Comparative Study of Formative Period Basalt Artifacts in the Bolivian Highlands

Rebecca Hein

Faculty Sponsor: Tim McAndrews, Department of Archaeology

ABSTRACT

This paper is a comparative study of Formative Period (2000 B.C. to A.D. 250) basalt artifacts in the Bolivian highlands. I will specifically focus on basalt artifacts found in the altiplano (3,800 m. above mean sea level), versus the Cochabamba Valley (2,400 m. above mean sea level). The artifacts from the altiplano will be compared to the form of artifacts found in the Cochabamba Valley. This paper deals with the differences in form and function between the basalt artifacts (primarily bifacial tools) found in each area. It will also discuss the possibility of trade in basalt between these regions.

INTRODUCTION

The Formative Period (2000 B.C to A.D 200) in the Andean highlands is defined by the emergence of sedentary populations. During this period agricultural systems were developed, animals were domesticated, and permanent settlements were established (Stanish 2003:99). Groups during the Formative Period had herds of domesticated camelids that needed to be taken out to pasture, but they also engaged in agriculture. This agropastoral adaptation led to the establishment settlements with access to both pasturage and farmland (McAndrews 1998:7).

Political organization during this time was limited to villages and their control over various resources. Villages formed relationships with each other in order to trade, and exploit resources not found in their ecological zone (Browman 1980:107). The harsh and rugged terrain of the Bolivian highlands made survival difficult. It was through exchange of goods throughout these different ecological zones that villages were able to survive.

Figure 1. Map showing location of altiplano and Cochabamba settlements (Ballivan 2004).

The main archaeological complex focused on in this paper is the Wankarani. The Wankarani were agropastoralists with villages distributed throughout the altiplano north of Lake Poopo (Kolata 1993:59) (Figure 1). It is interesting to note that some Wankarani villages have been found in the Cochabamba Valley. These villages may have been established to exploit resources such as wood or maize, resources available only at lower altitudes (Kolata 1993:59).

One resource that has been found at various Formative Period sites is basalt. The presence of basalt at these sites indicates trade activities (McAndrews 1998:54). Basalt tool use was widespread in the Bolivian highlands

during this period, and it was utilized for projectile points, bifacial knives, agricultural tools, and multipurpose implements.

The primary focus of this paper is to examine how these tools were used relative to their source area or ecological zone. A high altitude zone (altiplano) and a lower altitude zone (Cochabamba Valley) will be compared. By examining how basalt was utilized at altiplano sites, and determining which groups had ready access to the basalt, the use of basalt as a trade commodity will be demonstrated. Since there has been limited archaeology done on Formative Period sites in Bolivia, this analysis will contribute further insight into the structure of life ways during this time.

FIELD METHODOLOGY

In August of 2003 I visited Bolivia to gain an understanding of how the environment and topography are structured. I accompanied Dr. Tim McAndrews to help him establish a long-term research project in the Capinota Valley located within the Department of Cochabamba, Bolivia (Figure 2). By visiting Bolivia I was able to see the dramatic changes of the landscape.

While in Bolivia we visited the Department of Cochabamba and surveyed several Formative Period sites in the Capinota/Parotani region. The sites visited were Pirque Bajo (CP12), Pirque Alto (CP11), and Chara Mokho (CP13). The Formative Period spans approximately two thousand years, and the earliest Formative village sites appear c.1500 B.C. Based on ceramics found on the surfaces of the sites listed above, Dr. McAndrews was able to determine that they date to the Formative Period.

Figure 2. Photos of the Parotani region of Cochabamba, Bolivia (photos by the author).

The sites surveyed were selected by Dr. McAndrews, and located through the use of detailed topographical maps that he purchased in Cochabamba. During our stay in Cochabamba we were able to contact a German archaeologist who was conducting excavations in this area. She helped us locate the sites, and also supplied a jeep. Through the use of maps and a GPS device we were able to find and record where the sites were located.

I also examined artifact collections at the Instituto de Investigaciones Antropologicas y Museo Arquelogico de la UMSS in Cochabamba. My primary focus was Formative Period artifacts. The artifacts in the museum's collections came from the Cochabamba region.

LIBRARY RESEARCH

After returning from Bolivia I met with Dr. McAndrews to discuss the use of basalt during the Formative Period in the Altiplano. I also developed my text resource base and read through the material, taking notes on the differences between sites in the altiplano and Cochabamba Valley. The main difference I identified between the sites in those regions was that basalt artifacts are ubiquitous on altiplano Formative sites, but very rare on Cochabamba sites. In fact we identified no basalt artifacts on the sites we surveyed in Cochabamba.

One of the goals of my trip to Bolivia was to compare the lithics found on the sites we visited in Cochabamba, to the data Dr. McAndrews already collected from the Altiplano. The Wankarani sites surveyed by Dr. McAndrews in 1996 were covered with bifacial retouch debitage. However at the sites we surveyed there was none. This puzzle became the focus of my study.

Basalt was primarily linked to agriculture and many of the basalt artifacts were hafted and used as hoes and/or multipurpose tools in Altiplano sites (McAndrews 1998:50). However, certain regions, depending on the amount of agricultural activity, may have used the basalt in other ways. In this paper I compare the Altiplano and Cochabamba Valley, to gain an understanding of how the sites were organized and the types of activities characteristic of each site.

ENVIRONMENT, TOPOGRAPHY, AND NATURAL RESOURCES

The political system and economy of groups during the Formative Period is better understood with an examination of the environmental context. The environment of the altiplano and Cochabamba Valley are vastly different, even though they lie within two hundred miles of each other.

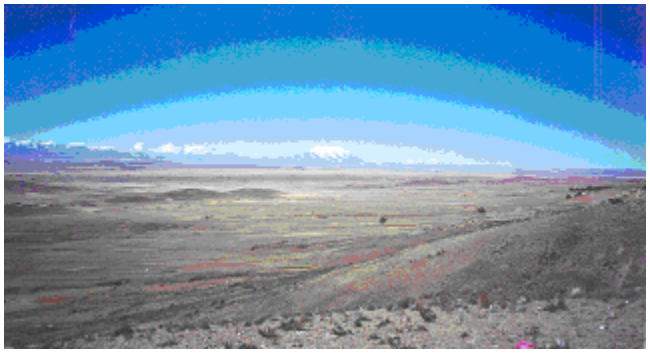

Figure 3. Bolivian altiplano (photo by the author).

The area of focus for this paper is the Department of Oruro in the provinces of Cercado, Carangas, Saucari, and Tomas Barron (McAndrews 1998:72). This area lies within the altiplano and the artifacts examined in this paper came from this research zone (Figure 3). This zone within the altiplano lies 3,771 meters (12,372 ft) above mean sea level (Montes de Oca 1989:38). The average ambient temperature is 9.5 degrees Celsius (49° F), with the average low of the coldest month at -5 degrees Celsius (23° F) (McAndrews 1998:73). The average high temperature of the warmest month is 15 degrees Celsius (59° F) (McAndrews 1998:73).

The altiplano is a cold, windswept environment with marked alteration between wet and dry seasons (Jennings 1978:241). November to March marks the wet season, which is characterized by torrential rainfall. This rainfall changes the levels in Lake Titicaca subsequently altering the levels of lakes throughout the Titicaca Basin (Jennings 1978:241). Large areas along streams are flooded during the wet season, leaving salt flats and silt deposits behind (McAndrews 1998:74). The dry season, April to October, has little or no rain (McAndrews 1998:74).

The altiplano is situated between two mountain ranges, the Cordillera Occidental to the west, and to the east the Cordillera Oriental (Jennings 1978:241) (Figure 4). The topography of the altiplano is flat with isolated volcanic hills that dot the landscape every 10 to 20 km (McAndrews 1998:75). Lake Titicaca is located in the altiplano. The only outlet of the lake, the Rio Desaguadero, flows through the altiplano 370 km southeast into Lake Poopo (McAndrews 1998:75).

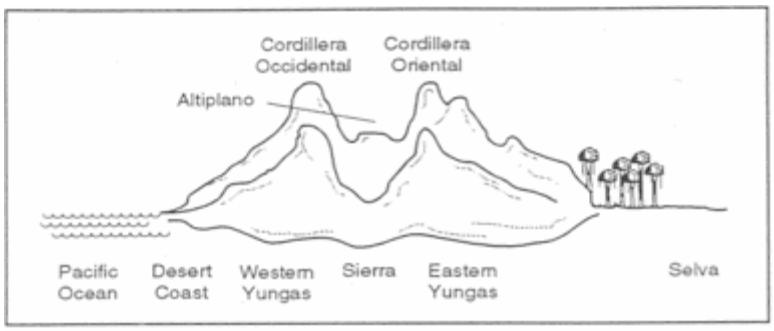

Figure 4. Cross section of the Andean World (Kolata 1993:40).

The lakes in the altiplano were formed in the Miocene with the rise of the Andes. They attained their present form in the Pleistocene. The process of tectonic uplift caused the lakes in this region to form a closed drainage basin. Consequently, many of the lakes have dried up through evaporative loss (Kolata 1993:43).

While the levels of Lake Titicaca have been known to fluctuate as much as 5 meters in a two year period, the level of Lake Poopo is becoming increasingly shallow and saline each century. Eventually Lake Poopo will dry up and form a salt pan. This is similar to what has happened to the other paleolakes that once covered the altiplano (Kolata 1993:44).

The region surrounding Lake Titicaca was the most productive for Formative Period groups. This area has sustained high population densities since the beginning of the Formative Period over 3,000 years ago (Kolata 1993:45). This area supported the cultivation of high altitude crops. Tubers such as oca, ulluco, and mashwa, and grains like quinoa, and canahua were derived from the natural vegetation of the altiplano (Kolata 1993:45).

Quinoa (*Chenopodium quinoa*) was cultivated due to its resistance to the cold temperatures and occasional frosts in the altiplano (McAndrews 1998:81). It was planted in August and harvested in April. The grain from this plant was used in soup, stews, and bread (McAndrews 1998:81). The grains from the canahua plant (*Chenopodium pallidecaule*) were used in the same ways as quinoa. They were also used in various drinks similar to chicha, which was the primary alcoholic beverage (McAndrews 1998:82).

In the altiplano the potato comes in hundreds of varieties. Potatoes are among the most important agricultural resources in the altiplano, even today. They can be processed into chuno (a freeze dried potato product), and stored for later use. Theses tubers were frost resistant and wild varieties indicate that potatoes were probably domesticated in the altiplano (McAndrews 1998:82-83).

Animal resources in the altiplano consist of domesticated camelids. The llama (*Lama glama*) and alpaca (*Lama pacos*) make up the domesticated species. Wild species such as guanaco (*Lama guanicoe*) and vicuña (*Vicugna vicugna*) were hunted. Domesticated camelids were utilized due to their adaptation to the environmental conditions in the altiplano (McAndrews 1998:84). The llama is able to survive with poor pasturage and can also be used as a load bearing animal (McAndrews 1998:84). For this reason llamas were used in trade caravans.

The llama and alpaca evened out the playing field for groups living in the altiplano. Since few crops grow in the altiplano the utilization of camelids became important for fostering trade relations (Moseley 1992:46). Not only were they utilized for wool and meat, but lower altitudes utilized the dung for fertilizing their fields (Moseley 1992:46).

The alpaca is slightly less adaptable to the environmental conditions however; it yields a great amount of fine wool. The guanaco and vicuña are wild camelids and became the focus for hunting groups during this period. There are a few other species of wild animals that can be utilized in the altiplano to supplement the diet. These include guinea pig, chinchilla, and other small mammals (McAndrews 1998:84-85).

Although the altiplano may seem like an inhospitable place to live, Formative Period groups were able to survive and prosper by using every available resource. The altiplano contrasts sharply with the subtropical region of the Cochabamba Valley (Figures 5 and 6). The rolling landscape and rich agricultural soils present in Cochabamba were used by Formative Period groups to grow maize, coca, and tropical fruits. All of these products can only be grown at lower altitudes than the altiplano. Even today Cochabamba remains a key agricultural center producing maize, coca, wheat, barley, alfalfa, and vegetables (Kolata 1993:270-271).

Figure 5. Chipaya village in the altiplano, similar to Wankarani villages (Maranon 2004).

Figure 6. Suticollo, Cochabamba (Maranon 2004).

The Cochabamba Valley lies to the northeast of the Department of Oruro. It is situated along the slopes of the Cordillera Oriental, which makes up the eastern part of the Andes mountain range. The Cochabamba Valley lies 2,382 meters (7,815 ft) above mean sea level. It lies within its own section called the Cordillera de Cochabamba (Montes de Oca 1989:172). The average ambient temperature is 18 degrees Celsius (64.4° F), considerably warmer than Oruro (Montes de Oca 1989:136). The average low of the coldest month is 5 degrees Celsius (41° F), and the average high of the warmest month is 30 degrees Celsius (86° F) (Montes de Oca 1989:139-140).

In contrast to the flat landscape of the altiplano the Cochabamba Valley landscape is characterized by large rolling hills and entrenched river valleys. One of the main cereal crops planted in this region was maize (*Zea mayz*), which is grown primarily on terrace and floodplain environments**.** There is some archaeological evidence that maize may have been ground (through the use of manos and metates) however it is more likely that it was roasted on the cob or boiled in soups or stews (Bruhns 1994:91). Maize was also used to brew chicha beer. Current evidence shows, through the recovery of pollen and phytolith samples, that maize was present in Ecuador from 4,000 B.C. onwards (Bruhns 1994:91).

The coca plant (*Erithroxylum coca*) was also intensively cultivated by groups in this region, and was not only used for its hallucinogenic properties, but also to combat altitude sickness (Montes de Oca 1989:391). When chewed coca leaves relieve high altitude fatigue, and they are rich in calcium and vitamin B (Moseley 1992:44). The coca plant needs a subtropical environment to grow in, which makes Cochabamba a prime location for cultivation (Montes de Oca 1989:391).

VERTICAL ECONOMIES

The environments of the altiplano and Cochabamba Valley are only two of the environmental zones of the Andes. Altitude produces great resource variation within short distances, and a number of different ecozones are distributed vertically along the Andean mountain chain (Jennings 1978:194). These zones offer different types of resources with no single zone supplying all of the resources needed or desired. Verticality is the term used to represent the vertical, or up and down flow of goods throughout these stacked resource zones (Moseley 1992:28).

Communities throughout the Andes learned that one way to overcome their need for other resources was to directly exploit several different ecological zones (Browman 1980:107). Villages or communities would spread out over the different zones distributing labor throughout the year (Moseley 1992:44). This distribution of colonies creates an archipelago of landholdings over various ecozones (Stanish 2003:71). Depending on the topography, the areas of resource holdings may be two to ten days away. At the end of the growing year the yields are transported to the parent community where the commodities are pooled and redistributed among the kin groups (Moseley 1992:44).

These adaptations focus on a number of ecological zones to ensure that bad growing years are compensated by goods from other zones. Since these zones are spread out over large distances, kin bonds are essential for this system to work. This kind of kin-based reciprocity could be represented by labor, service, or commodities (Moseley 1992:44).

This system of verticality or "vertical economies" varies in form and intensity throughout the Andes (Moseley 1992:45). Some areas of the Andes were unable to directly exploit multiple resource zones through seasonal movements or kinship ties. These populations had to find other ways of acquiring the goods they needed. One of these areas is the altiplano. The archipelago model works along the steep Andean flanks, however it is difficult to practice for groups living in the middle of the altiplano, an expansive high altitude plain. The groups living in the altiplano (Wankarani) exchanged goods with other ecological zones by establishing trade networks (Browman 1980:107).

Many of the communities in the altiplano became specialists, producing goods needed in the lower altitude ecozones. In this sense geography and topography made it more efficient for altiplano groups to move goods through exchange networks rather than establishing settlements of people throughout various ecozones (Browman 1980:107-108).

The domestication of llamas and alpacas in the altiplano opened up long distance trade into an extreme form of verticality (Moseley 1992:46). Great caravans of camelids would move goods between vast settlements. Llama caravans were organized by male heads of households who would go on journeys, some hundreds of kilometers, to obtain resources (Bruhns 1994:280). Along the way the caravan would stop and barter with specific kin groups or groups with established formal trading ties, for rare materials (Bruhns 1994:280).

Trading relationships were passed down from father to son. The relationships were based on *compadrazgo*; or rights and obligations of lodging, and granting favors during hard times (Browman 1974:194). These pastoral nomads followed well established trade routes in a fixed seasonal cycle with trading ventures up to four months in duration (Jennings 1978:267).

Great amounts of goods could be transported since an individual llama can carry loads of 45 kg or more (100 lbs), and requires only the grasses available in the highlands for food. Llama caravans were comprised of castrated males. It was believed that castration made a stronger caravan animal. Females weren't used since it was felt the work would make them sterile (Browman 1974:188,193).

Llama herds were also symbolic, conveying prestige and power of their owners enabling them to participate in social reciprocity (Browman 1974:189). Being without a herd would limit one's access to goods and hospitality in a system of institutionalized reciprocity (Browman 1974:195). Since the archipelago model is inefficient for people living in the altiplano, owning herd animals became a way for them to participate in trade and acquire the resources they needed.

WANKARANI

The Wankarani complex is defined as a Formative Period archaeological culture that represents a village based society beginning around 2000 B.C. (McAndrews 1998:63). The Wankarani archaeological complex covers the northern part of the Department of Oruro within the altiplano. As previously outlined above, the Wankarani relied on subsistence agriculture and camelid pastoralism. It has not yet been determined whether or not Wankarani sites represent fully sedentary villages, they may represent semi sedentary seasonal settlements (McAndrews 1998:64).

Wankarani sites represent egalitarian villages. These villages consist of clusters of circular adobe houses, probably with thatched roofs. These house clusters were often enclosed by an adobe wall to form a cancha or farm house enclosure. The number of houses at a site can vary from 15 to 780, with calculated populations between 75 and 3,900 (Kolata 1993:60-61).

Figure 7. Reconstruction of a Wankarani village (Kolata 1993:62).

The Wankarani villages were involved in the organized llama caravans that stretched throughout the altiplano. The distribution of settlements with uniform material culture, imply that these villages formed closely tied ethnic confederations able to engage in trade (Kolata 1993:63). Wankarani peoples would have been involved in llama caravans and trade from the altiplano to the adjacent low lying valleys. However, since the Cochabamba Valley has undergone limited archaeology, the nature of the archaeological complex contemporary with Wankarani is poorly understood.

BASALT TOOL USE

Basalt bifacial tools were used throughout the altiplano and Cochabamba Valley as agricultural implements. A use wear analysis study done by Aoyama (1995) indicates that these tools were multifunctional. His study analyzed lithic artifacts from the Department of Oruro to reconstruct their production and consumption systems. Twenty nine of the 292 artifacts were selected for microwear analysis. He found that 27 of them had soil polish on the distal end of the bifaces. Some of the bifaces had hide polish on all edges of them indicating that they may have also been used to scrape hide (Aoyama

1995:1, 4). Furthermore these specimens lacked the worn polished distal end that the bifaces used for soil excavation had.

In the altiplano, where populations engaged primarily in tuber agriculture, these bifacial tools were used in tilling, planting, cultivating, and harvesting activities (McAndrews 1998:50). The bifaces could have been hafted and used while standing, or through the use of a smaller handle used while the person was kneeling (McAndrews 1998:50). These tools would have aided groups like the Wankarani, when it came time to remove the potatoes and other tubers from the soil.

Wankarani groups living in the altiplano also used basalt artifacts to process meat (Aoyama 1995:12). Basalt projectile points could have been used for hunting the vicuña in this region, since it is clear that hunting with projectiles was a part of the subsistence economy at these sites (McAndrews 1998:127). Occasionally a llama was taken from the herd and used for meat, basalt knives would have been used for processing. Local inhabitants still use the extremely sharp edge of basalt tools for castrating their llamas (Kolata 1996:369). Based on available archaeological evidence, it is likely that some of these tools were used to scrape or cut the hide from these types of animals (Aoyama 1995:12).

On Wankarani sites bifacial tools were produced by households as they were needed (Beaule 2002:69). Based on the amount of stone debris at Wankarani sites, stone knapping was a common activity. Several individuals per household were most likely involved in producing the tools (Kolata 1996:366). In Beaule's analysis of Jachakala sites in the altiplano, she notes that little work has been done to show how basalt tools were made (Beaule 2002:61). Many studies treat bifacial tools as end products (Beaule 2002:61). Fortunately we have some data describing the sequence in which bifacial tools are created. See figure 8 below: Biface production sequence (Beaule 2002:59).

At many sites bifaces were used until they broke or wore out. A bifacial tool could be retouched many times throughout its life span. Bifaces used for soil excavation would wear down or break in the fields. They would then be brought back to the site and recycled. Hoe fragments served as cores for small tools, projectile points, scrapers, and knives (Beaule 2002:61, 63).

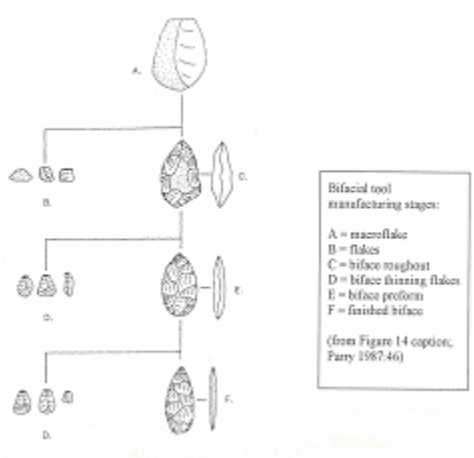

Figure 8. Biface production sequence (Beaule 2002:59).

Although some sites contain more bifacial tool remains than others, all of the sites in the altiplano would have had equal access to basalt. It appears that there were no restrictions in the access to this material. Instead, differences in the density of basalt reflect how intensive the agricultural activities were at the site (McAndrews 1998:135). Debitage is the residual material produced from lithic tool manufacturing, and is far more abundant than stone tools (Kolata 1996:365). Normally debitage is not removed from the site where the tool production takes place (Kolata 1996:365). Examining the amount of debitage at a site, is one way to gauge the intensity of agricultural activities (Beaule

2002:69). In order to reconstruct the sequence of stone tool production, one needs to look at the tools and the debris (Kolata 1996:365).

BASALT SOURCE

The major source of basalt in the Bolivian highland was the Querimita mine. This is the only major basalt quarry in the Bolivian altiplano that has been identified (Kolata 1996:368). The site of Querimita was located roughly 200 km (124 miles) from the Wankarani sites on the southwestern shore of Lake Poopo (McAndrews 1998:54). Raw material was quarried from the mine and brought outside. There the basalt was reduced to form large tool blanks, which could then be brought back to the site and formed into bifacial hoes (Beaule 2002:60).

Large amounts of basalt debris still litter the surface of the Querimita outcrop (Kolata 1996:369). Basalt mining is documented to begin in the Formative Period, since Wankarani ceramics have been identified at Querimita (Kolata 1996:369). The Wankarani also participated in long distance exchange of basalt (McAndrews 1998:184). This exchange was vital to the Wankarani economy (McAndrews 1998:184). In 1988 Martin Giesso conducted excavations to recover lithic artifacts at Tiwanaku, Lukurmata, and rural sites in the Tiwanaku Valley (including Oruro) (Kolata 1996:363). He found that the majority of the samples were from Querimita. However, there were several samples that were not from Querimita implying that one other basalt quarry was in use (Kolata 1996:364).

COMPARING FORMATIVE PERIOD SITES IN THE ALTIPLANO AND COCHABAMBA VALLEY

Site Differences

Wankarani sites are typically located in the altiplano adjacent to volcanic hill groups. The base of hills is a good location for pursuing farming and herding activities. The location of these sites is on the boundary of two resource niches, agricultural land, and high quality grazing land (McAndrews 1998:95-96). This positioning allowed them easy access to both areas.

In contrast, the sites I visited while in the Cochabamba Valley were quite different. Sites were located on the sloping hills along the river valleys. They were located in elevated positions compared to the Wankarani sites. Along the steep hills of these sites ceramic debris littered the area. The Cochabamba Valley sites lacked basalt debitage from stone tool production, in comparison with Wankarani sites which are littered with basalt debitage

(McAndrews 1998:134). This indicates clearly that basalt was not available to the same degree as Wankarani sites. This implies that basalt was harder to obtain, and therefore a rare material at these sites.

Tool Differences

Basalt bifacial tools are found in the altiplano and Cochabamba Valley; however, the morphological form of basalt tools from the Cochabamba Valley is different. In the altiplano bifaces were manufactured from relatively thin unmodified blanks that were imported from the mine site of Querimita. Aoyama's analysis indicates that most of biface reduction was carried out by direct percussion (Aoyama 1995:2). The bifacial tools found in the altiplano were chipped to form a large ovoid shape (Beaule 2002:60). The tools were not ground or polished to form a smooth surface, rather they were speedily made and crude in construction. This is probably because basalt was an easily obtainable resource in the altiplano. Since tools were manufactured as they were needed at the household level, they did not need any further modification. However, tools found in the Cochabamba Valley take a different form.

While there are large chipped hoes similar to the type found in the altiplano, polished basalt ax heads are also found. These artifacts are relatively common on Formative Period sites in the Cochabamba Valley. Interestingly, of the 18 Formative Period Wankarani sites surveyed by Dr. Tim McAndrews in 1998, which yielded hundreds of basalt artifacts, only one of the polished axes was found. The site of Jallahuana (B-1) yielded an artifact different from the others found in this region. Artifact B-1.6 (Figure 9) had sharpened sides and a worked distal end. The presence of this artifact suggests that there may have been contact between Wankarani groups and Formative Period groups in Cochabamba (McAndrews 1998:131,184).

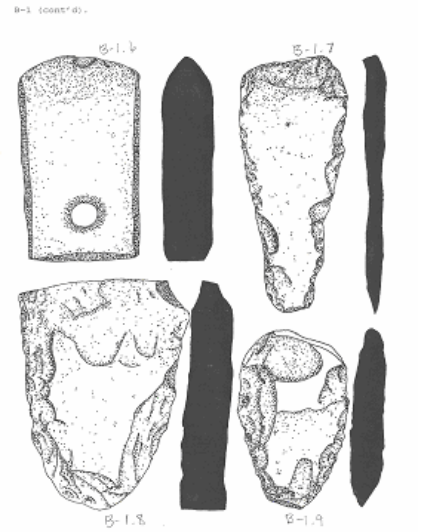

Figure 9. Upper left artifact is B-1.6; the other three bifacial tools represent the chipped altiplano tool form (McAndrews 1998:429).

The differences in form may be temporal. There has not been enough archaeology done in this region to develop a more narrow chronology. The extensive length of the Formative Period has not been broken down due to a lack of archaeological evidence. The classifications that have been attempted on ceramics recovered from this period are difficult to categorize due to their similarities. As a result, the Formative Period remains an extensive length of time.

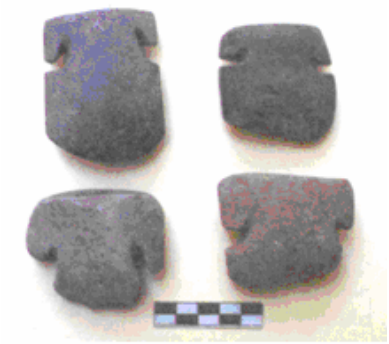

Figure 10. Example of ground stone axe heads found in Cochabamba Valley (Herrera et al. 2000:19).

There are four types of these axes, three of which are found in the Cochabamba Valley. Some of these have been dated to 1500 B.C. (Herrera et al. 2000:21). These axes, encountered with lateral cuts, take the form of plain axe heads with perforations (Herrera et al. 2000:21). These tools take an entirely different morphological form than the chipped hoes found in the altiplano. They were used and re-sharpened until they were discarded.

Figure 11. Axe heads found in Cochabamba region (Herrera et al. 2000**:**20).

DISTANCE OF SITES TO THE QUERIMITA MINE

Since the groups living in the altiplano had a direct route, that covered relatively flat terrain to the basalt source, I feel it is likely that they acquired basalt for trade with other regions. Groups living in the Cochabamba Valley during this time would have had to make a far longer and treacherous journey to the mine site of Querimita. Individuals from Cochabamba sites would have to travel 150 miles to the southwest, over the mountainous terrain of the Cordillera Central, just to reach the altiplano (Montes de Oca 1989:139). They also would have to overcome 1,389 meters (3,700 ft.) of altitude (Montes de Oca 1989:35-38). After they reached the altiplano they would have to hike an additional 200 km to the Querimita mine.

TRADE OF BASALT IN THE BOLIVIAN HIGHLANDS

There have been some Wankarani-like villages that have been found at lower altitudes near the Cochabamba Valley. These villages may have been established to exploit the resources of this subtropical zone that were not available on the high plateau. These resources would have included maize and wood, and signify an ancient expression of verticality (Jennings 1978:245).

Since basalt is not found in the Cochabamba Valley in the same amounts as Wankarani sites, several issues need to be addressed. From established archaeological evidence, we know that basalt was used throughout the Bolivian altiplano to construct multifunctional tools. Based on the morphological form of some of the basalt artifacts from the Cochabamba Valley, it is likely that they were not used for tilling soil.

Dr. Tim McAndrews referred to artifact B-1.6 found in 1998 as an axe head (McAndrews 1998:184). Furthermore, Herrera and his colleagues found similar artifacts in the Cochabamba Valley and referred to them as “hachas” or axes (Herrera et al. 2000:18). The altiplano’s sparse vegetation consists of grass or brush. The Cochabamba Valley is a subtropical region that would have had access to trees. Furthermore, the Cochabamba Valley is situated on the edge of the yungas. The yungas are the zone between the Bolivian highlands and the tropical rainforest of the Amazon basin (Kolata 1993:48). The natural vegetation of the yungas is a mix of trees,

shrubs, and vines (Kolata 1993:48). It is possible that the artifacts found in the Cochabamba Valley were used for harvesting trees or wood working.

Through the use of llama caravans groups living in the altiplano were able to trade with people inhabiting the various ecozones of the highlands. Since basalt was a trade commodity for Wankarani villages, it is likely that basalt preform blanks were traded with groups in the Cochabamba Valley. The Cochabamba Valley was the primary region where maize, coca, and various fruits were produced. The Wankarani living in the altiplano would have been able to exchange basalt for these products. They also may have received some bundles of wood, since the altiplano lacks a good wood source.

CONCLUSION

After examining the differences of tool forms in the Bolivian highlands, a difference in function is revealed. Chipped basalt bifacial tools are found in the altiplano and Cochabamba Valley. However, the artifacts recovered from the Cochabamba Valley take a different form. The ground stone artifacts found in this region represent axe heads. These axes may have been used to harvest wood from the subtropical region of Cochabamba.

The basalt used to create tools throughout the Bolivian highlands was a trade commodity. Wankarani groups during the Formative Period had direct access to the Querimita mine. It is likely that basalt preform tool blanks were traded with lower regions, due to the absence of debitage at several Cochabamba sites. These regions did not have access to basalt in the same way as altiplano sites. This may explain why basalt is not found in the same quantity as it is at altiplano sites.

In addition to the many trade goods supplied by the Cochabamba Valley, Wankarani groups could have obtained some quantities of wood. The altiplano lacks a good wood source, with the primary vegetation consisting of grass and shrubs. Groups in the altiplano may have obtained the wood needed for building thatched roofs and hearth fires from outside sources.

In closing, the environments of the Bolivian highlands are vastly different from one another. The Andes Mountains create ecozones that vary from cold and barren (altiplano), to subtropical (Cochabamba Valley) and more. People living in these areas during the Formative Period were able to utilize every available resource, and participate in vast trade networks in order to survive.

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