CHAPTER 3

THE NIÑALUPITA PERIOD: DOMESTIC ECONOMY

The Initial Occupation of Jachakala

The Niñalupita Period at Jachakala began around AD 170 and lasted until approximately AD 600. The site's founding date is based on a single calibrated radiocarbon sample obtained from a well-preserved hearth in the deepest cultural level. This carbon sample dates the site's initial occupation to 1720±60 years BP, between AD 170 and 290. Altogether, 80 centimeters of cultural deposits comprise the Niñalupita occupation of the site. These Niñalupita levels constitute a total of approximately four centuries of domestic occupation, given the current chronological understanding.

Surface remains at Jachakala cover 6.7 hectares, but the Niñalupita Period occupation measured approximately three to four hectares as a combination of artifacts and small domestic features extending from the southernmost border of the site to the middle of the central zone. In other words, the initial occupation of Jachakala lies underneath the southern half or so of the area later covered by the final, Jachakala Period, occupation. By the time of the final occupation, walls on the site's surface divided the Jachakala Period residents into two broad areas, the southern and central zones. Because the dividing walls date to late in the site's history (they are visible on the surface), they did not divide the community during the Niñalupita Period.

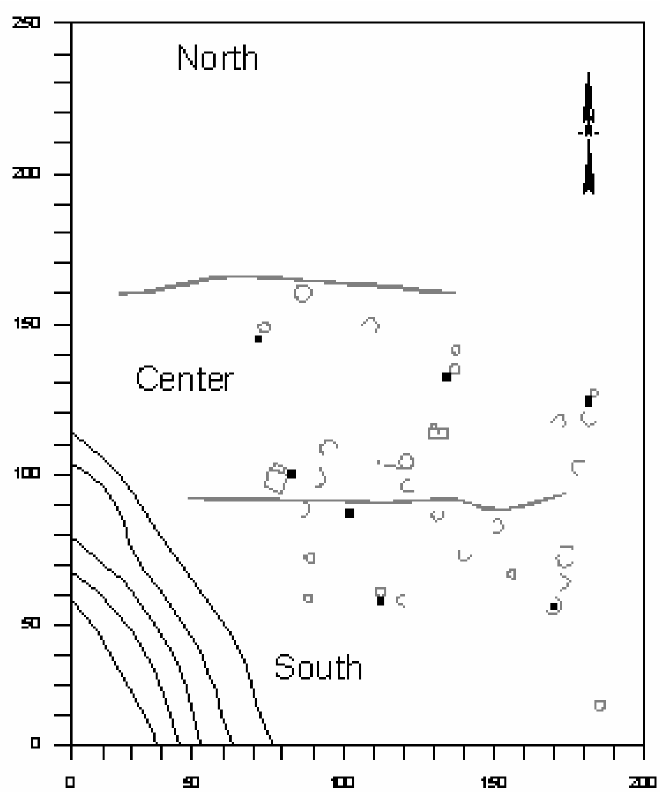


Figure 8. Location of excavation units (in relation to surface architectural remains) with Niñalupita Period levels used in inter-zonal analyses of cultural materials.

Excavation Units

Niñalupita Period remains were exposed in seven units located in the central and southern zones of the site (Figure 8). The only units in the northern zone with Niñalupita Period levels were those in the cemetery. Consequently, domestic refuse dating to this first occupation of Jachakala is confined to the south and center. The units selected for analysis were judgmentally chosen from the seventeen southern and central zone units excavated to sterile soil. Five of the seven were 2 x 2 m pits judgmentally placed next to house foundations on the surface to locate deep middens. The remaining two units were 2 x 2 m pits randomly located at the site, and systematically excavated in 10 cm levels down to sterile soil (reached between 140 and 195 cm below the surface). Three of the seven are located in the central zone, three lie in the site's southernmost zone, and a seventh unit, though technically on the border of these two zones, is classified as a central zone unit. This chapter concerns only the Niñalupita Period levels of these excavation units.

Finally, it should be noted that all of these units were excavated in 10 cm levels. The soil matrix generally consisted of light or dark orange-brown, homogeneous, very hard and compact silty clay. Pockets of organic inclusions such as carbon fragments and ash, as well as small domestic features, were occasionally encountered and recorded. Given these general characteristics, excavations proceeded in arbitrarily chosen 10 cm levels until sterile soil was reached.

Domestic Remains

No residential stone foundations were identified deeper than a meter below the surface, but recognizable domestic features such as small, unlined hearths, ash-filled pits, storage pits, adobe wall melt, and a small number of possible activity areas are scattered throughout the compact, silty clay matrix. Sections of this soil matrix include adobe wall melt, showing that structures once had mudbrick walls. Figure 9 is a stratigraphic profile of a southern zone unit showing several such features. Stone bifaces, projectile points, scrapers, a range of ceramic forms, and faunal remains, suggest that farming, herding, hunting, scraping, storage, and cooking were common household activities.

The Cemetery

Some forty to fifty meters to the north of this initial occupation, Jachakala's residents had already begun to bury their dead in a small area that was to serve as the cemetery for the village's entire thousand or so year history. The well-preserved remains of three older males were excavated in Niñalupita Period levels of this cemetery. The physical orientation, position, and treatment these three received differed greatly; one underwent post-mortem mutilation, another was laid extended atop a small fire, and a third was interred in a fetal position. Other than large round stones and a small quantity of undecorated sherds, however, no grave goods accompanied any of these three individuals.

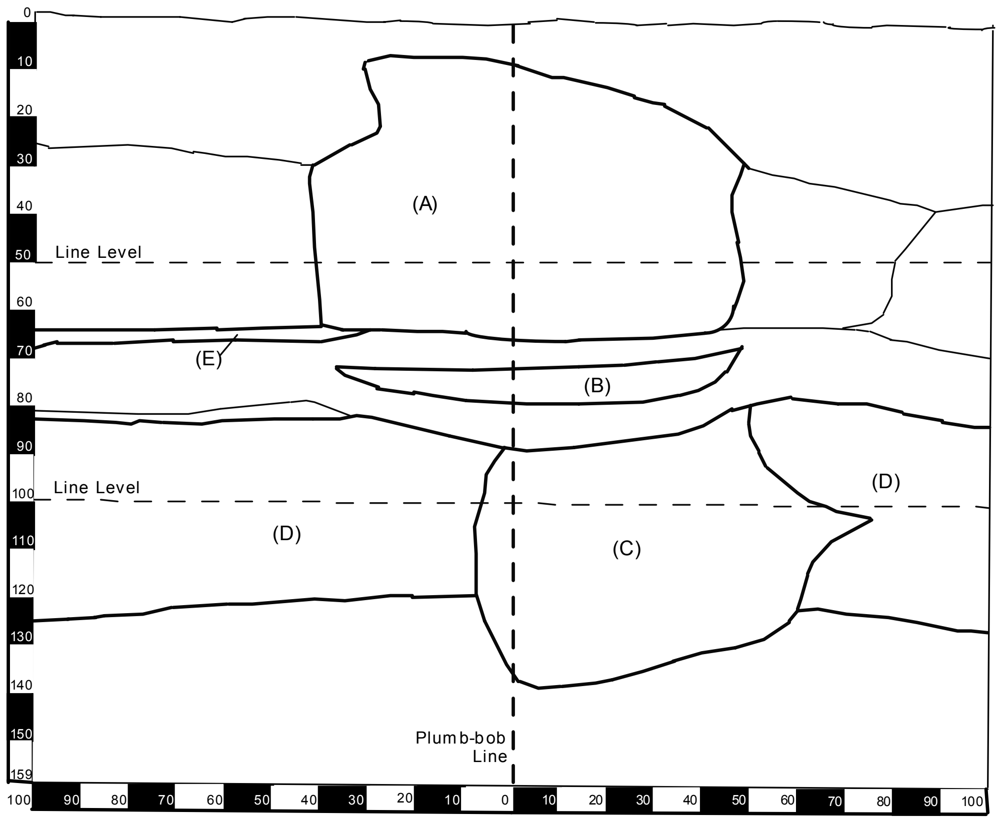


Figure 9. Stratigraphic profile of the southern baulk of unit North 416 East568. Note the adobe wall melt (feature D) and small, bell-shaped storage pits (features A, B, C, and E).

Features: (A) Small midden of light- and dark-gray ash, small charcoal fragments, camelid bone fragments, and burned earth; (B) Shallow depression filled with dark-gray ash, charcoal fragments, burned clay, and silty clay; (C) Large pit filled with light-gray ash, burned earth and clay, charcoal fragments, and camelid bone fragments; (D) Adobe wall melt: Homogeneous, fine-grained, very hard and compact, light reddish-brown (5YR-5/3) silty clay with no organic inclusions; (E) Shallow depression filled with loosely-packed, light greenish-gray (1 Gley-8/10Y) ash with a high density of small fleck of charcoal

Household Approaches

Data generated from analyses of the material remains of the earliest occupation of Jachakala provides an opportunity to broadly sketch the range of household activities practiced by early Jachakala residents. The objective of this approach is to investigate domestic processes and patterns rather than a comparison of static architectural remains or individual household units. In particular, a comparison of areas of the community to one another will highlight spatial differences in domestic patterns that may be antecedent to later wealth differences. As Hayden and Cannon argue in their hallmark article on corporate groups (1982:140, emphasis added), “while the error involved in interpreting most individual household assemblages is very large, it is greatly reduced when dealing with groups of households. Such grouping tends to average out the effects of specific historical and idiosyncratic factors acting on individual households."

Because household refuse was likely dumped nearer to residents’ homes than to their neighbors’ houses, we can compare assemblages from the two Niñalupita Period areas to test for spatial differences in the domestic economy of groups of households. In comparing the averaged Niñalupita central and southern zone collections, I do not mean to imply that each of these areas was a definitive social (ayllu) or economic (corporate group) subgroup within the community. The materials from groups of domestic features (i.e. the household unit) in the central and southern zones of Jachakala are compared by artifact class (lithics, faunal remains, ceramic wares, and so on) only to test for differences in the domestic economy of sections of the community.

There are analytical advantages to comparing areas or zones of a community this way. House floor assemblages are more likely to consist of materials deliberately left during the structures’ abandonment, small, easily overlooked items, or ones accumulated during post-abandonment events. Assemblages from such contexts tell us little about the domestic activities and organization of a house’s original occupants, and more about those abandonment and post-abandonment processes. In contrast, exterior midden deposits reflect many years of steady deposits from a range of domestic activities, thereby mitigating some of the idiosyncrasies characteristic of floor assemblages. Materials from midden contexts offer a better window on the domestic economy of those residents who deposited their trash in those features. Inter-zonal comparisons of groups of household units (each of which includes any combination of middens, storage pits, hearths, and floors) offer the additional advantage of allowing archaeologists to ignore the palimpsest nature of individual house floors.

The most important assumption underlying the application of this approach at Jachakala is that refuse produced by households in the southern (or central) zone is more likely to be dumped around their dwellings than it is to be disposed of near the houses of people living in another area of the site. This seems much more reasonable than assuming that house floor assemblages accurately reflect the full range and relative importance of domestic activities practiced by the residents.

Moreover, the inter-household analyses of lithic and faunal materials that I did undertake yielded no evidence whatsoever for one or two household units that were significantly different than the others, at least in terms of those kinds of subsistence remains. (I chose not to present the results of those analyses here because they add little to the argument about the validity of the Hirth models.) At that point in the project, I decided that grouping units by zone provided a good way to explore how one part of the community might have diversified their domestic economy relative to the other group of residents. This methodological choice restricts the degree to which I can generalize my interpretations of patterns in the data, and prevents me from measuring the relative contributions of individual households to the long-term changes I reconstruct. The inter-zonal comparison has the important advantage, however, of allowing me to explore relationships between people in the community on a different scale than that of the individual household; after all, households at Jachakala were probably occupied for fairly short periods of time, were not necessarily contemporaneous (making direct inter-household comparisons of limited theoretical value to my project objectives), and were identifiable only in the uppermost 60 cm of fill.

Inter-Zonal Comparisons Unpacked: Methodological Constraints

Of course, such an approach to domestic processes precludes discovery of any inter-household differences that may exist within each zone. Any significant differences found between the southern and central zones of Jachakala indicate that socioeconomic differentiation follows some sort of spatial residential segregation. Also, the absence of Niñalupita Period house foundations does not allow me to investigate whether assemblage variability might correspond to stages in the household life cycle, house size, a household's increased craft production, and so forth. The latter line of inquiry is restricted to the Isahuara and Jachakala occupations, which do contain both house floors and spatially associated middens.

To clarify, the assemblages of artifacts compiled within zones of the site include the grouped remains from several household units (floors, features, and middens associated with domestic structures in the south and center, while the north includes artifacts from pits inside of non-domestic structures). The excavation units I placed to uncover these household units were judgmentally chosen based on how well-preserved they appeared to be on the surface of the site. Therefore, there is nothing is this sampling strategy that would produce a random, representative sample of Jachakala households within each zone, or within the community as a whole.

The southern and central zone collections I created rather contained artifacts from groups of domestic features in two areas of the site. Those midden features were associated with structures on the surface of the site, and so were part of Isahuara or Jachakala Period household units. On the surface, the zones represent social divisions, which correspond with economic differences, since Jachakala's residents divided themselves with walls. Below the surface, however, there is no evidence to suggest that these social divisions predate the construction of those dividing walls. The inter-zonal comparisons of Niñalupita and Isahuara Period remains contrast the domestic economy of sections of the community that are averaged in the sense that grouping households negates the effect of idiosyncratic outliers in the sample of household units or domestic features. By grouping all artifacts of each class recovered from a group of stratigraphic levels in pits whose placement was determined by later factors (association with a Jachakala Period structure), each Isahuara Period unit's collection is akin to a random observation of remains deposited over several centuries in one 2 x 2 m^2 spot. In this way, grouping artifacts from the units in the south or center gives me comparable samples of domestic refuse. My inter-zonal comparisons of Isahuara and Niñalupita Period remains describe differences in the proportions of related artifact types (such as faunal packets or lithic categories of debris) within collections of samples of domestic refuse. Because of the dividing walls, Jachakala Period inter-zonal analyses have an additional component of self-imposed social divisions.

Perhaps this does not adequately distinguish between households (who, ultimately, were probably the ones deciding when to acquire new goods, make different tools than their neighbors, devote more or less time and energy to some tasks, consume or store different kinds of food, and so on) and zones (grouped observations of, or collections of refuse deposited over a long period of time in one 2 x 2 m spot). Zones were not necessarily units of social divisions or economic cooperation, even during the Jachakala Period, but differences between them do represent differences in the domestic activities being practiced in areas of the site. If we can reasonably assume that residents are more likely to deposit their trash in middens close to their own houses rather than transporting it to a different part of the community, then in some sense, the inter-zonal analyses compare groups of those people who lived in different parts of the community via a sample of observations of the material remains of the pooled domestic economies of those whose trash ended up in that unit of space.

AGRICULTURAL PRODUCTION

Direct lines of evidence for reconstructing the organization and intensity of agricultural production might include ethnobotanical data, information on storage features and facilities, and surveys of ancient fields. Because no floral analysis was performed on Jachakala soil samples and because my limited survey revealed no recognizable fields associated with the settlement, the relative distributions of basalt hoes (Figure 10), including the by-products of their production and consumption, will be used to assess the agricultural production practices of the population.

Although, as mentioned above, no distinguishable household units could be identified, artifact analyses suggest that the site was founded as a small, egalitarian village. In order to investigate the community's internal organization, patterns in lithic, faunal, and ceramic artifacts are compared below to expectations generated by the Hirth model of the domestic economy.

Objectives of Lithic Analysis

A range of graphical and statistical approaches to the lithics data was undertaken to address several questions. The first question is whether one or more (groups of) households specialized in the production of hoes. In this case, one might expect much higher proportions of tool production debris in one assemblage than in comparative

Figure 10. Sample of black basalt bifacial hoes or handaxes from Jachakala.

collections. This would represent what Bermann (1994) calls transformational change, or differences in some households' functions on a supra-household social scale. There are several steps to exploring and comparing areas of Jachakala in terms of differential involvement in hoe production. Typical production and consumption/use/refurbishing assemblages must be identified, and indicators of these collections used to identify potential agricultural and craft production differences between groups of households. Three questions stemming from these objectives include the following: Did every area have bifaces? Did they have similar quantities of basalt? Are there any inter-assemblage differences that would suggest differential involvement in production, or were those in Jachakala's two zones doing the same thing? These questions are best addressed through comparing the relative proportions of production and consumption/use indicators within each zone.

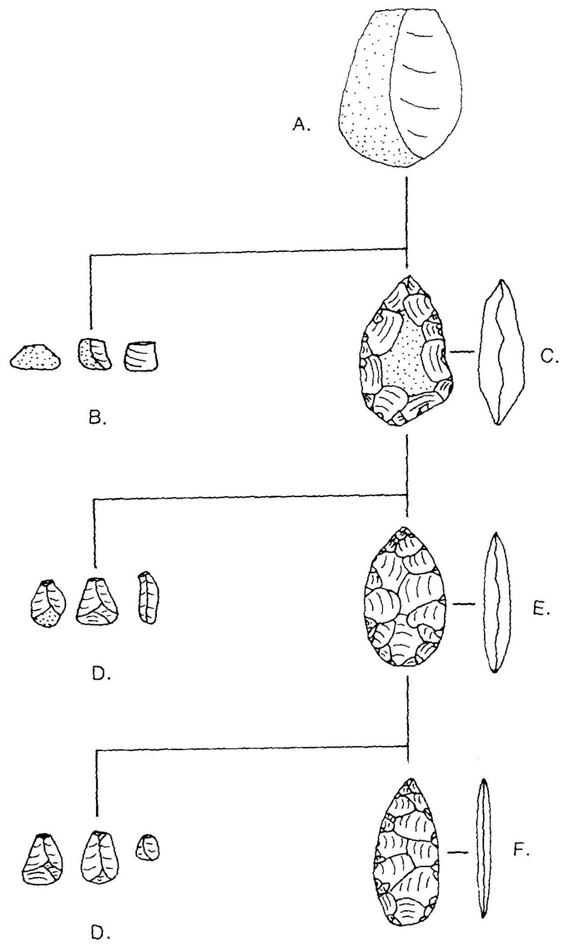
A second hypothesis examined via certain classes of lithic debris is the possibility that households in one area of the site were more intensely involved in producing and/or refurbishing stone bifaces. Such intensification of lithic production falls in the category of systemic changes, or shifts in internal domestic organization, because some households would be doing more of the same thing. In this case, proportions of production and consumption debris related to agricultural stone tools might still remain more or less constant across the site. One area's increased production would be reflected instead in greater densities of hoe manufacturing debris (relative to ceramics or some other constant). A greater or lesser volume of basalt in some area of the settlement would indicate differential involvement in stone tool production and use (measured by the total production of basalt debris), without qualifying that involvement as falling under the hoe production or refurbishing category of activities.

A third possibility, of course, is the rejection of both of these hypotheses. The absence of strong proportional differences between areas of Jachakala means there were no real differences in lithic production or consumption. The absence of strong differences between the center and south in the lithic:ceramic ratio would indicate no differential involvement in lithic craft production. Together, the two hypotheses investigated in this analysis represent ways to identify and distinguish possible inter-zonal differences in agricultural and craft production practices.

Basalt Assemblage Characteristics

Large chipped hoes manufactured from black basalt stones were among the most common tools produced throughout the site's history. A microwear study conducted by Kazuo Aoyama on a sample of Jachakala bifaces indicated soil polish on the distal edges of twenty-seven of his sample of twenty-nine tools (Aoyama 1995:4). Though other polishes associated with meat and hide processing were identified on many tool edges, supporting the notion that biface tools were multifunctional, the hoes served primarily as agricultural implements. Ethnographic analogy further supports an interpretation of these implements as hoes, generally thought to have been hafted (Bermann and Estevez Castillo 1995:395; Ponce Sangines 1970). Biface debris can be reliably used, therefore, to investigate hypotheses related to agricultural production.

The second characteristic of the lithic debitage at Jachakala is considerably more complex. Because the black basalt stone from which virtually all of the stone tools were



Bifacial tool manufacturing stages:

A = macroflake
B = flakes
C = biface roughout
D = biface thinning flakes
E = biface preform
F = finished biface

(from Figure 14 caption; Parry 1987:46)

Figure 11. Biface reduction sequence in which bifacial tool are the end products (Parry 1987:46, Figure 14).

manufactured was imported, initial manufacturing debris is absent. While no chemical or petrographic sourcing of the La Joya area basalt has been performed to date, the nearest known black basalt quarries or outcrops have been located around the perimeter of Lake Poopó at the site of Querimita, 150 km to the south (Bermann and Estevez Castillo 1993:318).

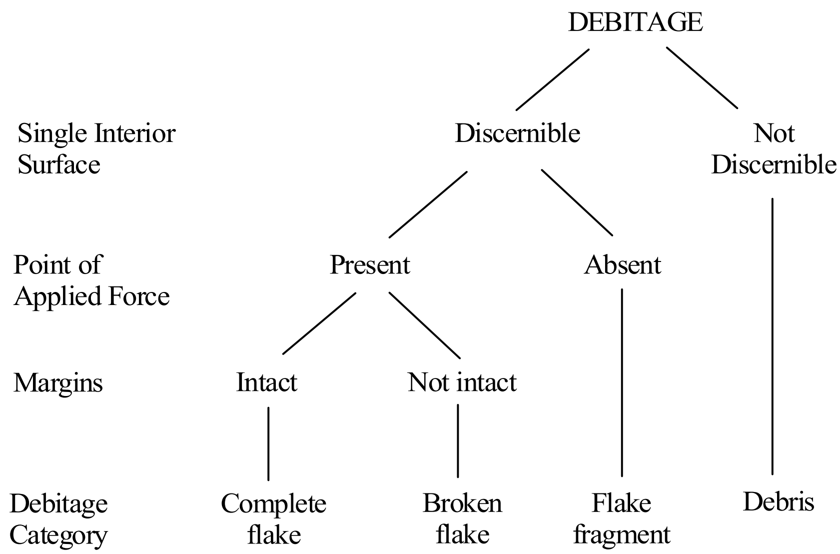


Figure 12. Artifact classification scheme used to analyze Jachakala's basalt lithic remains.

In fact, characteristics of the lithic assemblage indicate that basalt was largely imported in the form of tool blanks, rather than as raw nodules. These characteristics include, for instance, the lack of nodules at Jachakala and limited amounts of visible cortex (Aoyama 1995). Tool preforms (macroflakes and/or blanks) of sufficient size to produce large ovoid biface hoes and handaxes were imported and manufactured at the site into bifacial hoes. If raw nodules circulated in trade networks in the Oruro region, one would expect to find both discarded (because they were insufficiently pure) nodules as well as primary reduction debris with at least a moderate degree of cortical surface preserved. Because neither of these artifact categories was found, it is logical to infer that such initial reduction debris was produced elsewhere, presumably at the quarry site. Additionally, given the high density of basalt debitage at Jachakala and throughout the region, circulating large nodules of questionable utility over such a notably long distance would perhaps have unnecessarily high transportation costs.

The presence of all categories of stone tool debris and finished products throughout the south and center suggests that households in each zone produced a similar range of tools. It further suggests that each zone's households also maintained regular access to imported basalt throughout the Niñalupita Period.

Problems with Basalt Analysis

The first problem I faced in the lithic analysis is that little work has been done on basalt tool making. Many studies (e.g., McAnany 1989) of biface manufacturing technologies treat the bifacial tools as end products. Figure 11 illustrates one such biface reduction sequence. In these cases, there is spatial segregation of quarries and tool production locales from consumer sites yielding refurbishing debris. Imported finished tools are used, broken, and replaced with others procured from production centers. At Jachakala, in contrast, bifaces became cores that were used and refurbished until they were useful only as sources for flakes and smaller tools (see Figure 15). Finally, seemingly comparable studies of biface manufacturing and distribution practices such as McAnany's work (1989) in fact deal with situations in which bifacial manufacture took place at one site and the finished products were used elsewhere.

Lithic Categories

Given these problems, I had to turn to different criteria for distinguishing between tool production and consumption (or tool use), and for weighing the relative contributions of both in any assemblage. Examining assemblages with unmistakable indicators of production, including macroflakes and tool blanks, I compared these to ones without those classes of debris to see if they differed in some patterned way from each other. The same comparison was performed on assemblages with good markers of tool consumption -- namely cores -- to look for patterns indicative of biface consumption. Cores are treated as indicators of tool consumption in this case because they appear to be what is left after broken biface fragments are further reduced to make scrapers, knives, and other small implements. In this production sequence, cores are produced when broken hoes are recycled, not when hoes are produced. Because it is the first part of this production sequence that concerns me here, namely the production and consumption of bifacial hoes, cores are indicators of *hoe consumption* (rather than small expedient tool production).

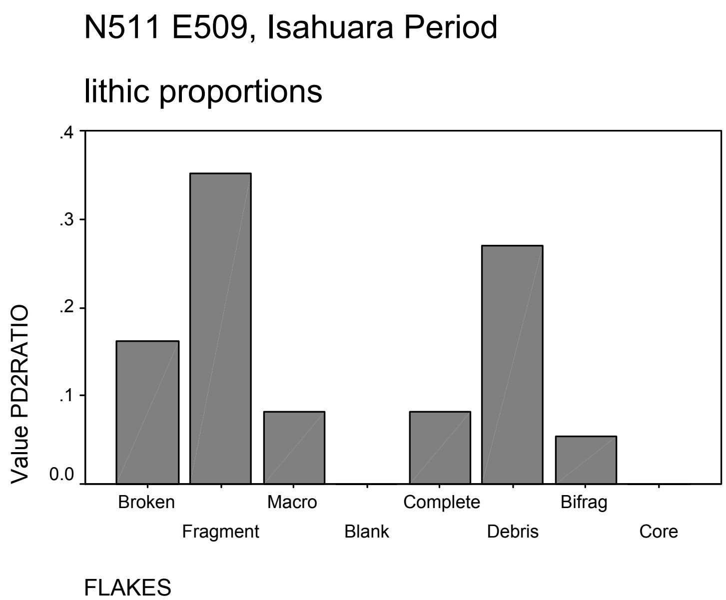


Figure 13. An example of proportions of lithic categories in a Jachakala assemblage with relatively more macroflakes and tool blanks, the indicators of bifacial tool production.

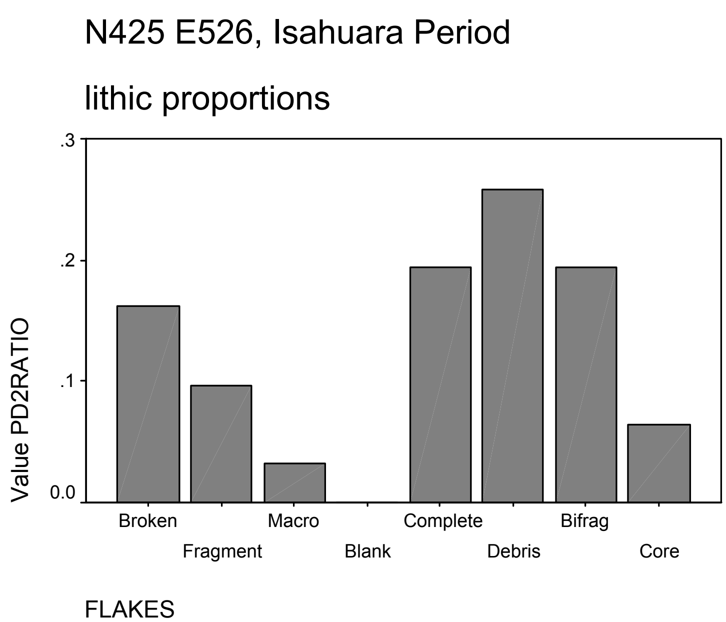


Figure 14. An example of proportions of lithic categories in a Jachakala assemblage with relatively more cores and broken biface fragments, the indicators of bifacial tool consumption.

Biface Reduction Sequence

Jachakala bifacial hoes were produced from preworked tool macroflakes or tool blanks (hence the absence of primary-stage reduction debris and large cores). Broken hoes were later recycled into smaller tools, producing later-stage reduction debitage and much smaller cores in the process. The Jachakala model of lithic production and consumption is presented in Figure 15. The reduction sequence I employed in the analysis of the Jachakala chipped stone assemblage divided lithics into two sets of artifacts: basalt biface “production” and “consumption” debris.

The four categories of debris associated with biface production include the two production indicators, imported tool blanks (“blank”) and large macroflakes (“macro”), and the two flake categories that tend to co-occur with those. Both broken and fragmented flakes (“broken” and “fragment”) are, in this model, associated byproducts of the manufacture of tools from preforms, although the only true indicators of production are tool blanks and macroflakes. These four variables are grouped together in the left half of bar graphs illustrating proportions of all eight types of lithic debris included in this analysis.

Refurbishing or consumption debris derives from hoes that have been used or consumed. The high proportion of soil polish on both whole hoes as well as complete flake exterior surfaces suggests that bifacial hoes were broken during tool use in fields. At least some of these hoe fragments were then transported back to the site and, as cores, used as sources of tool material. Hoe fragments then served as cores for the recycling of materials into smaller tools, such as small projectile points, scrapers, and knives. This second stage of chipped stone work produced both subangular debris as well as complete flakes (Figure 15). The small cores that are left have multidirectional flake scars, suggesting that flake tools were manufactured on an expedient basis.

The two markers of tool consumption (curation) or core reduction are cores and broken biface fragments (“bifrag”), which are the source of cores. As mentioned in the previous section, these two categories tend to co-occur with complete flakes (“complete”) and lithic debris or shatter (“debris”). The four categories of consumption debris include, therefore, two indicators of tool use: biface fragments and cores, and two associated categories: debris or shatter, and complete flakes.

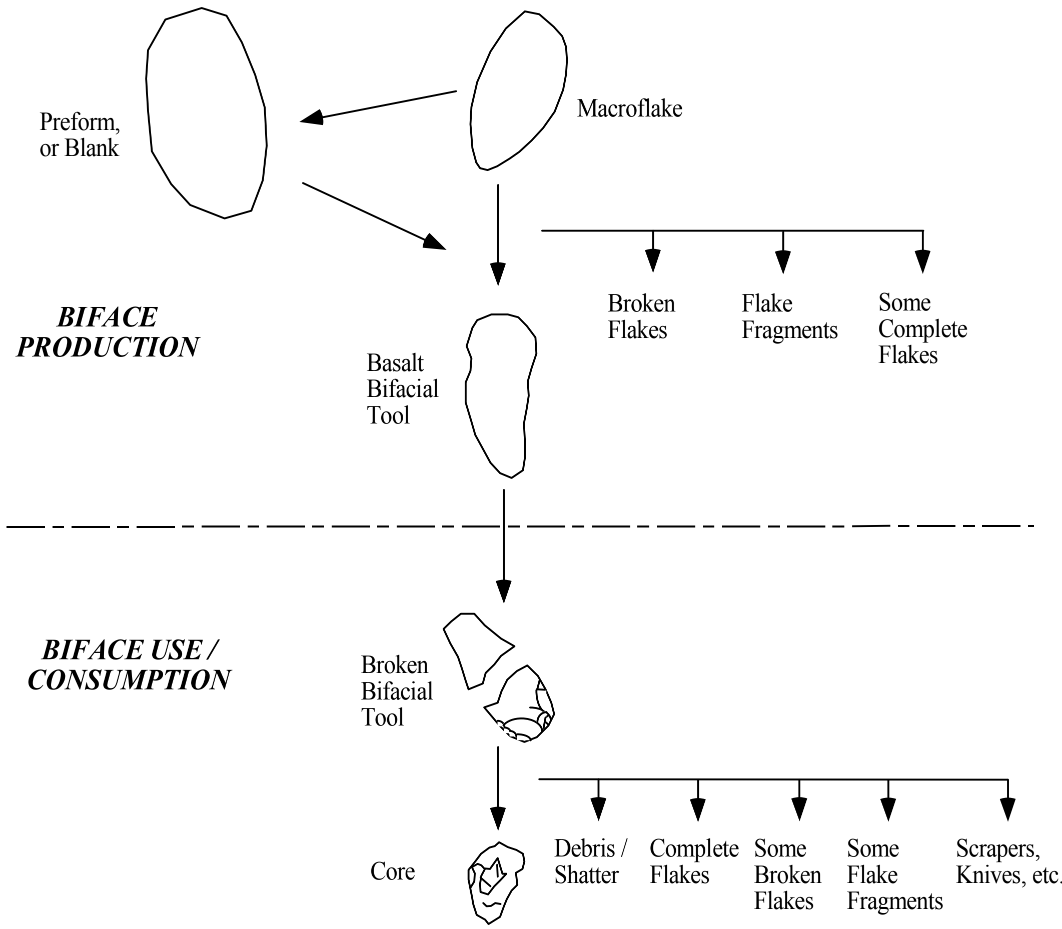


Figure 15. The bifacial hoe production sequence employed for Jachakala lithic remains.

This approach revealed that, in general, production assemblages with more tool blanks and macroflakes also tend to have higher proportions of broken and fragmented flakes. Similarly, collections with cores usually have more broken biface fragments, complete flakes, and debris (see Figure 12 for the artifact classification scheme used to identify these lithic categories). The graphs presented in Figures 13 and 14 show the proportions of all eight categories of lithic debris in Jachakala assemblages with relatively more indicators of production (Figure 13) or consumption (Figure 14). These

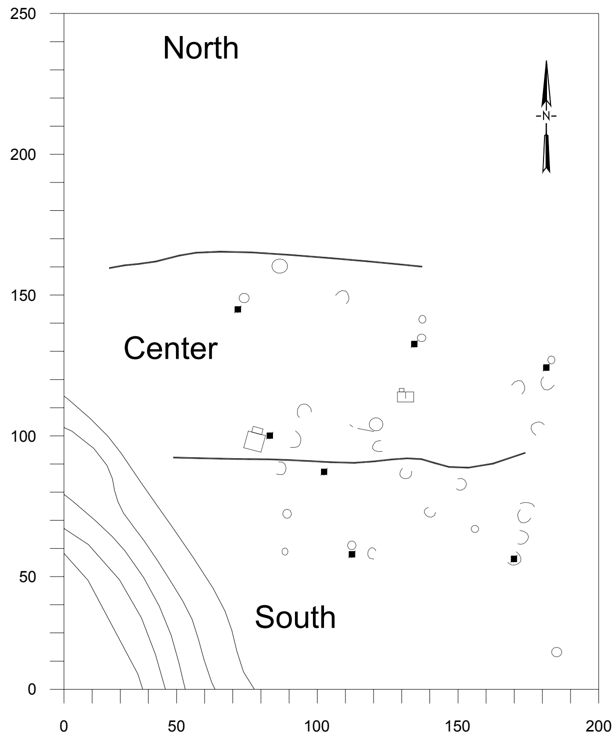


Figure 16. Location of excavation units with Niñalupita Period levels used in inter-zonal lithic analyses.

two demonstrate the co-occurrences of certain classes of debitage with those indicators as mentioned above.

These lithic associations are consistent with Sullivan and Rozen's (1985) work, in which collections composed mainly of the byproducts of tool manufacture "have the lowest percentages of cores and complete flakes, and the highest percentages of broken flakes and flake fragments" (1985:762). In contrast, collections suggestive of core reduction "are characterized by higher percentages of cores and complete flakes, and lower percentages of broken flakes and flake fragments" (1985:762). Other collections with percentages of these flake categories intermediate between those two groups, ones resembling Jachakala's assemblages, "could result from a mixture of core reduction and tool manufacture, varying degrees of reduction intensity, or both of these factors" (1985:763).

Because households at Jachakala made and used their own tools, however, both groups of artifacts occur together in all assemblages. Consequently, it is impossible to separate out ideal production or consumption assemblages from any context. However, assemblages can be compared to one another to ascertain whether production or consumption was a larger contributing factor in one collection than in another, since the two sets of activities are relative to each other. Even though no single category of lithics indicates tool production (tool blanks and macroflakes) or consumption (broken bifaces and cores) by itself, proportions relative to other variables can suggest that one set of activities was a more important factor than another.

Results of the Lithic Analysis

All basalt chipped stone debitage recovered from all Niñalupita Period levels of seven units are included in the analysis (see Figure 16 for their spatial distribution). Of the 24,964 lithic artifacts recovered during excavations at Jachakala, this total of 3,125 was analyzed in the field, or 12.52% of the Jachakala assemblage. Data produced during this artifact analysis were divided by period and zone. Proportions of all eight lithic

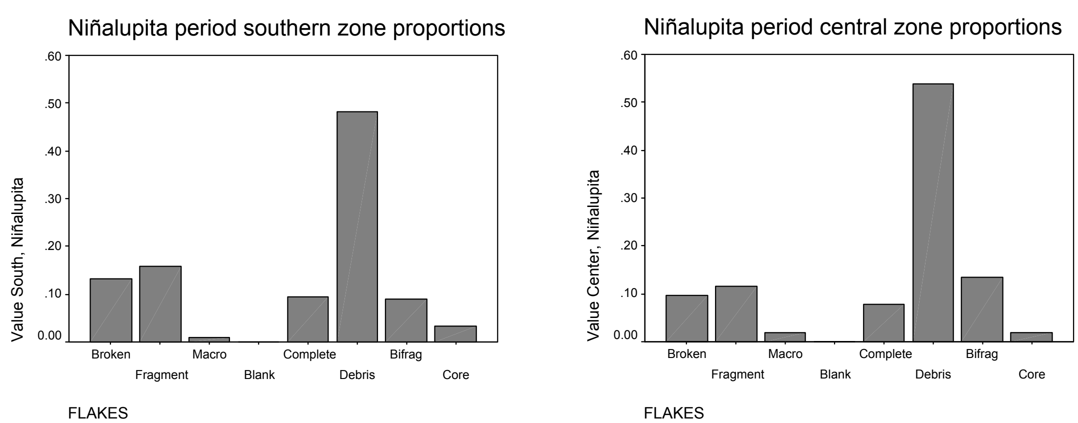


Figure 17. Proportions of lithic debris from the Niñalupita Period in the southern (left) and central (right) zones.

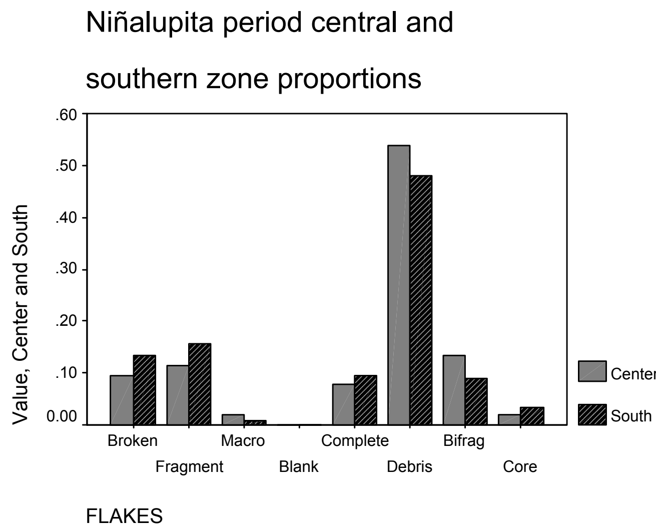


Figure 18. Proportions of lithic categories of debris from the Niñalupita Period in the center and south.

categories of debris for the Niñalupita Period, including the four production and four consumption flake types, are presented in Table 47. These proportions are the basis for the bar graphs accompanying this section.

A visual examination of the graphs in Figures 17 and 18 illustrates the strong proportional similarities between the two assemblages, or the Niñalupita Period central and southern zones. Chi-square tests of the differences in relative proportions of both production and consumption debitage from the two zones were most appropriate here because the eight classes of debris are herein treated as categories of the same thing, namely worked stone. Proportions are calculated as the total number of pieces in each category over the sum of all eight categories taken together. These proportions were independently calculated for each level of analysis, from individual stratigraphic levels in each excavated unit, as well as each period (set of levels) within every unit, to periods by zone (or set of analyzed units in the north, center, and south). As Parry (1987:23) emphasizes, counts of artifacts are not good numbers to compare because they depend on access to raw materials, but also “on the size of the excavation (and the proportion of the household unit that was exposed), the length of occupation, and the nature of refuse disposal practices."

The chi square tests reveal no significant differences, whether all eight categories of debris are grouped together (X2=0.8407, df=7, p>.50, V=0.15), or groups of production (X2=0, df=3, .80>p>.50, V=0) and consumption (X2=0.7039, df=3, .80>p>.50, V=0.14) categories are tested separately. Together, these three statistical comparisons of the central and southern zone lithics data subsets reveal no significant production or consumption differences, because there is between a twenty and fifty percent chance in each case that the two sets of lithics came from populations with the same proportions. Both Niñalupita Period central and southern zone households, therefore, were likely producing and consuming their own stone tools in highly similar proportions; we found no evidence of differences that would suggest production or consumption contributed more to one assemblage than another. The lithic analysis presented above also indicates no restricted craft specialization of bifaces or production of bifacial tools for export.

Also, the indicators of tool consumption or use were probably used to produce smaller tools on an expedient basis. Again, inter-zonal differences in the indicators of biface consumption (cores and fragments of broken bifacial tools) are not very significant (X^2=0.7039, df=3, .80>p>.50, V=0.14). Zones, or perhaps groups of households within them, were probably expediently producing their own smaller stone tools (actually, there could be specialists within either or both zones, but grouping units in the two areas does not allow me to identify them). Examples of secondary tools such as scrapers and projectile points of highly variable shape, size, and materials are illustrated in Appendix D, Figures 73 and 75.

However, a very different pattern emerges when the total numbers of lithic artifacts in each zone are converted to ratios over the number of ceramic sherds in the two areas. This lithic:ceramic ratios are a good way to test for differential time investments in the production and curation of lithic tools. For the Niñalupita Period, southern zone units produced 1.76 lithic artifacts for each sherd, while central zone pits yielded only 0.06 pieces of lithic debris for each sherd. This difference demonstrates that residents of the southern area of Jachakala were more heavily involved in the community's lithic economy than residents of the center. In fact, the lithic:ceramic ratio of 0.26 for the Niñalupita Period as a whole was the highest of the site's three occupations.

Conclusions

To return to the objectives of this lithic analysis, the several questions proposed at the start of this section can now be addressed. Though it appears from the graph in Figure 18 that Jachakala's central zone yielded more indicators of basalt bifacial tool production and that the south left more indicators of consumption (or at least cores), both areas were more or less doing the same thing. Households in both zones produced and consumed their own hoes, but they did so at different rates. Because my exploration of patterns in the Niñalupita Period lithic assemblages is an indirect way to look at agricultural activities, it is possible that the south's greater intensity could represent more intensive agriculture. However, with no evidence for agricultural features such as terraces or canals, or any other way to spatially link households and fields, I am unable to evaluate this hypothesis.

There is no evidence for restricted craft specialization in the production of basalt bifaces. If there was, I would not have seen widely distributed production indicators. To conclude, the absence of significant variations in the relative proportions of the eight categories of lithic debris (or, simply, evidence for tool production versus tool consumption) recovered from Niñalupita Period levels of southern and central zone pits fits the expectations of the domestic economy. The residents of each zone both produced and used their own basalt hoes and other tools, and by implication, used those hoes to provide for their own subsistence needs.

However, the lithic:ceramic densities presented above show that the southern zone was more heavily involved in lithic activities. In other words, households in the south were doing significantly more of the same. The two areas of the site differed then in terms of the intensity of their relative involvement in this aspect of the domestic economy.

CAMELID UTILIZATION

Goals and Methods of Faunal Analysis

The objective of the analysis of Niñalupita Period faunal remains was to compare camelid consumption patterns, rather than to document particular butchery, herding, or charqui (dried meat) production practices. As with the lithic analysis, central and southern zone assemblages were grouped for the Niñalupita occupation, and compared to one another in terms of proportions of related categories. Once again, the aim was to determine if there were differences in the camelid utilization patterns of residents in both areas of the site.

Because ethnographically and ethnohistorically known butchery practices in the Andes (Miller and Burger 1995:439) involve the division of carcasses into large units of meat, this approach is applied to the Jachakala faunal assemblage. Identified skeletal elements are divided into large packets or groups of elements that represent meat units such as the forelimbs, vertebral column, and so forth. The particular categories used, with minor revisions, are those presented by Aldenderfer (1998:105), whose categories based on ethnographic observation serve as a base model for exploring questions of subsistence. The five meat units, called faunal "packets" below, include the cranium, vertebrae ("trunk"), forelimbs, hindlimbs, and ribs. These five packets have quite different amounts of meat attached to them in a typical adult llama. The individual elements and meat utilities assigned to each of the five are adopted from Aldenderfer's study (1998) and presented in Table 3. The meat utility values assigned to each of the five faunal packets are calculated by simply summing utilities for the skeletal elements included in each packet. As Table 3 illustrates, the five packets have greatly variable meat utilities. They are listed in Table 3, and presented in all related graphs, by order of descending meat values for easy visual comparisons.

As these meat utility values illustrate, the greatest difference is between the trunk and forelimb packets. Therefore, differences between these two packets in particular are more meaningful than differences between, for instance, the hindlimb and rib packets. Differential access to the better cuts of meat will appear as statistically significant

Table 3. Faunal packet compositions and relative meat utility indices.

Packets	*Elements*	*Individual meat utilities*	*Total packet MUI*
Packet 1: Trunk	Pelvis Scapula Thoracic vertebrae Lumbar vertebrae Sacrum (0.66 x vertebral fragments)	40.2 41.7 61.8 77.9 -- --	221.6
Packet 2: Forelimb	Cervical vertebrae Humerus Radius Ulna (0.50 x long bone fragments) (0.33 x vertebral fragments)	64.2 36.7 23.0 23.0 -- --	146.9
Packet 3: Hindlimb	Femur Tibia (0.50 x long bone fragments)	75.9 43.0 --	118.9
Packet 4: Ribs	Ribs Sternum (not identified)	100.0 --	100.0
Packet 5: Head	Cranium Mandible Axis	14.8 9.9 8.6	33.3

unequal access to the prime meat of the trunk packet, and differences in the proportions of better to lesser cuts.

Finally, two assumptions behind this approach to faunal remains should be noted. First, the domesticated llama (*Lama glama*) and alpaca (*Lama pacos*), the undomesticated guanaco (*Lama guanicoe*) and vicuna (*Lama vicugna*), and cervids such as the taruca (*Hippocamelus antisensis*) may have contributed to the Jachakala assemblage. However, these large mammal taxa are aggregated under the broader camelid heading due to the difficulties inherent in distinguishing one from another.

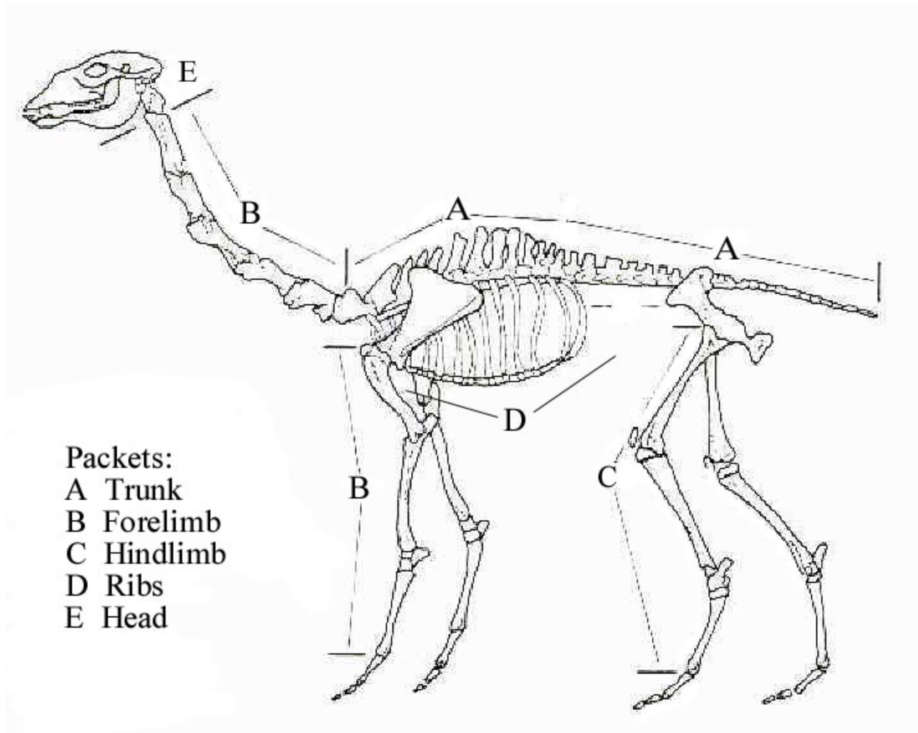


Figure 19. Faunal packets used for the Jachakala assemblage (camelid illustration from Aldenderfer 1998:107).

Furthermore, the meat utility indices appropriate for each individual species must be ignored in favor of that associated with the most common animal, the llama (Figure 19). The values assigned to each packet in Table 3 above exclusively represent those available for llama.

A second potential source of sampling bias affecting faunal assemblages relates to preservation conditions. Although post-depositional factors such as carnivore ravaging and differential survival rates stemming from element densities (Aldenderfer 1998:100-102) may have altered the composition of the surviving Jachakala assemblage, I assume that these factors affected each faunal assemblage more or less equally. Therefore, the

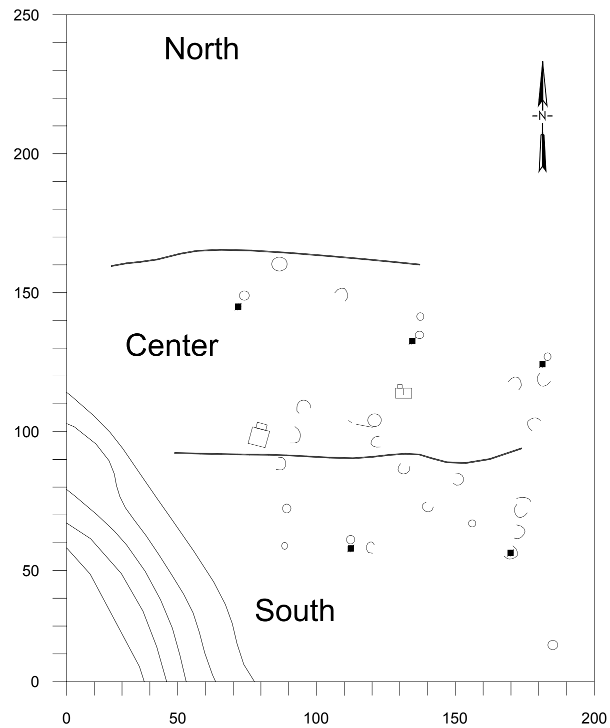


Figure 20. Location of excavation units with Niñalupita Period levels used in inter-zonal faunal analyses.

relative proportions of packets recovered from each subassemblage accurately represent, for the purposes of this project, consumption patterns.

Sorting Jachakala's Fauna

A total of 62,924 faunal elements were recovered at Jachakala, 9,402 or 14.94% of which were sorted. These 9,402 artifacts came from seven units excavated to sterile strata across the site: two are southern zone units, three fall into the central zone, and the remaining two units are located in the north (Figure 20). Because, however, the northern zone was never occupied during the Niñalupita Period, only artifacts from the other five units are considered here. These are the same two units in the south and three in the center as those used for the lithic analysis.

Faunal remains were, wherever possible, classified as one of the following elements: cranium, mandible, cervical, thoracic, or lumbar vertebrae, unidentified vertebral fragment, axis, scapula, pelvis, ribs, sacrum, humerus, femur, tibia, radius-ulna, unidentified long bone fragment, metapodials, phalanges, and unidentified bone fragments. The high degree of faunal preservation at Jachakala contributed to low breakage or fragmentation levels, thus greatly facilitating the identification of almost forty percent of the bones in selected units. All unidentified fragments were excluded from the following statistical analysis.

Because both long bone and vertebral fragments crosscut several packets, these counts were further divided between possible original elements. For instance, the total number of vertebral fragments in a given collection was divided by three, and each third assigned to the same respective packet as cervical, thoracic, and lumbar vertebrae. A similar approach to the large category of long bone fragments evenly split the difference between the forelimb and hindlimb packets.

Additionally, non-camelid remains were separated, and recognizable juvenile elements counted. Bones from immature animals are distinguished from adult camelid remains based on both their size and the degree of epiphysis fusion. Identified juvenile fragments total 543, or 5.74% of the analyzed assemblage. Non-camelid remains, including various species of snake, hare, dog, bird, and rodent families are also grouped separately. The non-camelid category, totaling forty-two bones, forms only 0.45% of the sample. There seems to have been little use of hunted meat.

My first step was to compare the relative packet proportions by level for each excavation unit to identify general patterns over space and through time. This was accomplished by calculating the proportions of each packet and then graphing the resulting numbers by descending meat utility value. The five faunal packets were counted and transformed into proportions by summing the five packet subtotals together then dividing each packet total by this number. Consequently, the five packet proportions add up to one hundred percent. These proportions were calculated for each level of each unit, each period (set of levels) by unit, and for each period by zone (set of units). Proportions were compared via chi-square tests.

All bar graphs presented in the appendix represent, from left to right, the relative proportions of trunk, forelimb, hindlimb, rib, and head packets found in a specified collection. These are ordered in terms of descending meat utility or desirability for an easy visual comparison of generally high (downward sloping) versus low (upward sloping) utility assemblages. Because the trunk packet has the highest meat utility index at 221.6 (Table 3), followed by the forelimb (146.9), hindlimb (118.9), ribs (100.0), and head (33.3) packets, the largest proportion of skeletal elements in an "optimal" distribution of packet elements would be from the trunk of a camelid. Of the remaining packets, the second largest category should be forelimb elements, followed by hindlimb parts, and so forth. Thus, an optimal "high utility" assemblage would produce a descending staircase (left to right) bar graph.

Results of Faunal Analysis

Differences in Niñalupita Period faunal packet proportions are evident in Figures 21 and 22, and tested by chi squares (Appendix C, Tables 66 and 69). The counts and proportions on which those tests are run are presented in Tables 61 and 63. The central zone's higher proportions of trunk and cranial packets are evident in Figure 21. By contrast, southern households have higher proportions of the three intermediately valued meat units, the forelimb, hindlimb, and ribs, than those in the center. The set of bar graphs in Figure 70 (Appendix C) present these same proportions, but grouped by faunal packet. Overall, there is less than a one-percent chance that this summed set of differences between the Niñalupita Period central and southern zones derive from random variation (X^2=15.1307, df=4, .999>p>.99, V=0.13).

Secondly, because the meat utility value of the trunk packet is so much greater than the other packets, I also ran a chi square test on the number of skeletal elements in the trunk packet and non-trunk packet totals (equaling the sum of the forelimb, hindlimb, ribs, and head packets) in the south and center. The observed and expected values are presented in Table 66 in the Faunal Appendix. The results are fairly significant (X^2=2.6899, df=1, .20>p>.10); the chance that the differences in numbers of trunk and non-trunk elements in the two residential zones of Jachakala are caused by the vagaries of sampling is just slightly more than ten percent. However, a Cramer's V test of the

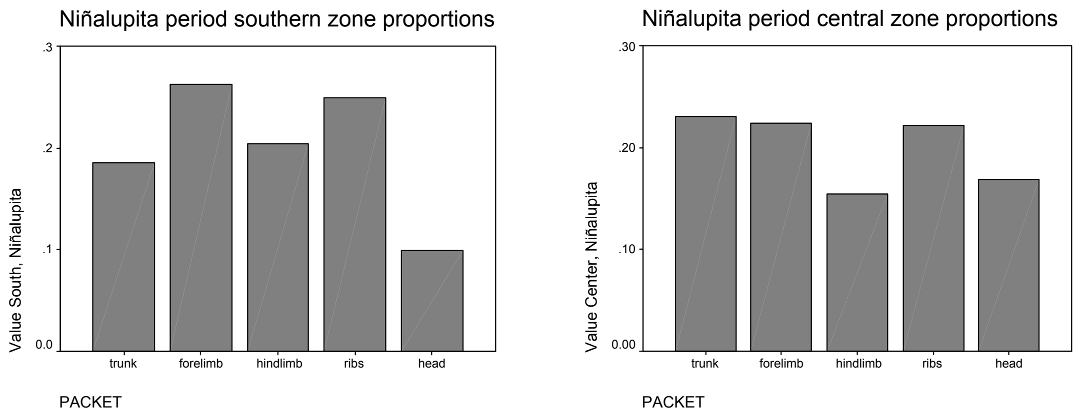


Figure 21. Proportions of faunal packets from the Niñalupita Period in the southern (left) and central (right) zones.

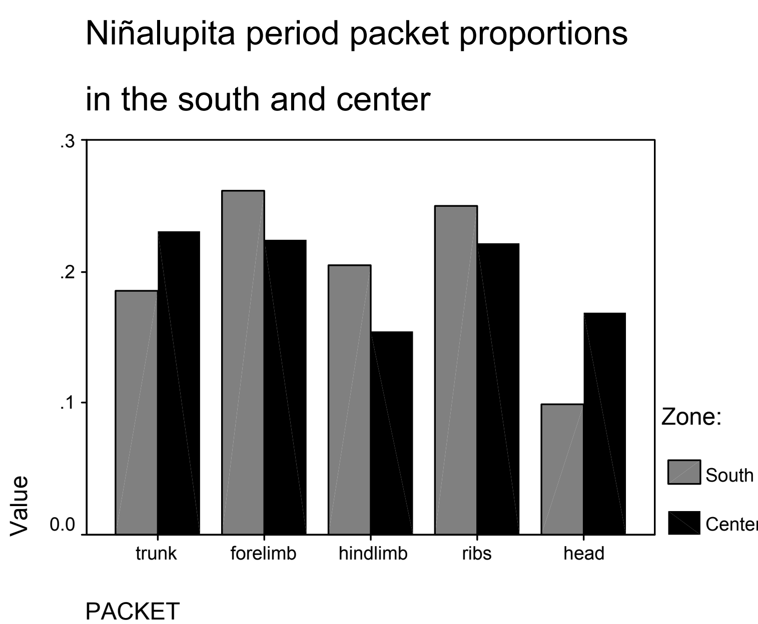


Figure 22. Niñalupita Period faunal packet proportions in the southern and central zones.

strength reveals that the actual difference between the observed and expected values is only about five percent (V=0.0527). Nevertheless, the difference in meat utility values of the trunk and other faunal packets makes these results more meaningful.

Conclusions: Meat Consumption Patterns

Overall, the faunal assemblage displays meaningful variability in the distribution of some of the meat units in this initial occupation of the site. We can be fairly confident that residents in the south consumed proportionally more camelid forelimb packets than their neighbors. This is as one might expect from the domestic economy model, under which a moderate degree of subsistence heterogeneity is expected within any community. However, the central zone's greater access to parts of the trunk is more striking. The central zone bar graph in Figure 21 reveals a closer pattern to the "optimal" profile, in that the first three faunal packets exhibit a downward (left to right) slope, even though all packets are represented somewhat equally. Because the trunk packet has by far the highest meat utility value, this aspect of the inter-zonal dietary differences could indicate the center's greater involvement in herding, or perhaps they had greater access to or first choice of the meat packets from the animals killed.

This difference provides evidence that some differences in pastoral subsistence practices date as far back as the Niñalupita Period. We cannot know if there was just a single household in the center more involved in herding (i.e. one or more extremely different households skewing the assemblage) or if the entire central zone had access to the best (and worst) cut of meat. However, there would be no reason to suspect that the two areas would be different because each assemblage comprises the pooled domestic remains of multiple households. Because of this, the differential proportions of trunk packet elements in the two zones may reflect a more systematic kind of interhousehold difference than Hirth described for a domestic economy. As a group, the southern zone households were doing something different in their meat consumption patterns than the central zone households; I believe this exceeds the moderate variability expected under the Hirth model. As mentioned in Chapter 1, this early difference in subsistence underscores a problem I encounter repeatedly in this project: namely whether such inter-zonal subsistence variability represents early status or wealth differentiation. This issue will be addressed further in the final chapter.

CRAFT AND EXCHANGE ACTIVITIES

Aims of Ceramic Analysis

The primary goals of the ceramic analysis were to: (a) refine the typology set out by Bermann (Bermann and Estevez Castillo 1993), (b) to identify diagnostic patterns and general assemblage characteristics such as the range of vessel forms produced at and imported into the community, and (c) make possible interhousehold synchronic and diachronic comparisons. Data produced to meet these simple goals was generated with all sherds from all levels of a sample set of units. This sample set includes the same seven units (four in the central zone and three in the southern zone) used in the inter-zonal comparisons of lithic and faunal remains (Figure 23). (Incidentally, the reader is referred to the ceramic appendix for descriptions of the ceramic types (Figure 61), counts and proportions of those types by unit (Tables 15 to 24), zone (Tables 25 to 27), and period (Tables 28, 29, and 30).)

Assemblage Characteristics

A small sample of rim and base sherds from each level of five units was illustrated in order to identify diagnostic characteristics (Figures 62 to 64, Appendix A). The range of vessel types represented in this sample is evident from rim and base diameters, and includes several sizes of cooking and storage jars, serving bowls and cups, small pitchers, and ritual wares. Rim and base diameters were not consistently measured, however, so statistically reliable inter-zonal differences in kinds of wares cannot be assessed.

Nonetheless, some preliminary associations of ceramic types with certain activities can be made, providing information on vessel function. These general observations equating vessel forms with groups of ceramic types are based on patterns in

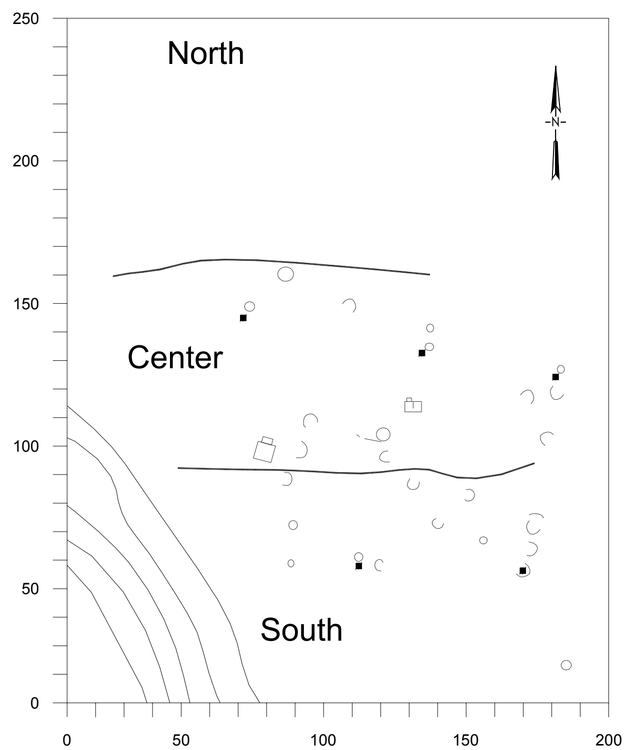


Figure 23. Location of excavation units with Niñalupita Period levels used in inter-zonal ceramic analyses.

the rim and base samples, reconstructed vessels (Figures 65, 66, 67, 93 and 94), and consistencies in contexts of discovery. For instance, large, buried storage jars next to house foundations were generally Inti Raymi Mica. Burned fragments of cooking pots found inside hearths and small storage pits are usually either La Joya Orange or Inti Raymi Mica. Several small bowls and the two pitchers illustrated in Figures 65 and 66 are also La Joya Orange, suggesting that this type was produced for a variety of domestic vessel forms. Smooth Brown wares and the two yellow wares (Niñalupita Yellow and Nonwash Yellow) are also commonly identified in domestic features such as storage pits. Consequently, these five ceramic types are tentatively labeled as storage and cooking wares, constituting between 88.1 and 92.3 percent of the assemblage dating to each occupation.

Occasionally, thick wavy bands of red paint on the exterior surface distinguished a few La Joya Orange or Niñalupita Yellow sherds. These decorated sherds were the only ones dating to this occupation of Jachakala, and seem not to be associated with any particular area of the site or domestic context.

The remaining 7.7-11.9 percent of the assemblage from each period consist of two local types. In later occupations, there is a strong co-occurrence of the imported Tiwanaku wares and these two locally produced types, Redwash and Desaguadero Orange. Sherds from these four categories tend to occur in Isahuara and Jachakala Period household offerings, northern zone features such as burials and temple middens, and in domestic refuse pits. However, there is no co-association of non-domestic features with Redwash and Desaguadero Orange sherds in the Niñalupita occupation. Consequently, they are separated into an "other wares" category in the bar graphs only because of this contextual association in the two later occupations of Jachakala. They are distinguished from one another primarily by the exterior surface treatment. Desaguadero Orange wares are medium to dark orange with a burnished slip of the same color (2.5YR-6/8). Redwash sherds are well-smoothed with a deep red wash (10R-5/8).

The Utilitarian Inventory

The typical household possessed a wide range of undecorated storage and cooking vessels. Storage vessels included large, wide-necked and thick-walled Inti Raymi Mica jars, small, thick-walled La Joya Orange jars, and small Smooth Brown, Niñalupita Yellow and Nonwash Yellow jars. Cooking vessels included La Joya Orange and Inti Raymi Mica open-mouth ollas. Additionally, a range of other utilitarian vessels included small, undecorated La Joya Orange bowls and pitchers. This typical household inventory was supplemented by Desaguadero Orange and Redwash vessels of unknown form, but which possibly included small bowls and large open-mouthed jars (based on sampled rim and base diameters). Presumably, many of these were locally produced. None of these types were obvious imports, but I found no evidence for ceramic production at Jachakala.

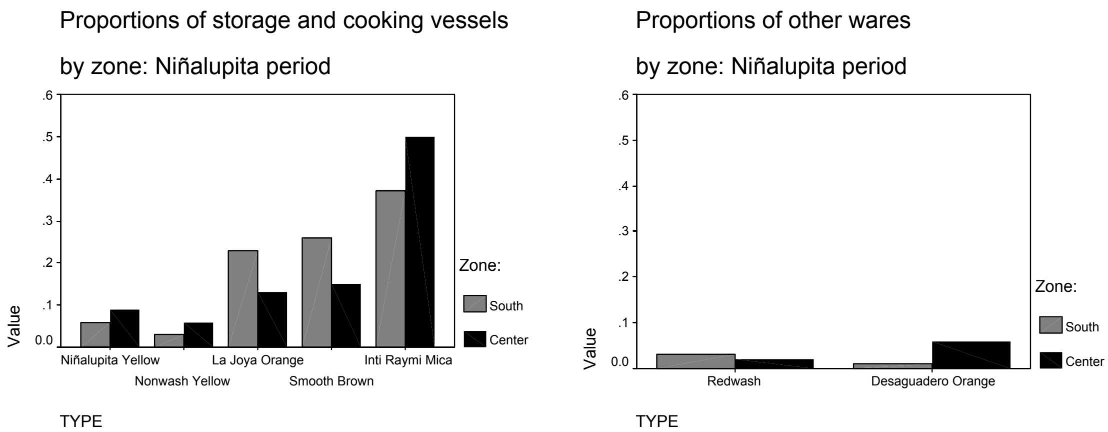


Figure 24. Proportions of typed sherds from storage and cooking vessels (left) and other wares (right) in the southern and central zones during the Niñalupita occupation.

Ceramic Comparisons

The bar graph on the left in Figure 24 compares proportions of each of the five types of storage and cooking wares for the southern and central zones in the Niñalupita Period. The graph on the right presents the same comparison for other Niñalupita Period wares. As these two bar graphs reveal, there are sizeable differences in the relative proportions of each of these ceramic types from the two residential zones. Comparing the proportions of the five types from the center and south with a chi-square test reveals highly significant, but only moderately strong, differences between the two in terms of both utilitarian (X^2=9.4034, df=4, .10>p>.05, Cramer's V=0.22) and other (X^2=58.5302, df=1, .001>p, Cramer's V=0.54) wares.

There are, then, highly significant and fairly strong differences in terms of these two broad sets of ceramic types between the two areas of the site that date to the initial occupation of the community. These overall inter-zonal differences are also variably strong, as Cramer's tests of strength make clear. Proportional differences between the two area's utilitarian assemblages are fairly strong (V=0.22), but differences in their proportions of Desaguadero Orange and Redwash types are very strong (V=0.54). Further investigation and interpretation of ceramic patterns will require more detailed analysis of differences in vessel forms than is available with these preliminary findings.

These results certainly indicate real differences in the relative proportions of utilitarian and non-utilitarian vessels that make up the average assemblages of the two areas of Jachakala, with different kinds of storage and cooking, and other wares preferred in each zone. Such differences between the southern and central zones could be explained by simple stylistic preferences, or they might represent slightly different activities performed by these two groups of households. Alternatively, they could reflect chronological differences masked by my pooling of multiple stratigraphic levels. Because, however, the full range of vessel forms and associated activities are so tentative, it is difficult to ascertain exactly what this variability indicates. The differences in the relative proportions of Desaguadero Orange and Redwash sherds are especially striking.

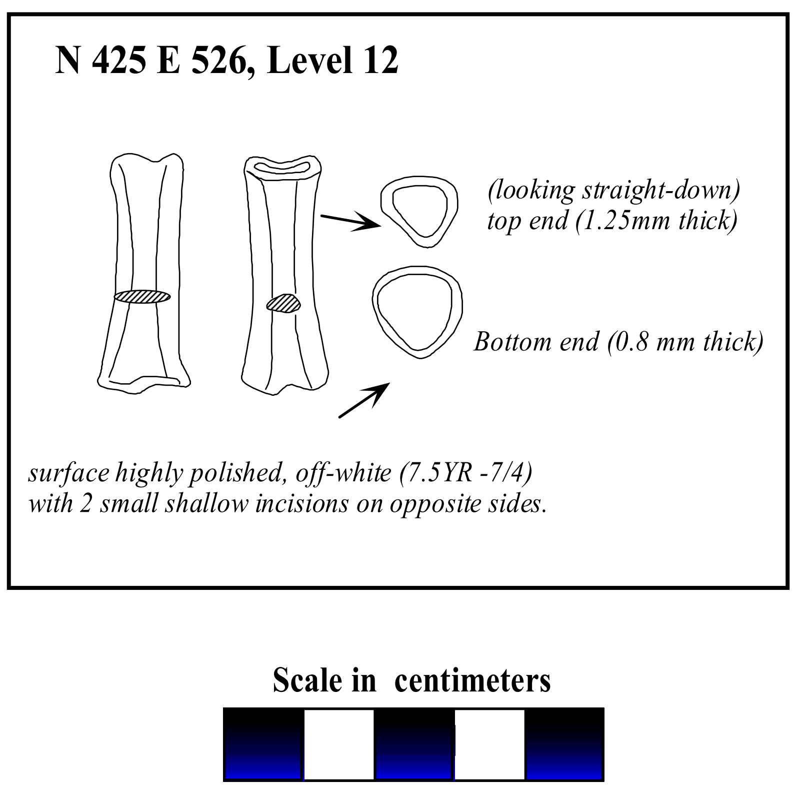


Figure 25. Incised bone flute or snuff tube fragment from a southern zone pit.

If these two ceramic types were preferred for household rituals, as they were in later occupations, it is possible that some of the highly significant differences between the center and south in household ritual assemblages had their origins in the Niñalupita Period.

Miscellaneous Craft and Exchange Goods

Other craft goods represented in the Niñalupita occupation include a number of worked bone fragments. Examples in the southern zone include one incised fragment, which appears to be an incompletely manufactured bead. A second shaped fragment, illustrated in Figure 25, likely came from an incised bone flute or, possibly, a snuff tube; in either case, the original implement may have had a ritual function or significance. Worked bone artifacts from central zone pits include two pyroengraved fragments as well as one large polished scoop.

Conclusions about Exchange

The only evidence for long-distance exchange from Niñalupita Period levels is the basalt. As discussed earlier, the distribution of basalt in both areas of the site indicates that all households had access to this imported material. However, there were inter-zonal differences in each area’s involvement in the lithic economy; so, there might have also been differences in their involvement in the basalt trade. Such differences in exchange activities or craft production are the basis for a political economy in the Hirth model. However, there is solid evidence at Jachakala for a significant long-distance trade in basalt from the beginning of the site’s history. This raises questions about the role that exchange activities and imported goods played in each period, because no group of households expanded their domestic economy to disproportionately include exchange activities. Rather, all groups of households participated in exchange networks in all three periods. The role of exchange in later developments will be addressed further in Chapter 6.

OTHER DOMESTIC ACTIVITIES

Excavations of the Niñalupita Period also produced evidence bearing on a range of additional domestic activities. These activities include textile production, hunting, and storage. The practice of metallurgy was also indicated, though this was most likely a non-domestic activity. The small sample sizes associated with the material correlates for each of these prevent inter-zonal comparisons. However, these artifact classes provide a glimpse into what Niñalupita Period households were doing besides provisioning themselves.

Textile Production

Excavations revealed material evidence for the production of cloth during this period, including spinning, sewing, and weaving tools. Artifacts include a single ceramic spindle-whorl disc recovered in the southern zone, as well as another whole and one incomplete spindle whorl disc (the latter being slightly indented on one surface) in the central zone. Worked bone sewing or knitting instruments found in the south included three large, pointed needles (one of which may have alternatively functioned as an awl). Two bone tools (wichuñas) recovered from pits in the central zone were used in loom weaving.

Hunting

Evidence for hunting activities in the Niñalupita Period is similarly limited. A total of three small bifacial basalt projectile points date to this phase in the southern zone. Excavations also yielded three small points in central zone pits, one manufactured of basalt, and the other two made from cloudy gray quartzite. These small projectiles may have been hafted and used for hunting small mammals, birds, and fish.

Metallurgy

A small amount of slag from the production of metal was recovered in both the southern (thirteen pieces) and central (four pieces) zones. Evidence for metal production in the La Joya region dates to Late Formative Period and is found at Wankarani sites. It has long been assumed that this slag derived from copper production; recent examination by a metallurgical specialist suggests the possibility that silver production may have been practiced as well or instead of copper (Heather Lechtmann, personal communication). The slag found at Jachakala is consistent with the notion that metal production was both known and practiced on a small scale at the site, though not as a typical household activity.

Storage

Storage and refuse disposal activities are represented by a small number of small outdoor pits excavated and mapped through this occupation of Jachakala. These include two refuse pits located in Levels 12 or deeper in central zone units, and a single refuse pit in the southern sector of the site. The field crew also mapped a large number of shallow ash lenses and small quantities of ash and refuse that collected in natural depressions in the original surfaces throughout the site. These, however, are excluded from this discussion. In general, rounded and sloped refuse pits were between 20 and 40 cm deep, containing a mixture of ash, bone fragments, and a few sherds, and were often topped by a groundstone fragment. The limited number of features that might be interpreted as storage pits prohibit a meaningful comparison of storage behaviors between areas of the site. Fire pits or hearths, on the other hand, were deep and round with fairly straight, vertical walls. Large fragments of carbonized wood, burned earth, and ash ranging from dark gray to white were the identifying characteristics of otherwise unlined hearths. Burned bone fragments and similarly burned ceramic sherds were often recovered from these features as well.

DISCUSSION: NINALUPITA PERIOD AND THE DOMESTIC ECONOMY

In a society devoid of permanent political offices or strong ascriptive status differences, the domestic economy should be displayed in four characteristics of material patterns. These were discussed more fully in Chapter 1, and are briefly revisited here. Given the various lines of evidence presented above, the Niñalupita Period patterns are consistent with the four expectations of the domestic economy model. These include an absence of evidence in the center and south that would clearly indicate farming, herding, and/or storage above the level of household subsistence demands. Secondly, evidence for the manufacture and consumption of craft goods should not be differentially distributed within the community. The same relatively even spatial distributions are predicted for the third line of evidence, namely items imported via exchange networks. Finally, we expect small-scale variability in inter-household comparisons, because houses at various stages of their life cycles (and/or with a normal range of membership) will intensify their production according to their needs. Therefore, this variability should correlate with differences in the sizes of domestic architectural structures. (I was unable, of course, to compare Niñalupita Period households at all, because I found none in those stratigraphic levels.) Together these four archaeological correlates provide a direct means of examining the three aspects of the domestic economy, which include the production, exchange, and service sectors. Note that any evidence recovered from excavations does not support the concept of service activities such as communal functions and payments to elites.

The lithic analysis reveals moderate differences between the central and southern residential areas in their relative proportions of production and consumption debris. However, inter-zonal differences in their lithic:ceramic ratios were quite large. Faunal remains exhibit even greater differentiation, particularly in the significant inter-zonal trunk comparison, but forelimb, hindlimb, rib, and cranial packet distributions are nonetheless not very strong. Overall, these moderate levels of inter-zonal differentiation in terms of subsistence practices exceed to some extent that expected under the Hirth model of domestic economy and, as we shall see, they may have formed the basis for deeper economic differences during the Isahuara and Jachakala Periods. Evidence for a range of other domestic activities, including craft production, weaving, storage, hunting, and so forth, did fail to reveal patterns consistent with wealth or status differentiation. Highly significant and quite strong differences between the two zones in terms of proportions of storage and cooking ceramic wares are also revealed.

Again, households at the same stage in their life cycles should be doing essentially the same things. Moderate inter-household economy variability is to be expected simply because households have variable numbers of producers and consumers available to them at different stages of their life cycles. However, none of these dimensions of variability should be highly significant or very strong, in the statistical sense. In conclusion, Jachakala's Niñalupita Period occupation was likely a small egalitarian community with limited inter-household variation in resource use and activities. With the exception of the faunal remains, the inter-zonal analyses revealed patterns that conform to the Hirth model of domestic economy.