In fact the opposite is true, Figures 5-11 to 5-14 show that the inland occupations (like Agua Blanca and the isolated farmsteads) are the ones that have less emphasis on export species. More important, however, is that these differences are minor. Just about anywhere in the study area where shell remains appear, whether they are dispersed throughout the settlements or in packed *concheros*, and whether they are in large communities by the ocean or in small domestic units on hilltops, they consistently show the same basic pattern—large quantities of gastropods with about 10% exotic shells mixed in. This makes it more likely that this pattern, whether near the coast or inland, resulted from the same basic domestic organizational strategy rather than from differential midden formation processes that coincidently created the same result everywhere in the study area.

Finally, the best indication for the lack of intense craft production comes in the form of strong negative evidence. If the purpose of analysis was to find—within a study area of roughly one hundred square kilometers—even a single place where a relatively homogenous shell assemblage suggested that artisans could have worked at craft production for most of their time, that expectation was never met. Even in the "elite areas" of the Agua Blanca ceremonial center, far removed from the ocean and surrounded by complex architectural remains, the very heterogeneous shell assemblages indicate that craft production of exports seem to always take place within domestic units alongside many other subsistence activities.

This ultimately corroborates, as well as expands, the understanding that was gained form the localized excavations of shell working areas described above. Not only does surface evidence essentially depicts the same basic low intensity production scenario already reconstructed from subsurface localized excavations (as well as some striking similarities in shell proportions); but these findings can now also be projected to the community level. In this sense, it appears that the similar low intensity levels of production of the localized excavations described above, as well as the increased craft standardization noted by Carter (2008) for the period of A.D. 700-1300, could likely be the result of basically consistent forms of domestic organization that took place throughout communities in coastal Ecuador.

5.4.1.3 Lithic Evidence from the Study Area

Lithic material provides yet another way to investigate the nature of craft production within the study area. In particular, Masucci (1995) has identified a number of small lithic tools that are associated with contexts where shell bead manufacturing took place. These are depicted in Figure 5-15. Lithic drills such as these are common throughout coastal south America in contexts associated with shell beads production—some examples occurring as early as 8000 B.P. (for example in the Peruvian Siches Preceramic site just north of Talara [Richardson 2009, Personal communication]). While our lithic typology differed somewhat from that of Masucci, all of the types that she identified for the El Azúcar site were recognized and cataloged within the lithic assemblage of the Machalilla National Park survey, and were in fact quite common. The main types of manufacturing tools were drills (Figures 5-15:c,d,e,f,k), puncturing tools (5-15:i,j), burin spalls (5-15:a,b), and reamers (5-15:h). Altogether, 183 of these four tool types were recognized.

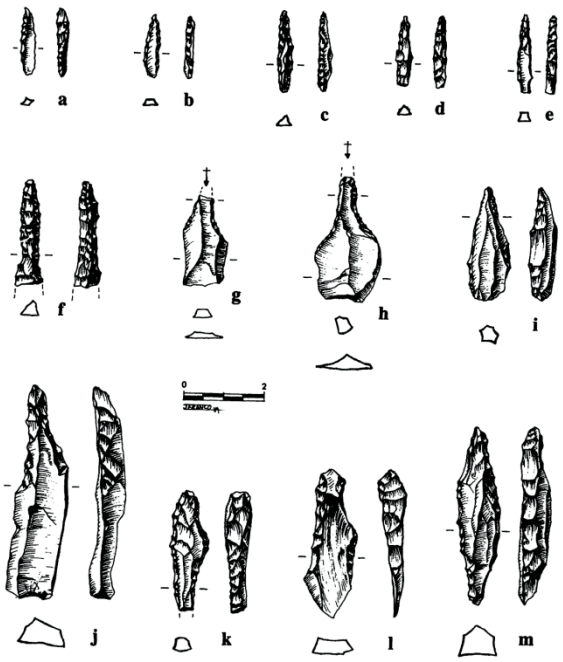


Figure 5-15. Lithic tools associated with shell craft production for the El Azúcar site. From Masucci (1995).

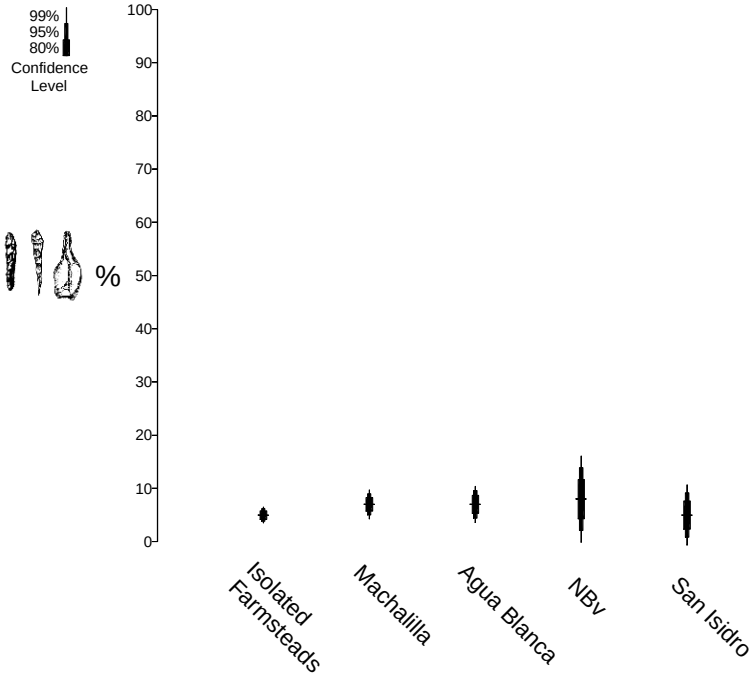


Figure 5-16. Proportion of manufacturing tools within total lithic count for each of the settlements within the study region.

Like shell, the quantities of these manufacturing tools in different settlements provide useful indicators of which ones placed more emphasis on shell craft production. If any given settlement focused more pronouncedly on shell manufacturing, we would expect it to show a higher proportion of manufacturing tools in its lithic assemblage. Figure 5-16 shows the proportion of manufacturing tools (which include the four categories listed above) to total lithic count for each of the settlements within the study region. As for the ceramics and shell proportions, error ranges were attached using a cluster sampling formula (Drennan 1996:247-51). As the figure shows, all of the settlements have very low—and very similar—proportions of manufacturing tools within their total lithic assemblages, or between 5 and 8%. The error ranges indicate that it is likely that these differences could simply be the result of the vagaries of sampling. This further reinforces the interpretation that no settlement appears to have been intensely specialized in this activity and that, when people worked at craft production, they did it following a consistent and similar level of intensity.

The lithic assemblage also gives us an opportunity to further explore the nature of the shell concentrations and their relationship to craft production. The emphasis on small gastropods suggested that these concentrations were primarily domestic middens resulting from food procurement strategies based on shellfishing. However, the modest presence of the four species used to manufacture export items also suggested that a moderate craft manufacturing industry probably took place within the same domestic units and helped complement a larger array of subsistence strategies. If this was really the case, we would expect to see some degree of correspondence between the presence of the shell species used for export and the presence of the tools used for manufacture in the shell concentrations. More specifically, we would expect that the shell concentrations that have larger numbers of the four export species should also show

larger numbers of the lithic tools associated with manufacture. A linear regression between the proportions of the four export species and the proportions of manufacturing tools in the shell concentrations does reveal a mild positive correlation between these two variables [r= .521, p= .001, y= (.410)x + (.010)]. Figure 5-17 shows a scatter-plot of the two variables. Concentration 103 was not included in the regression because it contained a very high misleading number of *Pinctada mazatlanica* fragments that was probably the result of a single fragment that flaked during laboratory processing. Concentration 442 was also not included because it differed greatly from the usual makeup of shell concentrations; it was located on a small hilltop isolated from any other settlement, it was exclusively dominated by gastropods of the same two species, and may well have represented the remains of a single cooked assemblage.

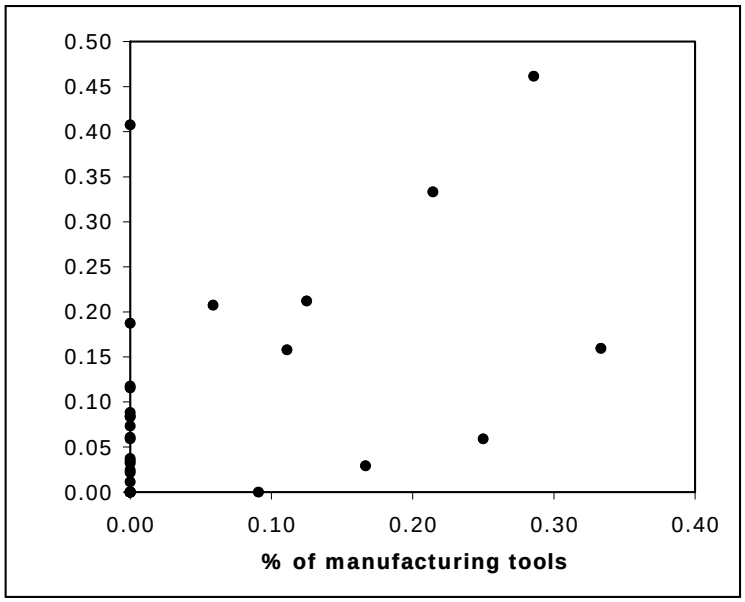


Figure 5-17. Scatter-plot of the proportion of the four shell export species within total shell count and the proportion of manufacturing tools within total lithic count for 37 shell concentrations of the study area.

It should also be noted that although the linear regression did reveal a mild association, the value for r^2 is only .271, which indicates that shell export species only explain about 27% of the variation in manufacturing tools. This is in agreement with the picture that has been reconstructed so far of the organization of craft production within the study area. It suggests that while drills, puncturing tools, burin spalls, and reamers were probably used in shell craft production within less intense, domestic modes of production, they probably served other purposes as well. Hence, aside from the fact that the shell export species always appear in the contexts of shell middens dominated by domestic sustenance discards, the manufacturing tools that also appear in these middens do not seem to be exclusively related to manufacturing for export.

Finally, while the regular collection lots did not reveal substantial differences in the proportions of manufacturing tools between settlements, a comparison of the lithic types within the shell concentration does show a more noticeable difference (Figure 5-18). Machalilla with about 11%, contrasts with Agua Blanca with only about 2% (the other settlements had such minute quantities of these tools that they produced unusable error ranges). This difference could be the result of several factors. Either the Machalilla work areas were slightly more intense than those of Agua Blanca (which appears to be roughly supported by the general picture reconstructed here) or more people were engaged in shell craft production in Machalilla than at Agua Blanca. To investigate this second possibility it is important to reconstruct the scale of production in the different settlements. Towards this end, the next section explores issues of scale using the data from the regular collection lots, the shell concentrations, as well as supporting lithic data.

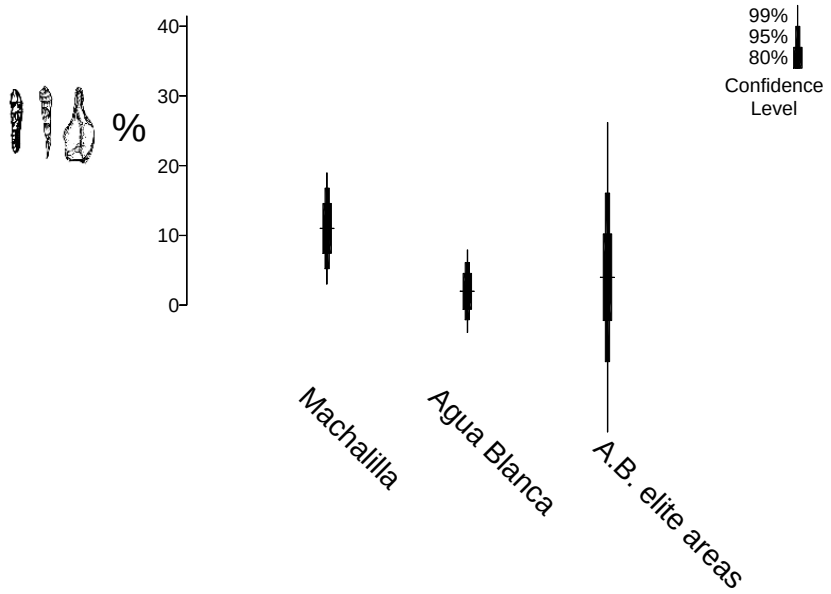


Figure 5-18. Proportion of manufacturing tools within total lithic count for the shell concentrations of Machalilla and Agua Blanca.

5.4.2 Scale of Production and the Coast of Ecuador

Unlike intensity, considerably fewer efforts have been undertaken to understand the scale of production within coastal Ecuador. In order to determine the scale of production it is necessary to measure the proportion of people within the population that are engaged in a given activity. If only a few individuals are involved in the production of a given item then this is considered to be small-scale production. Alternatively, large-scale production is where just about everybody is engaged in craft production. These different scenarios are expected to leave very different patterns in the archaeological record. While small-scale shell production would only leave material remains of the activity in a small portion of a settlement (spatially representing just a

few people), a larger scale of production would leave a wider dispersal of material evidence throughout an occupied area. Finally, if just about everybody was engaged in manufacturing shell items for export, we would expect the material remains of this activity to be ubiquitous throughout a settlement.

Because scale by definition refers to the broader social distribution of a given activity, and deals fundamentally with the ubiquity or dispersal of its archaeological evidence, it cannot by its very nature be appropriately studied through single localized excavations (although see Taylor 2009 for an interesting approach to solving this problem when regional data is lacking). While localized horizontal excavations are often useful in providing rich detailed data about specific locales and serve as useful methodology for investigating phenomena that are localized in nature (such as the intensity of specific work areas), they prove inadequate for understanding regional phenomena. Communal or regional forms of organization intrinsically require communal or regional levels of analysis. In this sense, it is precisely this property that makes systematically collected regional survey data a powerful tool to investigate issues of scale.

Since the fundamental task was to sketch out the general ubiquity of manufacturing evidence in the different communities, scale was determined by using the shell data from the regular collections lots. Each community or occupation is composed of several lots and a systematic collection of artifacts was picked up at the heart of every one. Each collection, then, serves a single observation of whether or not that spot contained shell-manufacturing evidence. Consequently, the proportion of collections within a given community that show manufacturing evidence would indicate (within the attached error ranges) the proportion of territory, and by proxy the amount of people, that were involved in shell craft activities. The most direct artifactual evidence of the production of shell export items is the presence of at least one of the

four exotic species used to manufacture export items (*Spondylus princeps* and *calcifer*, *Pteria sterna*, and *Pinctada mazatlanica*). If the manufacture of exotic shell items was only carried out by a handful of people, we would expect that only a small proportion of the collections would have picked up one of these four exotic species used to manufacture exports. By contrast, if just about everybody was in some way involved in this type of craft production, we would expect that the presence of these four shell species would be widespread, and that most collection units would have recovered at least one of these species.

For example, if we examine the continuous surface scatter that represents the center of the Machalilla community (Figure 5-19), we can see that 35 of the 51 collections carried out at the center of each lot recovered shell remains used in the production of exports. Statistically, while 51 observations is not a terribly high number, it still allows us to say that (at a 95% confidence level) the proportion of the total area of Machalilla that shows surface evidence of the shell species used in craft production is 69% with an error range of ±12%. While the error range is somewhat wide, this proportion does indicate that it is very likely that a very large proportion of the population was engaged in this activity.

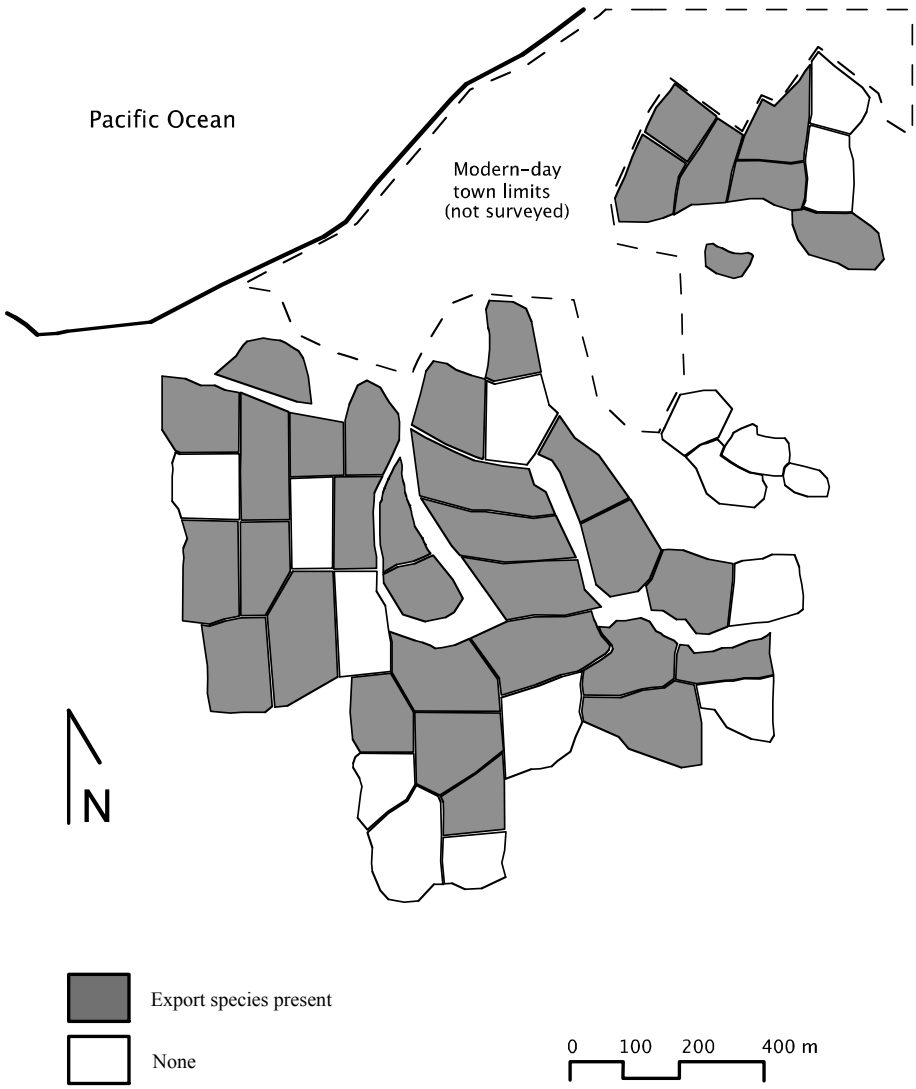


Figure 5-19. Lots of the central Machalilla surface scatter where regular collections retrieved at least one of the four shell species used to manufacture export items.

If instead of only using this continuous surface scatter, we include all the lots that define the Machalilla community (Figure 5-4), this number drops slightly to 56% since 39 of 70 lots recovered at least one of the four manufacturing species (±12% at 95% confidence). This is still a fairly large proportion of the total Machalilla settlement, which indicates that this activity was undertaken by a great many people in the community. If we consider that Machalilla is estimated

to have between 1700 and 3500 inhabitants, this would mean that about 940 to 1920 people might have been in some way engaged in craft production. This number is simply too large to be representative of monopolized, attached, or imbedded types of elite craft production where only a few specialists carry out production. This is further reinforced by the analyses of intensity carried out in the previous section, which indicate that all throughout the study area manufacturing of shell items always took place on a part time basis (low intensity production) and there is no evidence of full time specialist. It is much more likely that such large numbers of craft producers dispersed across a sizeable community like this one—and working at low intensity—are the result of domestic modes of craft production where many families took up this activity and used it to supplement their general subsistence economy.

The small community of San Isidro shows a very similar pattern. Altogether, 9 of the 22 collections recovered evidence of export manufacture, or 41% (±22% at 95% confidence). This would mean that between 35 and 70 people in a community of between 80 and 160 were involved in craft production.

By contrast, all other occupations have much lower scales of production, suggesting that outside of Machalilla and San Isidro, shell manufacturing was not as widespread. For Agua Blanca, of the 126 lots, only 19 or 15% (±6% at 95% confidence) recovered fragments of one of the four shell species used for exports. A substantially lower proportion that indicates that for that occupation exotic shell manufacturing was considerably more marginal, even in the place that congregated the second largest amount of people within the study area. Since the Agua Blanca occupation is estimated to have between 900 and 1800 people, about 140 to 280 could have worked at this activity.

Likewise, a very small proportion of the North Buenavista occupation shows any evidence of this activity. Only 2 of the 19 collections recovered evidence of shell craft production, or 11% (±15% at 95% confidence). This would mean that only between 10 and 20 people might have worked at this industry in this community.

Finally, the isolated rural farmsteads show the least evidence of being engaged in exotic shell manufacturing with only 17 of 261 collections retrieving any of the four shell species used for exports, or 7% (±9% at 95% confidence). Since the rural occupation is somewhat more sizable than the two smaller communities, with between 300 and 600 people, this would mean that between 20 and 40 people were engaged in craft production. All of these proportions are depicted in Figure 5-20.

Here, it is again important to remember that the analyses carried in the previous section indicate that for all these communities the intensity of production was low. The pattern of large scale/low intensity production found at Machalilla and San Isidro suggests that at those locations many families carried out craft production on a part time bases. In this sense, rather than interpreting the small scale of production of Agua Blanca, North Buenavista, and the scattered farmsteads as the possible presence of full time attached specialists, it is much more likely that the pattern of small scale/low intensity found at these communities results from only a few families working at craft production—also on a part time bases.

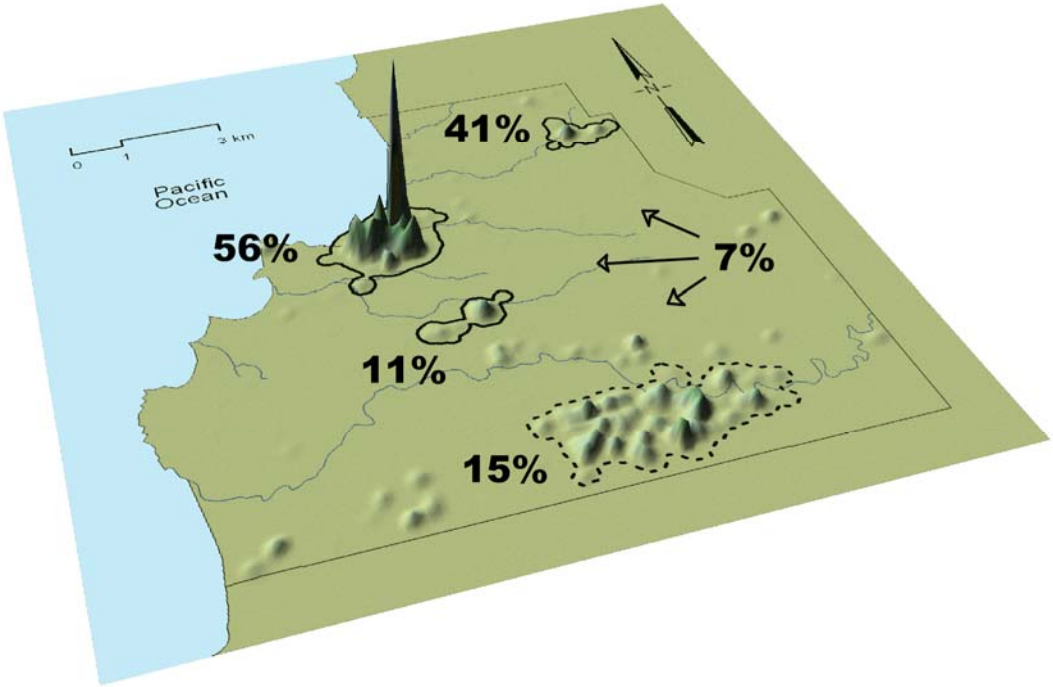


Figure 5-20. Scale of production for the four settlements in the study area as well as for the scattered farmstead occupation.

Adding together the number of people engaged in craft production from each community can provide us with some indication of the scale of manufacture at the regional level. First, the total number of people in the entire study area that appear to have been engaged in craft production is between 1150 and 2300. Again, this number is simply too large in absolute terms to represent elite monopoly of craft production, which is further reinforced by the general lack of any intense shell working areas within the study region. In prehistory, productive scales of this magnitude are more likely the result of many domestic units carrying out craft activities across a territory, more often than not, because they see some internal benefit in doing so.

Second, if we consider that population estimates suggest that during this period between 3150 and 6300 people lived inside the survey zone, it would mean that the proportion of the total regional population engaged in this production was about 36%. In other words, at the regional level, manufacturing of export items was not an activity carried out by most domestic units. Rather, it was an activity mostly undertaken by the inhabitants of the most populous center—Machalilla—and to a similar degree by the inhabitants of the smaller San Isidro village. At these two locations, there were enough families engaged in this activity that the industry could have certainly been an important component of the community's economy (even though it was carried out with low intensity modes of production by any given family). Yet outside of these areas, the scale of this activity drops considerably so that in combination with the low intensity of production the industry is likely to have been of marginal importance at those locations.

This means that for the overall regional population, the industry might not have been as important as it was for the inhabitants of Machalilla and San Isidro. For example, out of 498 lots, 57 contained manufacturing tools but no shell export species, 55 contained shell export species but no manufacturing tools, and another 31 contained both of these artifacts. This means that 355 (or 71% of all the lots) lacked evidence of shell production of any kind. A χ^2 test reveals that we can be highly confident that these strong proportional differences do represent the real population proportions (χ^2=24.128, p<.001). Again, those lots that do contain either lithic or shell manufacturing evidence, are fundamentally restricted to the highly populated, more nucleated community of Machalilla and the San Isidro village.

This should not be understood to mean a complete lack of importance of this industry at the regional level. Rather, it helps highlight essential differences in terms of subsistence strategies and settlement structure between the more nucleated Machalilla and San Isidro

communities, carrying out some degree of shell craft production, and the more dispersed Agua Blanca and rural occupations that focus more on agricultural strategies and show more dispersed settlement patterns. This differing emphasis is also evidenced by the variations in the basic domestic ceramic assemblages of these communities. Figure 5-21 shows a comparison of the proportions of *rallador* Manteño sherds to total sherd count for the different settlements. Although the word *rallador* translates as "grater," most archaeologists working in coastal Ecuador now recognize this to be a misnomer. The more agreed upon function for these thin, large striated plates is one of griddles for cooking manioc or maize foodstuffs (see Figure 2-11). As we can see, it is precisely the two more dispersed occupations (Agua Blanca and the isolated farmsteads) that show increased emphasis on ceramics associated with preparing agricultural resources. Since these cooking plates only comprised a small part of total domestic assemblages, and the sherds that could be recognized as such were even less, it had the effect of making differences in proportion seem weak. Nevertheless, the error ranges do suggest that we can be moderately confident that these differences in proportion represent actual differences in the population.

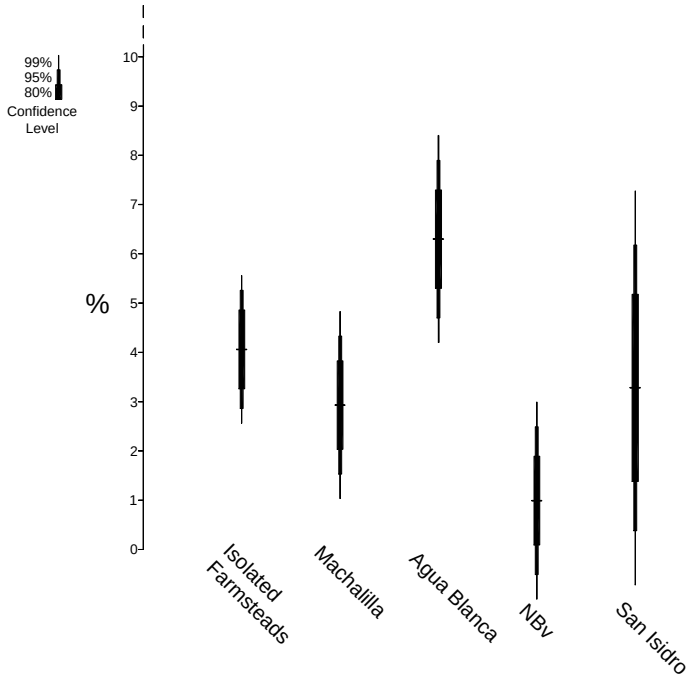


Figure 5-21. Comparison of the proportions of *rallador* Manteño sherds within total sherd count for the different settlements.

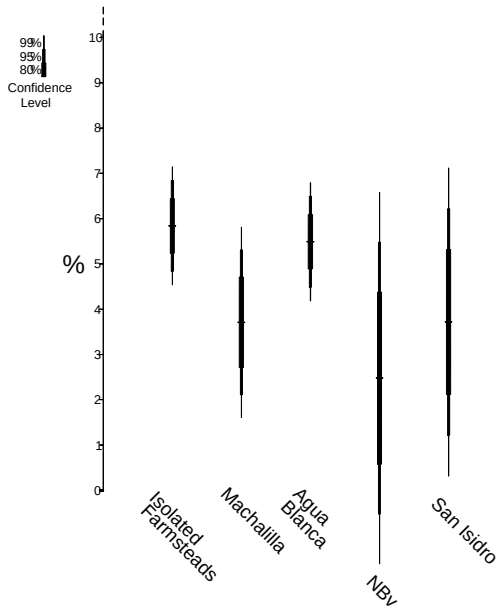


Figure 5-22. Comparison of the proportions of sherds belonging to large utilitarian pots within total sherd count for the different settlements.

The same pattern is also visible if we compare the sherd counts of large Manteño utilitarian pots (depicted in Figure 2-14 and presumably used to carry or store grain or other agricultural resources) to total sherd count (Figure 5-22). Again, the more dispersed occupations (Agua Blanca and the isolated farmsteads) show higher proportions of these sherds than the two nucleated communities with more evidence of craft production.

Interestingly, the North Buenavista community shows the lowest proportions of either utilitarian pots or *rallador* Manteño sherds than any other settlement. This not only suggests a generally low presence of domestic activities at this location, but also further reinforces the idea of North Buenavista as an especially distinct locus of elite activities.

5.4.3 The Domestic Mode of Production and the Organization of Craft Production

If shell craft production was being carried out by a small group of attached specialists financed by the political elites, we would have expected to find evidence of high intensity work areas restricted to a small territory of the study region. In fact, the data from the study area seems to support the complete inverse scenario. Evidence of craft production is dispersed throughout many locales and especially widespread throughout the most populous community in the survey zone, Machalilla. Based on demographic reconstructions, as many as between 1150 and 2300 people might have worked at this activity. At the same time there is no evidence for a single high intensity shell working area, either within the survey region, or from past excavations along the coast of Ecuador. This large scale/low intensity scenario is consistent with the way Masucci (1995) has characterized the organization of craft production for coastal Ecuador. She has noted that production of shell export items probably took place within the domestic mode of production as a supplemental industry to the subsistence domestic economy.

Within the study area, it appears that this industry boomed during the Integration Period, when Peruvian markets for *Spondylus* and other exotic shells blossomed (Carter 2008; Martín 2007; Shimada 1994). It is also during this period when for the first time in the local trajectory of development demographic numbers soar. This regional population growth appears primarily driven by Machalilla, which expands demographically much more than any other settlement capturing over half of the regional population, and yet retains a denser, more nucleated character than other places in the survey region. Most of the regional population that took advantage of shell craft production for export also appears to have resided at this locale. It seems reasonable to assume that this industry was in some way related to the factors that allowed Machalilla to support larger population numbers at this time. However, the people that took advantage of this industry apparently did not become full time specialist producers of exotic goods. While in certain settlements (such as Machalilla and San Isidro) the evidence of this activity is more widespread, low levels of intensity always remain constant, which suggests that whenever people engaged in shell manufacturing, they always carried out this activity in conjunction with other subsistence strategies.

As is to be expected, alongside the demographic expansion of the Machalilla center, regional population also increases. Many more people take advantage of the seasonally watered flood plains of the Buenavista Valley as well as settle the small communities of North Buenavista and San Isidro. Nevertheless, it is interesting to note that those areas where the emphasis was more on terrestrial resources retain a more dispersed character than the areas where the bulk of craft production took place, which are decisively more densely occupied. The nature of craft production, as an added benefit to the domestic unit, and without the need to

consume large amounts of land, could indeed have provided the basis for increased levels of population nucleation.

In spite of the long academic history of referring to the Agua Blanca occupation as the elite regional center (mainly due to the presence of architecturally complex *corrales* in that valley) we should note that most evidence for fancy ceramics occurs in Machalilla, and even more pronouncedly in the very small settlement of North Buenavista. It should be noted that while North Buenavista produced virtually no evidence of any type of shell production, it had overwhelmingly the most indicators of elite status (including high proportions of fancy ceramics and low proportions of domestic utilitarian pots and cooking griddle plates). This discrepancy between the settlement with the highest elite indicators and the lowest evidence for shell craft production further reinforces the conclusion that there was not a strong association between elites and shell production.

Instead, the influence of this activity in sociopolitical development appears to be more related to the economic principles that allowed individual family units to reside in closer proximity to one another than they previously had. With the introduction of this new form of supplemental income, the Machalilla settlement began supporting larger numbers of people living in denser settlements arrangements. The resulting population increase seen at this location is temporally and spatially coupled with a more complex regional settlement pattern that includes supra-local forms of organization and more status differentiation between settlements. In this sense, the increased packing and demographic growth evidenced in Machalilla at this time would have likely required an increase in the managerial political formations that permit fluent social articulation, and would have concurrently pushed for the higher levels of social and political complexity also evidenced during this period.

6.0 DISCUSSION AND CONCLUSIONS

Models that propose that the monopoly of the manufacture of luxury items by elites acted as the catalyst for sociopolitical development have been prominent in the discussion regarding the rise of social complexity. In this respect, the long trajectory of social development of the populations of southern Manabí serves as a useful case study to clarify the role that the manufacture of exotic items played in the development of political complexity.

First, southern Manabí does show evidence that its trajectory of social development was distinct from that of its neighbors to the north and south (Guayas and northern Manabí) where more gradual social development appears to have been underwritten by a maize staple economy. In southern Manabí, by contrast, social development appears to be more punctuated and vigorous, and especially associated with the appearance of large consumer markets for *Spondylus* objects in the central Andes. The developmental trajectory of the study area shows that the region retained extremely low population levels and a fairly uncomplex character throughout most of its chronological sequence, or from 3300 B.C. to around A.D. 800. However, during the Integration Period (A.D. 800-1532) the settlement pattern evidence shows a substantial regional population increase, a more complex settlement hierarchy, more wealth and functional differentiations amongst settlements, evidence of supra-local forms of settlement organization, the presence of elite or communal architecture, more evidence of institutionalized hierarchy, etc. This surge in sociopolitical complexity coincides with the time period in which the Sicán and

Chimú states expanded and Central Andean demand for Ecuadorian exotic shell items increased. Within the Machalilla National Park, evidence for the manufacture of such items is widespread, both in the form of shell debris discarded from the production of finished goods, as well as in the presence of the lithic tools used to manufacture them. The ceramic contents of the shell concentrations present throughout the study area revealed that the bulk of the manufacturing industry seems to have taken place during the Integration Period. This makes coastal Ecuador a particularly interesting case study for models of social development that see the manufacture of exotic export items as a key factor in the development of sociopolitical complexity.

As detailed in Chapter 1, in recent decades, researchers have tended to place a strong emphasis on the role of political elites when explaining the mechanisms through which societies become more complex. Particularly, many models of social evolution propose that control or monopoly of elites over craft production and/or long distance trade of luxury goods offers a critical avenue through which elites can increase their status. This can be done either by controlling the movement of exotic goods crucial for cultural reproduction, or by directly increasing their income through the extraction of surplus from this monopoly. This increase in prestige or wealth allows elites to separate themselves more markedly from the general population, which eventually leads their differential status to be institutionalized. While these types of approaches vary greatly in the specific mechanisms used to explain the development of social stratification, they all share a common emphasis on the central role of political elite institutions in the appropriation of craft production and on a resulting increase in social complexity (see for example Blanton et al. 1996; Earle 1997; Kipp and Schortman 1989; Stanish 2003, 2004; Vaughn 2006; amongst others). Stated in other words, these types of models see the

generation of a *political economy* as the central factor that allows social stratification to develop (Earle 2002, 1997).

In this regard, it is important to note a key distinction between this political economy and the *domestic economy* from which the former is derived (Earle 2002; Johnson and Earle 2000:22-27; Sahlins 1972; Smith 2004:78). The domestic economy refers to the range of productive activities that the domestic unit carries out with the purpose of generating resources for its biological and cultural reproduction. This includes the production of resources for sustenance, as well as the production of other items necessary to meet cultural needs, such as clothing, ceramic wares for food processing, ritual paraphernalia for ancestor veneration, personal adornments, etc. This sector of prehistoric economies contrasts with the political economy, which is based on the extraction of surpluses from domestic units by elites in order to finance their agendas or institutions (for example to fund monumental construction, acquire exotic goods, finance attached specialists, build public works, etc). In this sense, the political economy is intrinsically based on productive surpluses that go beyond what the domestic unit uses for its biological or cultural reproduction.

In the last few decades, much less emphasis has been placed on the role of the domestic economy in the development of social and political complexity. This is interesting in that while craft production has often been studied along the axis of its possible role in the formation of a political economy, researchers such as Feinman and Nicholas (2000) and Smith (2004:83) have noted that—for most prehistoric cases—craft production probably took place within the domestic unit or in workshops associated with the household. In fact, from a large cross-cultural study of societies of different levels of complexity, Clark and Parry (1990) show that the type of full-time specialization (high intensity production) that is often cited for attached specialists is strongly

correlated with complex states. In general terms, elites of less stratified societies have at their disposal less coercive power or economic resources with which to either force or finance full-time attached specialist than elites of larger, more complex societies. This would suggest that producers within societies in their early stages of social stratification would be expected to be less able to withdraw completely from their basic domestic subsistence pursuits in order to work full time as attached craft producers. Hence, for chiefly societies, it might be more appropriate to think that craft production was associated with the domestic subsistence economy rather than the formation of a political economy. It is this alternate scenario that is supported by the archaeological evidence from the Machalilla National Park.

The results of analysis from Chapter 5 indicate that, for this case of prehistoric craft production at least, the manufacture of export items does not appear to be associated with elites. If the production of luxury goods was carried out by a small group of attached specialists financed by the elite sector, which because of this financing could specialize more intensively at this activity, we would have expected to see evidence that the manufacture of such items was carried out by a small group of people, the evidence of manufacture should have shown some type of spatial association with elite areas, and there should have been evidence of work areas where shell manufacture was the primary activity. None of these expectations were supported by the analyses carried out.

On the contrary, the organization of shell working within the study area shows the opposite pattern. Evidence for manufacture of *Spondylus* objects is relatively widespread; the distribution of shell material strongly suggests that large numbers of people carried out this activity, particularly in the highly populated center of Machalilla, where spatial analysis revealed that more than half of the population is likely to have been involved in some way in craft

production. It is also this area that shows evidence of people settling more closely together than others in the study region. Manufacturing evidence does not appear to be associated with elite areas; rather, most shell working appears in the context of what are likely to be domestic shell middens. The make-up of these middens—mostly composed of small gastropods resulting from food procurement—also suggests that manufacturing was not carried out under high intensity modes of production, but rather that households took up this industry as a complement to other subsistence activities. In fact, not a single full time shell working area has been clearly recognized to date in the coast of Ecuador, either by this study or by past excavations.

These findings agree with the way Masucci (1995) has characterized shell manufacturing in coastal Ecuador for earlier periods. The cottage production of beads—which serve as non-perishable trade resources—could have provided a useful, more stable, secondary income that could help buffer environmental uncertainty and the resulting fluctuations in returns of more direct food procurement pursuits. In this sense, shell manufacturing actually forms part of the basic domestic subsistence economy and not part of a developing political economy.

How, then, did domestic craft production play a role in the rise of social stratification? Domestic units are generally thought to be very resistant to production intensification because in the domestic mode of production laborers are related, which provides disincentives to exploit them or intensify production beyond what is needed for the family (see Netting 1993:295-299; Stanish 2003, 2004:15; Vaughn 2006:315; etc.). In other words, domestic units are often seen as resistant to generating surpluses. This view is perhaps best exemplified by the Chayanov model, named after the Russian agrarian economist Alexander Chayanov (Netting 1993:299). He noted that, because household members are related, domestic units would only work as hard as they need to in order to meet their (biological and cultural) reproductive needs, which intrinsically

provides a productive ceiling for the generation of surpluses under domestic modes of production. This intrinsic tendency of the household unit to stabilize production below the generation of surpluses has been to some degree responsible for pressuring researchers to look for the catalyst of social stratification outside of the domestic unit, and consequently to give elite sectors more prominent roles in the models they use to explain the development of political economies.

While it is certainly true that the domestic modes of production have strong disincentives to generate surpluses, the appearance of new economic opportunities, and the economic pressures that they place of individual households, should also not be overlooked. Several decades ago, Renfrew (1969:159) noted the critical role that the appearance of new sources of income (whether by technological invention, the discovery of new resources, the appearance of new consumers, etc.) could have on local economies. In his study of the Neolithic, he argued that it was the appearance of a new resource that was for the first time worth trading—for that case metallurgy—that pressured European changes in social complexity at that time.

Certainly, and in spite of a tendency to stabilize production, it would be expected that domestic units would take advantage of better or more efficient forms of production, which allow them to spend less energy to get the same—or better—returns. For example, technological innovation can permit more efficient production; or new markets for luxury goods, which provide better returns, may develop elsewhere. In cases such as these, it would be natural to assume that family units would switch their productive strategy in order to spend less energy per laborer (or spend the same amount of energy with better returns). This would be particularly true in regions where environmental fluctuations make other subsistence pursuits uncertain (Masucci 1995). In this sense, while family units might retain their individual tendency to stabilize

production (and not over-exploit their family members), it would be normal to expect that, as many family units as the new resources can support, would switch their productive strategy to take advantage of their better returns. Particularly when the extraction or production of these new resources is in a restricted locale, this may have the outcome of promoting population nucleation in the areas where the opportunity to exploit them is available. In other words, the appearance of better economic opportunities might not prompt individual families to intensify production, but they very well might result in a larger number of households taking advantage of those resources.

Similarly, for the coast of Ecuador, the appearance of the *Spondylus* industry seems to have been related in some way to the demographic increase seen in the study area during the Integration Period. The data indicates that not only many more people are visible in the local landscape once Peruvian markets develop, but that the Machalilla community appears to have been the main locus of population growth, where a large proportion of the community took advantage of this industry.

In modern examples, the internal economic drives of individual household units have often been understood as key catalysts of population nucleation and demographic growth for regional centers. For example, for present-day Panama, Rudolf (1999) tracks how the macro process of rural migration to Panama city results from micro economic processes that originate at the individual household level, where each individual family attempts to take advantage of the perceived economic opportunities offered by the capital city. At the household level, rural families make conscious decisions based on perceived cost-benefits, which results in a system wide pattern of migration and nucleation to the city, a process commonly cited in modern examples as responsible for over-migration and associated city-slums in many cities around the world.

For prehistoric examples, the appearance of new economic opportunities in a restricted locale could certainly pressure individual household units to use similar economic cost-benefit rationales as they attempt to take advantage of the new resources. For the Ecuadorian coast, the appearance of *Spondylus* markets at around A.D. 600-800 could have very well offered family units important benefits that attracted them to Machalilla where they could take advantage of this resource. Even though only one part of a broader range of subsistence endeavors, many elements make *Spondylus* manufacturing a potentially important complement that family units might have wanted to include it in their substance strategy repertoire. Aside from the direct face value of the objects being produced, the nature of non-perishable trade resources would have been of great value in areas that face periodic environmental uncertainty such as this one. In this sense, the availability to exploit this resource may have been a critical factor in promoting the enlargement and more densely packed nature of Machalilla.

It is also possible that the appearance of the *Spondylus* industry on the archaeological landscape of coastal Ecuador influenced regional population growth through other means as well. For example, if this resource was of sufficient economic importance, its trade might have brought important quantities of edible resources into the area (maize or other foodstuffs), effectively raising the amount of people that the region could sustain. Furthermore, even a moderate population increase resulting from a few families taking advantage of this industry might have made it possible for the Machalilla community to provide a larger array of services than other nearby places, which would provide further incentives for more subsequent population growth and nucleation. At the same time, many other political, economic, and social factors are sure to have played important roles in the development of these populations, which may also have had their part in the demographic increase visible during the Integration Period. Much more

nuanced knowledge about the trajectory of development of these societies, from multiple scales of analysis, would provide valuable information to help reconstruct the role that the *Spondylus* industry played in the broader society and in social change.

Nevertheless, in whichever way the *Spondylus* industry affected population growth; this demographic increase would have had profound implications on the way society structured itself. As early as the nineteen sixties authors such as Service (1962) noted the central role of managerial formations in the development of social complexity. In small populations, maintaining full-time elites has a high proportional cost to each individual. However, as the size of the society grows, the proportional cost of maintaining these elites decreases in relation to the totality of the population. For this reason, as the population enlarges and more resources are generated, the proportion of resources that each domestic unit has to relinquish to maintain a full time elites is progressively less taxing. At the same time, as the population increases—and particularly in areas where people nucleate more closely together—the amount of social friction that individuals encounter also increases. This growing number of people residing in close proximity to one another would gradually experience more internal social conflict and tension, and would progressively require more and more the appearance of the managerial formations that permit smooth social articulation. At some point, the increasing need for managerial formations—produced by population enlargement—would offset the increasingly lowering cost of maintaining elites who could provide smoother social articulation (Service 1962).

Hence, under this scenario, it is individual household units that take advantage of the appearance of new resources for their own (economic) benefits. This has the result of congregating a larger number of families in the restricted locales where the new resources are available. Yet, at the same time, this creates a propitious environment for the formation of

hierarchical structures. It also creates precisely the type of environment that aspiring elites might take advantage of to increase their political economy. For example, aspiring elites might very well take advantage of this scenario and co-opt the control or production of the vessels that are needed to move the resources created by the individual domestic units; or acquire control of specific production nodes (see Arnold and Munns 1994:477). In other words, it is not to say that aspiring elites do not play a key role in the development of social stratification, but it is important not to overlook the economic forces that create the types of social environments where social stratification is likely to take place in our search for explanatory mechanisms of social development.

The details of the long trajectory of development of the Machalilla National Park seem to offer at least preliminary support for this scenario. It is the appearance of large consumer states of shell items in the central Andes that coincides with the drastic population enlargement and rise in social complexity of the study area. As noted above, the Machalilla center—located in prime relation to these exotic shell resources—appears to be the fulcrum of population growth, clearly dominating the landscape and attracting by far the largest number of people. It also shows a decidedly more nucleated pattern than other parts of the study area where shell-manufacturing evidence is scant or lacking (for example, Agua Blanca and the rural occupation). Finally, the makeup and distribution of shell craft production strongly suggest that it was not elite sectors, but rather domestic units, that took advantage of this industry; not in the form of high intensity production, but as a complementary source of income that provided people with more stable—or better—returns than were previously available in the area.

Studies that explore how new economic opportunities that originate non-locally affect the development of local societies are common in the academic literature (see for example Blanton

and Feinman 1984; Gilman 1991; Guinea 1995; Renfrew 1969). But treatments such as these often run the risk of being labeled as offering *Deus ex machina* explanations of social change. More specifically, they are often charged with explaining local development as a simple epiphenomenal effect of some change that took place elsewhere in the world. In this regard, it is important to note that the changes in the global landscape that took place outside of the areas under study are not truly what makes cases such as these interesting. Rather, it is the opportunity that they give us to discern the internal mechanisms by which local societies transform themselves into more complex stratified ones that is truly useful. Specifically for this case, it makes it possible to discern with more precision how the elemental forces of supply and demand affected the internal social structure of prehistoric societies.

This discussion is also not just relegated to the appearance of external markets. New types of production or better ways to exploit old resources can appear in a number of ways. For example, new ores for metallurgic production can be discovered, providing new sources of income; pilgrimage centers can congregate large numbers of people in small areas for the first time, creating new economic opportunities for local communities; the development of new technologies can allow more households to exploit the same amount of land; the production of weaponry for warfare can provide new sources of income for families; etc.

Scenarios such as these will often generate the economic centripetal forces that create denser, more nucleated communities where managerial formations would be encouraged to appear. Much more work is still needed to properly explore the interplay of economic pressures between the micro and macro sectors of prehistoric societies, as well as their relation to the formation of political institutions. In particular, multi-scalar research is critical. This study focused primarily on the regional and community levels, which until now had been largely

neglected along the coast of Ecuador. This provided a clearer picture of issues related to regional complexity and scale of production that is often difficult to discern through localized excavations. Even so, the complement that multiple horizontal excavations along the coast of Ecuador provided—particularly those of shell workshops—were invaluable to recreate a coherent picture of prehistoric production. In this sense, the findings of this research now allow us to refine our conceptualization of the industry and return to other scales of analysis with more precise questions regarding its role in prehistoric society.

Specifically, it is important to understand exactly how the development of this industry allowed for larger populations numbers to appear in the landscape and what other factors played a role in this development. To this aim, other demographic reconstructions, carried out in neighboring regions, would be highly informative. If nearby regions experienced a decrease in population numbers during the Integration Period, it would provide supportive evidence for the idea that the large demographic increase seen at Machalilla resulted from people moving into the study area as sketched above. On the other hand, if population numbers in neighboring regions remain stable or increase it would suggest that the *Spondylus* industry might have affected regional population numbers in other ways, perhaps by literally raising the carrying capacity of the region from the foodstuff acquired from its trade. Alternatively, we might look at the broader social context to find more clues regarding this demographic expansion. There is still much more to reconstruct about the specific social dynamics of this society, much of which might shed light on how precisely this industry fit into a larger picture of social development.

Including data from the other two settlements described in ethnohistoric accounts, as well as some larger expanses of surrounding hinterland would give us a more complete picture of how the Machalilla data fits within the larger Çalangome political unit, both economically and

politically. The analyses carried out here uncovered some degree of settlement differentiation in productive strategies, with Machalilla focusing more strongly on maritime recourses and craft production and Agua Blanca centering on inland resources and with only nominal amounts of shell craft production. Including data from the coastal communities of Puerto López and Salango might shed further light into the degree of productive differentiation between the coastal sites that had prime access to *Spondylus* shells.

Excavations at multiple commoner households throughout this region would allow us to compare assemblages more precisely to determine how much social and productive differentiation there is between households. This would make it possible to determine more precisely if there were other important factors affecting population nucleation and demographic growth. It would also be useful to determine if each family unit undertook all the stages of shell craft production or if there was noticeable division of labor between households. The degree of household craft interdependence and division of labor would shed light on the level of household autonomy with regards to this industry, which would in turn let us evaluate more accurately the degree to which the household economy was a dominant force on the formation of this industry.

More data from elite households units would provide evidence for elite interest and clarify how the elites came to cement their power, and indicate if this was in any way related to shell production. While the regional data reconstructed here has provided preliminary information for when political supra local structures arose, data from burials, as well as from elite and commoner households, would help determine when and how exactly political power became institutionalized. Data from burials, particularly form elite contexts—which until now have been prominently lacking—would be especially useful in that it would provide more direct evidence on the differing status of individuals. Evidence from these multiple places and scales is

critical to understanding more fully what role did craft production play in promoting population nucleation, demographic growth, and social differentiation; as well as for understanding what other factors played their role in these transformations.

Finally, once the evidence from the coast of Ecuador more has been more thoroughly reconstructed, it would greatly benefit from systematic comparisons to other regions where population nucleation (or the lack there of) has been reported and systematically investigated. This would make it possible to empirically compare elements such as the degree of nucleation, evidence for political complexity, the level of household or elite involvement in craft activities, demographic patterns, etc, to determine which factors appear to show strong correspondence and which ones do not. This would ultimately make it possible to go beyond the reconstruction of a single case to understand how these factors affected social development under explicitly comparative contexts.

7.0 BIBLIOGRAPHY

Abbott, R. Tucker
1974 *American Seashells*. New York: Van Nostrand Reinhold Co.

Akazawa, Takeru
1986 Hunter-gatherer Adaptations and the Transitions to Food Production in Japan. In *Hunters in Transition: Mesolithic Societies of Temperate Eurasia and their Transition to Farming*. M. Zvelebil, ed. Pp. 151-166. Cambridge: Cambridge University Press.

Arnold, Jeanne E., and Ann Munns
1994 Independent or Attached Specialization: The Organization of Shell Bead Production in California. *Journal of Field Archaeology* 21(4):473-489.

Baines, John, and Norman Yoffee
1998 Order, Legitimacy, and Wealth in Ancient Egypt and Mesopotamia. In *Archaic States*. G. Feinman and J. Marcus, eds. Pp. 200-260. Santa Fe: School of American Research Press.

Bauer, Daniel
2007 The Reinvention of Tradition: An Ethnographic Study of Spondylus Use in Coastal Ecuador. *Journal of Anthropological Research* 63:33-49.

Bischof, Henning
1982 La Fase Engoroy - Períodos, Cronología y Relaciones. In *Primer Simposio de Correlaciones Antropológicas Andino-Mesoamericano: 25-31 Julio, 1971, Salinas - Ecuador.* J. Marcos and P. Norton, eds. Guayaquil: ESPOL.

Boada Rivas, Ana María
2007 *The Evolution of Social Hierarchy in a Muisca Chiefdom of the Northern Andes of Colombia*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 17. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Blanton, Richard, and Gary Feinman
1984 The Mesoamerican World System. *American Anthropologist* 86(3): 673-682.

Blanton, Richard, Gary Feinman, Stephen Kowalewski, and Peter Peregrine
1996 A Dual-Processual Theory for the Evolution of Mesoamerican Civilization. *Current Anthropology* 37(1):1-14.

Blanton, Richard E., Stephen Kowalewski, Gary Feinman, and Jill Appel
1982 *Monte Albán's Hinterland, Part I: The Prehispanic Settlement Patterns of the Central and Southern Parts of the Valley of Oaxaca, Mexico*. Memoirs of the Museum of Anthropology, University of Michigan, Volume 15. Ann Arbor: University of Michigan.

Blower, David
1995 *The Quest for Mullu: Concepts, Trade, and the Archaeological Distribution, of Spondylus in the Andes*, M.A. Thesis, Department of Anthropology, Trent University.

Carneiro, Robert.
1981 The Chiefdom: Precursor to the State. In *The Transition to Statehood in the New World*. G. Jones and R. Kautz, eds. Pp. 37-79. Cambridge: Cambridge University Press.

Carter, Benjamin Philip
2008 *Technology, Society and Change: Shell Artifact Production Among the Manteño (A.D. 800-1532) of Coastal Ecuador*, Ph.D. Dissertation, Department of Anthropology, Washington University.

Chase-Dunn, Christopher, and Thomas D. Hall
1991 *Core/Periphery Relations in Precapitalist Worlds*. Boulder: Westview Press.

Clark, John E., and William J. Parry
1990 Craft Specialization and Cultural Complexity. *Research in Economic Anthropology* 12:289-346.

Clark, Kathleen E.
2001 Analysis of Molluscan Remains from the Río Chico Site (OMJPLP-170B), Manabí, Ecuador. Guayaquil: Report submitted to the Instituto Nacional de Patrimonio Cultural.

1995 Chapter 4: Analysis of Faunal Remains. In *Prehistory of the Southern Manabí Coast, Ecuador: Lopez Viejo*. E. Currie ed. Pp. 40-48. Oxford: Tempus Reparatum.

Cordy-Collins, Alana
1990 Fonga Sigde, Shell Purveyor to the Chimú Kings. In *The Northern Dynasties: Kingship and Statecraft in Chimor*. M.E. Moseley and A. Cordy-Collins, eds. Pp. 393-417. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

1985 The Old Shell Game: Spondylus and the Ecuadorian Connection. Paper presented at the Symposium "The Northern Dynasties: Kinship and Statecraft in Chimor," held at Dumbarton Oaks, Washington D.C., October 12th-13th, 1985.

Costin, Cathy Lynne
1991 Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production. *Archaeological Method and Theory* 3:1-56.

Cuellar, Andrea M.
2006 *The Organization of Agricultural Production in the Emergence of Chiefdoms in the Quijos Region, Eastern Andes of Ecuador*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Currie, Elizabeth J.
1995a Archaeology, Ethnohistory and Exchange Along the Coast of Ecuador. *Antiquity* 69(264):511-526.

1995b *Prehistory of the Southern Manabí Coast, Ecuador: López Viejo*. B.A.R. International Series, Volume 618. Oxford: Tempus Reparatum.

D'Altroy, T., and Timothy K. Earle
1985 Staple Finance, Wealth Finance, and Storage in the Inka Political Economy. *Current Anthropology* 26:187-197.

Damp, Jonathan
1988 *La Primera Ocupación Valdivia en Real Alto: Patrones Económicos, Arquitectónicos e Ideológicos. Volume 3*. Quito: Corporación Editora Nacional.

1984 Environmental Variation, Agriculture, and Settlement Process in Coastal Ecuador (3300-1500 B.C.). *Current Anthropology* 25(1):106-111.

Delgado Epinoza, Florencio
2002 *Intensive Agriculture and Political Economy of the Yaguachi Chiefdom of Guayas Basin*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Dillehey, Tom D.
2007 *Monuments, Empires and Resistance: The Araucanian Polity and Ritual Narratives*. Cambridge: Cambridge University Press.

Drennan, Robert
2006 *Prehispanic Chiefdoms in the Valle de la Plata, Volume 5: Regional Settlement Patterns*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 16. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

2001 Overview—Numbers, Models, Maps: Computers and Archaeology. In *Handbook of Archaeological Sciences.* D.R. Brothwell and H. Pollard, eds. Pp. 663-670. London: Wiley.

1996 *Statistics for Archaeologists: A Common Sense Approach*. New York: Plenum Press.

1995 Chiefdoms in Northern South America. *Journal of World Prehistory* 9(3):301-340.

1988 Household Location and Compact versus Dispersed Settlement. In *Household and Community in the Mesoamerican Past*. R. Wilk and W. Ashmore, eds. Pp. 273-293. Albuquerque: University of New Mexico.

Drennan, Robert, and Christian E. Peterson
2005 Communities, Settlements, Sites, and Surveys: Regional-scale analysis of prehistoric human interaction. *American Antiquity* 70(1):5-30.

Drennan, Robert D., Christian E. Peterson, Gregory Indrisano, Teng Mingyu, Gideon Shelach, Zhu Yanping, Katheryn Linduff, and Guo Zhizhong.
2003a Chapter 4: Approaches to Regional Demographic Reconstruction. In *Regional Archaeology in Eastern Inner Mongolia: A Methodological Exploration*. Pp. 152-165. Beijing: Science Press.

Drennan, Robert D., Gideon Shelach, Gregory Indrisano, Zhu Yanping, Katheryn Linduff, Guo Zhizhong, and Manuel Roman-Lacayo.
2003b Chapter 3: Methods for Archaeological Settlement Study. In *Regional Archaeology in Eastern Inner Mongolia: A Methodological Exploration*. Pp. 122-151. Beijing: Science Press.

Earle, Timothy K.
2002 *Bronze Age Economics: The Beginnings of Political Economies.* Boulder: Westview.

1997 *How Chiefs Come to Power: The Political Economy in Prehistory*. Stanford: Stanford University Press.

Estrada, Victor Emilio
1958 *Las Culturas Pre-Clásicas, Formativas, o Arcáicas del Ecuador*. Guayaquíl: Museo Victor Emilio Estrada.

1957 *Prehistoria de Manabí*. Guayaquil: Museo Victor Emilio Estrada.

Feinman, Gary M.
2000 Corporate/Network: New Perspectives on Models of Political Action and the Puebloan Southwest. In *Social Theory in Archaeology*. M.B. Schiffer, ed. Pp. 31-51. Salt Lake City: University of Utah Press.

Feinman, Gary M., and Linda M. Nicholas
2000 High-Intensity Household-Scale Production in Ancient Mesoamerica: A Perspective from Ejutla, Oaxaca. In *Cultural Evolution: Contemporary Viewpoints*. G.M. Feinman and L. Manzanilla, eds. Pp. 119-142. New York: Kluwer Academic/Plenum Publishers

Fish, Suzanne, and Stephen Kowalewski, eds.
1990 *The Archaeology of Regions*. Washington D.C.: Smithsonian Institution Press.

Flores, Carola F., Bernardo R. Broitman, and Pilar Rivas
2009 Changes in the Subsistence Strategy of Prehistoric Intertidal Gathering: The Preceramic and Ceramic Coastal Hunter-Gatherers of Reloncaví Sound. In *Comparative Perspectives on the Archaeology of Coastal South America*. R.E. Cutright, E. Lopez-Hurtado, and A.J. Martín, eds. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Fried, M.
1967 *The Evolution of Political Society*. New York: Random House.

Gilman, Antonio
1991 Trajectories Towards Social Complexity in the Later Prehistory of the Mediterranean. In *Chiefdoms: Power, Economy, and Ideology*. T. Earle, ed. Pp. 146-168. Cambridge: Cambridge University Press.

Guinea, Mercedes
1995 Diferentes Mecanismos de Articulación Hombre-Entorno en la Costa Norte de Ecuador. In *Primer Encuentro de Investigadores de la Costa Ecuatoriana en Europa*. S.G. Alvarez, A. Alvarez, C. Fauria, and J.G. Marcos, eds. Pp. 47-61. Quito: Abya-Yala.

Haller, Mikael John
2004 *The Emergence and Development of Chiefly Societies in the Rio Parita Valley, Panama*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Harris, Michael, Valentina Martínez, W.M Herald Kennedy, Charles Roberts, and James Gammack-Clark
2004 The Complex Interplay of Culture and Nature in Coastal South-Central Ecuador: An Interdisciplinary Work. *Expedition* 46(1):38-43.

Hester, Thomas R., and Harry J. Shafer
1992 Lithic Workshops Revisited: Comments on Moholy-Nagy. *Latin American Antiquity* 3(3):243-248.

Johnson, A. W., and Timothy Earle
2000 *The Evolution of Human Societies: From Foraging Group to Agrarian State*. Stanford: Stanford University Press.

Kim, Bumcheol
2005 *Rice Agricultural Intensification and Sociopolitical Development in the Bronze Age, Central Western Korean Peninsula*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Kipp, Rita Smith, and Edward M. Schortman

1989 The Political Impact of Trade in Chiefdoms. *American Anthropologist* 91(2):370-385.

Keen, Myra
1971 *Sea Shells of Tropical West America*. Stanford: Stanford University Press.

Kowalewski, Stephen A., Gary M. Feinman, Laura Finsten, Richard E. Blanton, Linda M. Nicholas
1989 *Monte Albán's Hinterland, Part II: Prehispanic Settlement Patterns in Tlacolula, Etla, and Ocotlán, the Valley of Oaxaca, Mexico*. Memoirs of the Museum of Anthropology, University of Michigan, Volume 23. Ann Arbor: University of Michigan.

Kristiansen, Kristian
1987 Center and Periphery in Bronze Age Scandinavia. In *Centre and Periphery in the Ancient World*. M. Rowlands, M. Larsen, and K. Kristiansen, eds. Pp. 74-86. Cambridge: Cambridge University Press.

Langebaek, Carl Henrik
1995 *Regional Archaeology in the Muisca Territory: A Study of the Fúquene and Susa Valleys*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 9. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Lunnis, Richard
2001 *Archaeology at Salango, Ecuador: an Engoroy Ceremonial Site on the South Coast of Manabí*, Ph.D. Dissertation, Department of Archaeology, University College London.

Marcos, Jorge G.
1995 El Mullo y el Pututo: La Articulación de la Ideología y el Tráfico a Larga Distancia en la Formación del Estado Huancavilca. In *Primer Encuentro de Investigadores de la Costa Ecuatoriana en Europa*. S.G. Alvarez, A. Alvarez, C. Fauria, and J.G. Marcos, eds. Pp. 97-142. Quito: Abya-Yala.

1988 *Real Alto: La Historia de un Centro Ceremonial Valdivia (Primera Parte)*. Quito: Corporación Editora Nacional.

1985 El "Mullu" (Spondylus Princeps) Alimento de los Dioses Andinos. In *Actas del Seminario Sobre la Situación de la Investigación de las Culturas Indígenas de los Andes Septrionales.* Pp. 111-115. Madrid: Ediciones Cultura Hispánica.

1977/78 Cruising to Acapulco and Back with the Thorny Oyster Set. *Journal of the Steward Anthropological Society* 9(1-2):99-133.

Martín, Alexander J.
2009 Comparing the Role of the Export Sector in Prehistoric Economies: The Importance of Shell Manufacture to the Livelihood of Coastal Ecuadorian Populations. In *Comparative Perspectives on the Archaeology of Coastal South America*. R.E. Cutright,

E. Lopez-Hurtado, and A. Martín, eds. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

2007 El Intercambio de Spondylus a lo Largo de la Costa Sudamericana de Acuerdo al Registro Arqueológico. In *II Congreso Ecuatoriano de Antropología y Arqueología. Balance de la Última Década: Aportes, Retos y Nuevos Temas, Volumen 1*. F. García, ed. Pp. 433-462, Quito: Abya-Yala.

2001 *The Dynamics of Pre-Columbian Spondylus Trade Across the South American Central Pacific Coast*, M.A. Thesis, Department of Anthropology, Florida Atlantic University.

Martínez, Valentina

2001 Río Chico Site Report (OMJPLP-170B), Manabí, Ecuador: Report Submitted to the offices of the Instituto Nacional de Patrimonio Cultural, Guayaquíl.

1987 Campos Elevados al Norte del Sitio Arqueológico Peñon del Río, Guayas, Ecuador. In *Pre-hispanic Ridged Fields in the Andean Region*. W.M. Denevan, K. Mathewson, and G. Knapp, eds. Pp. 267-277, B.A.R. International Series, Volume 359(ii). Oxford: Tempus Reparatum.

Masucci, Maria Ann

1995 Marine Shell Bead Production and the Role of Domestic Craft Activities in the Economy of the Guangala Phase Southwest Ecuador. *Latin American Antiquity* 6(1):70-84.

1992 *Ceramic Change in the Guangala Phase, Southwest Ecuador: A Typology and Chronology (Ceramics)*, Ph.D. Dissertation, Department of Anthropology, Southern Methodist University.

McEwan, Colin

2003 *'And the Sun Sits in his Seat': Creating Order in Andean Culture*, Ph.D. Dissertation, Department of Anthropology, University of Illinois Urbana-Champaign.

Meggers, Betty Jane

1966 *Ecuador: Ancient Peoples and Places*. New York: Praeger.

Mester, Ann Marie

1990 *The Pearl Divers of Los Frailes: Archaeological and Ethnohistorical Explorations of Sumptuary Good Trade and Cosmology in the North and Central Andes*, Ph.D. Dissertation, Department of Anthropology, University of Illinois Urbana-Champaign.

Moholy-Nagy, Hattula

1990 The Misidentification of Lithic Workshops. *Latin American Antiquity* 1(3):268-279.

Moseley, Michael E.
1992 Maritime Foundations and Multilinear Evolution: Retrospect and Prospect. *Andean Past* 3:5-42.

1975 *The Maritime Foundations of Andean Civilization*. Menlo Park: Cummings.

Murra, John V.
1982 El Tráfico de Mullu en la Costa del Pacífico. In *Primer Simposio de Correlaciones Antropológicas Andino-Mesoamericano*, July 25-31, 1971. J. Marcos and P. Norton, eds. Pp. 265-74. Guayaquil: Escuela Superior Politécnica del Litoral.

Murillo Herrera, Mauricio
2009 *Social Change in Pre-Columbian San Ramón de Alajuela, Costa Rica, and its Relation with Adjacent Regions*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Muse, Michael
1991 Products and Politics of a Milagro Entrepot: Peñon del Río, Guayas Basin, Ecuador. *Research in Economic Anthropology* 13:269-323.

1989 Corrología Regional y Relaciones de Territorialidad en la Región Oeste del Area Septentrional Andina, Siglo XVI. In *Relaciones Interculturales en el Area Ecuatorial del Pacífico Durante la Epoca Precolombina.* J.-F. Bouchard and M. Guinea, eds. Pp. 187-197. B.A.R. International Series, Volume 503. Oxford: Tempus Reparatum.

Netting, Robert McC
1993 *Smallholders, Householders: Farm Families and the Ecology of Intensive Sustainable Agriculture*. Stanford: Stanford University.

Norton, Presley
1986 El Señorío de Calangome y la Liga de Mercaderes. *Miscelánea Antropológica Ecuatoriana* 6:131-144.

Norton, Presley, Richard Lunnis, and Nigel Nayling
1983 Excavaciones en Salango, Provincia de Manabí. *Miscelánea Antropológica Ecuatoriana* 3:9-72.

Olsson, Axel A.
1961 *Mollusks of the Eastern Pacific: Particularly from the Southern Half of the Panamic-Pacific Faunal Province (Panama to Perú).* Ithaca: Paleontological Research Institution.

Oyola-Coeur, Monica
2000 *A Preliminary Investigation of the Ceramic Styles and Chronology at the Río Chico Site (OMJPLP170), Manabí, Ecuador*, M.A. Thesis, Department of Anthropology, Florida Atlantic University.

Paulsen, Allison C.
1974 The Thorny Oyster and the Voice of God: Spondylus and Strombus in Andean Prehistory. *American Antiquity* 39(4):597-607.

1970 *A Chronology of Guangala and Libertad Ceramics of the Santa Elena Peninsula in South Coastal Ecuador*, Ph.D. Dissertation, Department of Anthropology, Columbia University.

Pearsall, Deborah M.
2002 Maize is Still Ancient in Prehistoric Ecuador: The View from Real Alto, With Comments on Staller and Thompson. *Journal of Archaeological Science* 29:51-55.

1996 Reconstructing Subsistence in the Lowland Tropics: A Case Study from the Jama River Valley, Manabí, Ecuador. In *Case Studies in Environmental Archaeology*. E.J. Reitz, L.A. Newsom, and S.J. Scudder, eds. Pp. 233-254. New York: Plenum Press.

Pearsall, Deborah, Karol Chandler-Ezell, and James Zeidler
2003 Maize in Ancient Ecuador: Results of Residual Analysis of Stone Tools from the Real Alto Site. *Journal of Archaeological Science* 31:423-442.

Peregrine, Peter
2000 Archaeology and World Systems Theory. In *A World-Systems Reader*. T. Hall, ed. Pp. 59-68 Lanham: Rowman & Littlefield.

1992 *Mississippian Evolution: A World Systems Perspective.* Madison: Prehistory Press.

Peterson, Christian E.
2006 *"Crafting" Hongshan Communities? Household Archaeology in the Chiefeng Region of Eastern Inner Mongolia, PRC*, Ph.D. Dissertation, Department of Anthropology, University of Pittsburgh.

Peterson, Christian E., and Robert Drennan
2005 Communities, Settlements, Sites, and Surveys: Regional Scale-Analysis of Prehistoric Human Interaction. *American Antiquity* 70:5-30.

Piana Bruno, Luiz, and Hans Marotzke
1997 *Unidad Cultural en el Litoral Meridional Ecuatoriano*. Guayaquil: Escuela Superior Politecnica del Litoral.

Pizarro, Francisco
1571 (1844) Relación del Descibrimiento y Conquista de los Reinos del Perú. In *Colección de Documentos Inéditos para la Historia de España, Volumen 5*. M. Fernandez Navarrete, M. Salva, and P. Sainz de Baranda, eds. Pp. 201-388. Madrid.

1527 (1844) Relación de los Primeros Descubrimientos de Francisco Pizarro y Diego de Almagro. In *Colección de Documentos Inéditos Para la Historia de España, Volumen 5*. M. Fernández Navarrete, M. Salva, and P. Sainz de Baranda, eds. Pp. 193-201. Madrid.

Pillsbury, Joanne
1996 The Thorny Oyster and the Origins of Empire. *Latin American Antiquity* 7(4):313-340.

Reitz, Elizabeth J., and Maria Ann Masucci
2004 *Guangala Fishers and Farmers: A Case Study of Animal Use at El Azúcar, Southwestern Ecuador*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 14. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Renfrew, Colin
1969 Trade and Culture Process in European Prehistory. *Current Anthropology* 10(2/3):151-169.

Richardson III, James B., and Thor Heyerdahl
2001 Where are the Sails: Pre-Columbian Contact Between the Central Andes, the Pacific Islands, and Mesoamerica. Paper presented at the SAA conference, New Orleans.

Rowe, Sarah M.
2003 *Variation and Continuity in Manteño Ceramics: Issues of Social/Ethnic Identity*, M.A. Thesis, Department of Anthropology, University of Illinois Urbana-Champaign.

Rudolf, Gloria
1999 *Panama's Poor: Victims, Agents, and History Makers*. Gainesville: University Press of Florida.

Sahlins, Marshall
1972 *Stone Age Economics*. New York: Aldine de Gruyter.

1963 Poor Man, Rich Man, Big Man, Chief: Political Types in Melanesia and Polynesia. *Comparative Studies in Society and History* 5(3):285-303.

Sanders, William T., Jeffrey R. Parsons, and Robert S. Santley
1979 *The Basin of Mexico: Ecological Processes in the Evolution of a Civilization*. New York: Academic Press.

Schneider, Jane
1977 Was there a Precapitalist World-System? *Peasant Studies* 4(1):20-29.

Service, Elman Rogers
1962 *Primitive Social Organization: An Evolutionary Perspective*. New York: Random House.

Shafer, Harry J., and Thomas R. Hester
1991 Lithic Craft specialization and Product Distribution at the Maya site of Colha, Belize. *World Archaeology* 23(1):79-97.

Shimada, Izumi
1994 *Pampa Grande and the Mochica Culture*. Austin: University of Texas Press.

Silva, María Isabel
1984 *Pescadores y Agricultores de la Costa Central del Ecuador: Un Modelo Socio-económico de Asentamientos Precolombinos*, M.A. Thesis, Department of Anthropology, University of Illinois Urbana-Champaign.

Smith, Michael E.
2004 The Archaeology of Ancient State Economies. *Annual Review of Anthropology* 33:73-102.

Stanish, Charles
2004 The Evolution of Chiefdoms: An Economic Anthropological Model. In *Archaeological Perspectives on Political Economies*. G. Feinman and L.M. Nicholas, eds. Pp. 7-24. Salt Lake City: University of Utah Press.

2003 *Ancient Titicaca: The Evolution of Complex Society in Southern Peru and Northern Bolivia*. Berkeley: University of California Press.

Stemper, David
1993 *The Persistence of Prehispanic Chiefdoms on the Río Daule, Coastal Ecuador*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 7. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Stothert, Karen E., Dolores R. Piperno, and Thomas C. Andres
2003 Terminal Pleistocene/Early Holocene Human Adaptation in Coastal Ecuador: The Las Vegas Evidence. *Quaternary International* 109-110:23-43.

Taylor, Sarah R.
2009 Evaluating the Role of Inter-Societal Interaction in the Emergence of Institutionalized Hierarchy: An Example from Southern Ecuador/Northern Peru. In *Comparative Perspectives on the Archaeology of Coastal South America*. R.E. Cutright, E. Lopez-Hurtado, and A.J. Martín, eds. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Vaughn, Kevin J.
2006 Craft Production, Exchange, and Political Power in the Pre-Incaic Andes. *Journal of Archaeological Research* 14:313-344.

Widmer, Randolph, and Rebecca Storey
1994 Social Organization and Household Structure of a Teotihuacán Apartment Compound: S3W1:33 in the Tlajinga Barrio. In *Prehispanic Domestic Units in Western Mesoamerica*. K. Santley and K. Hirth, eds. Pp. 87-104. Boca Raton: CRC.

Yépez, Alexandra
2007 La Dinámica de las Identidades: La Etnoarqueología como Instrumento del Pasado. In *II Congreso Ecuatoriano de Antropología y Arqueología. Balance de la Última Década: Aporte, Retos y Nuevos Temas, Volumen 1*. F. García, ed. Pp. 606-629. Quito: Abya-Yala.

Zedeño, Maria Nieves
1985 *Analisis de Ceramica Chorrera del Sitio Peñon del Rio*, Licenciatura Thesis, Escuela Politecnica del Litoral, Ecuador.

Zeidler, James A.
2003 Appendix A: Formative Period Chronology for the Coast and Western Lowlands of Ecuador. In *Archaeology of Formative Ecuador*. J.S. Raymond and R. Burger, eds. Pp. 487-527. Washington D.C.: Dumbarton Oaks Research Library and Collection.

1991 Maritime Exchange in the Early Formative Period of Coastal Ecuador: Geopolitical Origins of Uneven Development. *Research in Economic Anthropology* 13:247-268.

Zeidler, James, and Deborah Pearsall
1994 *Regional Archaeology in Northern Manabí, Ecuador, Volume 1*. University of Pittsburgh Memoirs in Latin American Archaeology, Volume 8. Pittsburgh: University of Pittsburgh Latin American Archaeology Publications.

Zvelebil, M.
1986 Mesolithic Societies and the Transition to Farming: Problems of Time, Scale, and Organization. In *Hunters in Transition: Mesolithic Societies of Temperate Eurasia and their Transition to Farming*. M. Zvelebil, ed. Pp. 167-188. Cambridge: Cambridge University Press.