

REGIONAL ASSOCIATIONS AND A CERAMIC ASSEMBLAGE FROM THE FOURTEENTH CENTURY LLANOS DE MOJOS

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INTRODUCTION

As archaeologists turn more attention and resources to the Amazon Basin, the breadth and depth of indigenous cultural achievement are becoming clearer. Recent interpretations of the precolumbian Amazon include systems of long distance trade, diasporas of linguistically and culturally related populations, and early urbanism. Many of these interpretations are linked to the archaeological and anthropological study of landscape. Precolumbian Amazonian communities used a huge range of domesticated plants and a large number of animal products (Denevan 2001). In some cases, these organisms bear the marks of domestication in their genome. Other examples are better seen as domestication of the landscape, making patterns of plant and animal life predictable and useful. Amazonian peoples have demonstrated the ability to modify the environment (Clement 1999:190), changing the vegetation cover and the animal populations in the places where they live (Balée and Erickson 2006; Stahl 2010). Amazonian peoples created and used *terra preta*, literally black earth (Glaser and Woods 2004; Lehmann *et al.* 2003; Woods *et al.* 2009), domesticated fruits and nuts (Clement 1999), and constructed earthworks in western and southern Amazonia (Denevan 1966, 2001; Erickson 2006; Erickson and Walker 2009; Pärssinen *et al.* 2009; Snead *et al.* 2009; Walker 2004). Histories of these landscapes are connected to the demands placed on them by the exchanges, syntheses, trade, invention and

recombination expected in multicultural, multilingual settings.

In the neighboring Andes, environmental diversity is packed into small areas arranged along steep gradients (Murra 1972; Troll 1966). By traversing the mountains and interacting with other communities at different elevations, Andean peoples exchanged a wide variety of raw materials, artifacts, and ideas. In the Amazon, environmental diversity is affected by elevation in a different way. Connections between distinct ways of life and economies necessarily cover longer horizontal and shorter vertical distances. For an Amazonian community to maintain contact with a wide variety of different ethnicities, language groups, and settlements, exposing itself to a variety of ideas and artifact styles, its connections must cover long distances. If landscape archaeology opens new ground by documenting the scale and distribution of these landscapes, the next step is to fit them into local, regional, and continental frameworks of time and space. Radiocarbon dating, ceramic chronology, and stylistic comparison have important roles to play, integrating landscapes to build inter-regional histories.

Areas of raised fields, clusters of ringed villages, geometric earthworks (called geoglyphs in this context), causeways, and canals have been found across more than 1500 kilometers of southern and southwestern Amazonia (Mann 2008). This conclusion builds on decades of

research on well-known archaeological landscapes in the Guayas Basin, the Llanos de Mojos, the Lake Titicaca Basin, and other regions. This article examines a ceramic assemblage from the Iruyañez River in the Llanos de Mojos (Figure 1), well dated to the fourteenth and fifteenth centuries A.D., and relates that assemblage to five other archaeological regions, from 200 to 1400 kilometers distant.

AMAZONIAN CERAMICS STUDIES

Debates that began in the 1960s still influence the outlines of ceramic analysis in Amazonian archaeology. Placing the Amazon in a larger context of debates on linguistic and agricultural dispersals around the world, Neves calls for investigating combinations of ceramic assemblages and hypothetical language groups, but also agricultural economies (Bellwood 2001; Neves 2008). In a review of the connection between ceramics and populations, Neves argues that although the interpretation of the ceramic record is an unresolved question, Meggers and Evans' four Amazonian horizons remain a useful heuristic (*ibid.*). Neves affirms the four-horizon sequence (Zoned Hatchure, Incised-Rim, Polychrome, and Incised-Punctate), although without the historical explanation of the succession of those horizons. He suggests that this broad outline be used while the details of Amazonian sequences are worked out.

Originally, Meggers explained Amazonian culture history as an extension of Andean culture history, because in her understanding, complex ceramic styles at the mouth of the Amazon were the result of a long-distance migration of people down the river valley (Meggers 1971). Large population movement over long distances, identifiable through ceramic styles, constitutes her explanation. In Lathrap's view, on the other hand, Amazonian peoples

played a significant role in Andean culture history. He argued that the complex ceramic styles at the boundaries of the Upper Amazon came about as the result of a series of long-distance up-river migrations. His model relies on the movements of large numbers of people, identifiable through ceramic styles (Brochado and Lathrap 1982; Lathrap 1970a, 1970b). Lathrap's model drew explicit parallels between language groups and archaeological ceramics.

One point of agreement is the role of population pressure. For both Meggers and Lathrap population pressure drives the development of agriculture, the movement of people throughout the Amazon, thereby determining local sequences. For Lathrap, the Central Amazon supported a growing population and generated a series of outward migrations, like pulses of a beating heart. For Meggers, the Central Amazon limited population growth, which doomed complex societies to decline and populations to decrease. However, for both, population played a leading role in understanding cultural change, whether dynamism or decline.

Many factors complicate associations between population, language, and material culture in the Amazon, making large-scale archaeological interpretation more difficult. Much of the Amazon Basin can be characterized by strong linguistic diversity at the regional level, but also within individual communities or even families. In the southwestern Amazon, the Guaporé-Mamoré region in general, and Mojos in particular, constitute a particularly diverse linguistic region (Crevels and van der Voort 2008). The upper Guaporé-Mamoré region has fifty languages of eight different stocks and eleven isolates, likely to be of long standing. Mojos, the southern half of this region, also displays linguistic diversity, with four language isolates (Canichana, Cayubaba, Itonama, and

Movima) that predate the entry of Arawak languages.

Neves (2008:369) identifies the Guaporé-Mamoré region as a possible center of cultural innovation, if not a heartland from which a language group spread across the Amazon Basin. Evidence suggests that the Guaporé-Mamoré was a center for the development of several key Amazonian crops, including manioc, peanuts, and chili peppers (Piperno 2006). If the upper Madeira-Guaporé region was a locus of agricultural innovation, we might expect to find ceramic assemblages there that are associated with agricultural economies and share stylistic traits with other regions. Neves argues that recent data do not support a Central Amazon heartland from which language-related migrations originated. Instead, conjunctions between language, ceramics, and agricultural landscapes are the most reliable basis on which to reconstruct culture history.

As records of landscape management, raised fields (and other earthworks) are likely to be associated with settlements that differ significantly from settlements unassociated with earthworks. Raised fields can be thought of as industrial infrastructure, in the sense that they were used to produce a range of different crops, substances, and valued objects, rather than an exclusively agricultural infrastructure, producing only food crops. Research from across Mojos suggests that links between settlement and landscape are distinct in three recently presented examples (Erickson 2010; Lombardo and Prümers 2010; Lombardo *et al.* 2011).

Excavations conducted early in the twentieth century in southeastern Mojos have been used to characterize Mojos ceramics, and investigations have continued there in the past decade (Nordenskiöld 1913, 1924a, 1924b; Prümers 2000, 2001, 2002). During early syntheses of Amazonian (and South American)

archaeology, similarities were noted between the ceramics recovered in these excavations and contemporaneous ceramics from the adjacent Andean highlands. In 1936 Wendell Bennett made this connection explicit, and associated it with sociopolitical complexity, classifying Lower and Upper Velarde, Maisicito, and Hernmarck as Sub-Andean (Bennett 1936). More recent analyses suggest the importance of other geographic connections. Features such as large urns and polychrome wares suggest closer associations with Amazonian ceramic traditions, rather than Andean ones. Lathrap distinguished between two phases in Mojos with Lower Velarde and Chimay as the earlier, and Upper Velarde and Hernmarck as the later. The earlier phase he associated ultimately with both the Barrancoid tradition of the Central Amazon, and also with bichrome painting associated with the Andes (although earlier than, and not necessarily associated with, Tiwanaku). The description of more ceramic assemblages from Mojeño contexts will help resolve these sequences and connections (Jaimes Betancourt 2010; Walker 2011b).

THE IRUYAÑEZ RIVER IN THE LLANOS DE MOJOS

The Llanos de Mojos (or Mojos) is a seasonally flooded tropical savanna (Figure 1), created in part by a tangle of hydrologic features including major rivers and tributaries, seasonal creeks, ancient riverbeds, oxbow lakes, “oriented” lakes, and both permanent and seasonal wetlands (Hanagarth 1993). The Iruyañez River is one of the main tributaries of the Mamoré, and rides in a channel originally formed by the Beni River, which today forms Mojos’ western boundary. The annual cycle between wet and dry seasons determines much of Mojos’ land use. As much as half of the landscape can be underwater in February, while August can pass without any rainfall. The movements of water across slight differences in

elevation determine soil conditions and land use. This landscape is a record of the long and complex history of rivers moving across the savanna, cutting channels, building levees, and erasing them. It also records more than 2,500 years of human habitation and landscape management (Denevan 1966, 2001; Erickson 2000, 2006; Erickson and Balée 2006; Erickson and Walker 2009; Walker 2004, 2008a, 2008b). Precolumbian farmers used earthworks to extend planting seasons and improve soil conditions for cultivation, and perhaps for a variety of other purposes, including transportation, controlling water and fire, or ritual processions (Walker 2011c).

The community at the Cerro Site¹ used raised fields, probably both producing food and raw materials for a wide range of industrial products. Lowland societies create rich and varied material cultures from animal and botanical raw materials (Roth 1916). The occupied area within the forest at Cerro was more than eight hectares and could easily have been as large as thirty hectares. This settlement size suggests a population greater than five hundred, and is consistent with later ethno-historic descriptions of 1,800-2,000 person towns (Zapata 1906 [1693]:25-26). Political leaders from this area are in one case said to have held influence over several settlements. The ethnohistoric descriptions cited above, which loom large in later classifications of Mojeño societies (Steward and Faron 1959:350), are based on descriptions of the Cayubaba, identified with north-central Mojos, near the Iruyañez River (Block 1994; Zapata 1906 [1693]). The Mojo and Baure, both Arawak groups located further south and east, are associated with smaller settlements and

chiefs who have authority within a single settlement (Eder 1985 [1791]).

El Cerro

El Cerro is a large island of forested high ground named for a rock formation approximately forty meters high and ten hectares in extent, surrounded by about 110.8 hectares of forest (Figure 2). The rock formation is the highest point for several hundred kilometers, a landmark for both horsemen and airplane pilots. The surrounding high ground has been occupied continuously throughout local memory. A permanent stream (Cerro Creek) lies along the southwest side, and the Iruyañez River lies three kilometers to the south. The entire dry forest at Cerro contains evidence of modern occupation, in the form of slash-and-burn fields, both abandoned and in use, trails, abandoned houses, and mango groves.

Transects

Two transects of shovel test excavations, each approximately fifty centimeters in diameter were excavated at right angles to each other in order to sample a large area of the forest. Transect 1 extended due east of a brick-lined well at the modern Cerro ranch (ca. 1997), and extended through the levee into the savanna. Its total length was 615 meters (41 individual shovel tests). Beginning from where Transect 1 exited the forest, Transect 2 extended due south through the levee and out into the savanna (Figure 3). Its total length was 1140 meters (76 shovel tests).

The high ground is covered with mixed palm forest, punctuated by a few modern swidden fields. The soils of the northern and western part of the levee (sampled in Transect 1) contrasted strongly with the soils of the central and southern parts of the levee (sampled in

¹ To avoid confusion, in this paper I refer to the rock formation as "El Cerro" and call a modern ranch and the area in general "Cerro", and the archaeological site the "Cerro Site".

Transect 2). Reddish sandy soils with few sherds were found in the shovel tests of Transect 1. Dark soils, burned clay, and dense deposits of sherds were found in most Transect 2 shovel tests, and sherds were recovered on the surface in some locations. Transect 2 intersected a deposit of anthrosol that was approximately 500 meters across (Figure 3). The definition of anthrosol is based on three criteria: dark soil, ceramics, and burned clay soil, and is further examined elsewhere (Walker 2004:63-110, 2011a).

The total area of occupation at the Cerro Site is difficult to determine. One method used is to map a circle around the shovel tests that contained sherds. These circles provide an estimate for the area of occupation intersected by Transect 2. The smaller of the two circles in Figure 2 encloses twenty-two shovel tests, covering 330 meters, all of which contained sherds (translating to an area of 8.5 hectares). The larger circle encloses a total of thirty-four shovel tests, covering 510 meters, all but two of which contained sherds (an area of twenty hectares). A third estimate takes the total number of shovel tests (117), divides by the number of shovel tests yielding ceramics (41), and multiplies by the total area of the forest (110.77 hectares) to generate an estimate of 38.8 hectares of settlement. Based on this range of estimates, Transect 2 at the Cerro Site crosses a site with an area between 8.5 hectares and 38.8 hectares, and most likely more than twenty hectares. The transects document a precolumbian settlement that covered a significant fraction of the levee surrounding the Cerro rock formation.

Trench 3

This trench was located adjacent to Transect 2, near shovel tests in which sherds and charcoal were recovered to a depth of 120 centimeters below the surface (Figure 4). The

trench was two meters by two meters square, oriented to magnetic north. The trench was excavated according to natural stratigraphy, and excavation was controlled with a transit. The trench was excavated to at least five centimeters into the subsoil throughout, about 120 centimeters below the surface. All excavated soil was screened using a one centimeter screen.

Stratum 1, beginning from the ground surface, extended across the trench and was between ten and twenty centimeters thick. It was a black (10YR2/1 in the Munsell color system), very friable, sandy loam, and passed easily through the screen. The interface with Stratum 2 below was very gradual and smooth. The difference between Strata 1 and 2 was probably no more than a slight difference in the amount of organic material present. Stratum 1 had a weak and very fine-grained structure. Wood charcoal was present, and two sherds were recovered in excavation.

Stratum 2 was immediately below Stratum 1, and also extended throughout the trench. Stratum 2 was a very dark brown (10YR2/2) sandy loam. The texture of the soil was very loose and friable. The interface with Stratum 1 above was very gradual and smooth. The interface with Stratum 3 below was gradual and uneven. Wood charcoal was present, and seventy-five sherds, weighing 1.50 kilograms were recovered.

Stratum 3 was immediately below Stratum 2, and also extended throughout the trench. The soil was a very dark grayish brown (10YR3/2) sandy loam. The soil texture was somewhat friable, but compact. The interface with Stratum 2 above was gradual and uneven, and the interfaces with the three strata below, Strata 4, 5, and 6, were uneven and abrupt. No soil structure was present. Carbon was recovered from this stratum as well as burned clay. A total

of 311 sherds, weighing 6.550 kilograms were recovered.

Stratum 4 was below Stratum 3 and above Stratum 5, in the southwest quadrant of Trench 3. It was a dark gray (10YR3/1) to black (10YR2/1) silt loam. The interface with Stratum 3 above was abrupt and almost level. The interface with Stratum 5 below was abrupt and uneven. No soil structure was present. Wood charcoal was present, as well as burned clay, and large numbers of sherds. In some places, large sherds defined the lower interface of Stratum 4. The large sherds of the feature totaled 323, weighing 16.425 kilograms, while sherds taken from the soil within the feature totaled 45 and weighed 1.800 kilograms.

Stratum 5 extended throughout the trench, beneath Strata 3, 4, and 6. It was a red (2.5YR3/6) clay loam. The soil was compact and hard. Some sherds were recovered near the interfaces with the strata above, but no sherds were recovered deeper than 2 or 3 centimeters into the stratum. The interfaces with all of the strata above (Strata 3, 4, 6) were both uneven and abrupt. There was some wood charcoal in Stratum 5. The soil had a blocky structure, with blocks of less than 5 centimeters in diameter. The soil structure was very weak. Near the upper interfaces with Strata 3, 4, and 6 a total of 10 sherds were recovered, weighing 0.350 kilograms.

Stratum 6 (not represented in the Figure 4 profile) was between Stratum 3 above and Stratum 5 below, in the northeastern quadrant of the trench. It extended from a maximum elevation of 99.04 meters to a minimum elevation of 98.64 meters. It was a dark gray to very dark grayish brown (10YR3/1) sandy loam. Its interface with Stratum 3 above was almost level, and abrupt. The interface with Stratum 5 below was uneven and abrupt. No soil structure is present. Some wood charcoal was present. A

total of 52 sherds were recovered, weighing 4.750 kilograms. In some locations, large sherds defined the lower interface of this stratum.

Trench 3 – Interpretation

The color of Strata 1 and 2 was darker and grayer than the soils sampled in the shovel tests from Transect 1. Strata 1 and 2 had high concentrations of sherds. In combination with Strata 3, 4, and 6, they are interpreted as anthrosols, representing prehispanic occupation.

Stratum 3 is the thickest of the five soil strata interpreted as anthrosols. Dense concentrations of sherds were found in association with small pieces of wood charcoal in this stratum. In parts of the trench, Stratum 3 has an uneven lower limit. The lower elevations in Stratum 3 correspond to Strata 4 and 6. Strata 4 and 6 are associated with Stratum 3. The presence of anthrosols is demonstrated by soil color, high concentrations of wood charcoal and sherds, and the presence of burned clay.

Strata 4 and 6 are interpreted as parts of trash pits, used for the disposal of broken pottery, ashes, and other household debris. The recovered sherds had no discernible spatial pattern. Some sherds were oriented vertically and others horizontally. In addition, the lower boundaries of the stratum were not even, suggesting a secondary deposit, such as a garbage pit, rather than a primary deposit such as a house floor, or an activity area. In Stratum 6, in addition to the sherds, many pieces of burned clay and of wood charcoal were also recovered, but they had no clear spatial pattern.

Stratum 5 is interpreted as culturally sterile subsoil. It was very hard and compact, and with the exception of the interfaces with the strata above, no sherds were recovered from Stratum 5. The color and texture of this soil were

consistent with the subsoil found in other shovel tests from Transects 1 and 2, and throughout the study area.

Trench 3 confirmed the results from Transects 1 and 2, that a large deposit of anthrosols with dense concentrations of sherds is present. In some places in Trench 3, the anthrosol deposit is up to 120 centimeters deep, but in other areas, the deposit is only 40 centimeters deep.

Radiometric dating

A total of 8 radiocarbon dates were obtained using samples from Trench 3 (Table 1). Beta Analytic, Inc. processed three of these samples, and the University of Arizona AMS Laboratory processed five. Of the eight samples, one was processed using conventional radiometric methods, one was processed using extended count methods, and the other six were processed using the AMS technique.

Sample	Type	Lab No.	Stratum	14C Age BP	Calibrated age BP	68% range	Calendric Age AD	cal AD range
ECC-4	Charcoal	117218	2	480±50	523±24	498-547	1427±24	1403-1451
ECC-3	Charcoal	AA30388	2	535±45	577±46	530-623	1373±46	1327-1419
ECC-15	Charcoal	AA30389	3	570±45	590±43	547-633	1360±43	1317-1403
ECC-14	Charcoal	117220	3	610±70	604±46	557-650	1346±46	1300-1392
ECC-17	Charcoal	117221	4	470±90	485±105	379-590	1465±105	1360-1570
ECC-18	Charcoal	AA30390	4	620±40	608±39	568-647	1342±39	1303-1381
ECC-22	Charcoal	AA30392	6	600±45	602±40	561-642	1348±40	1308-1388
ECC-21	Charcoal	AA30391	6	620±40	608±39	568-647	1342±39	1303-1381

CalPal-2007online (online version)

Danzeglocke, U., Jöris, O., Weninger, B., CalPal-2007^{online}; <http://www.calpal-online.de/>, accessed 2010-04-01.

Table 1. Calibrated radiocarbon dates from the Iruyañez River, Beni, Bolivia

When calibrated, all of the dates fall into a single group, with center points ranging from A.D. 1342 to A.D. 1465, and 68 percent confidence intervals ranging from A.D. 1303 to A.D. 1570. The dates cluster in the mid-fourteenth century A.D. (Table 1). The dates suggest that Stratum 4 may represent a longer history of activity than the surrounding strata 2, 3 and 6.

These samples establish the date of the occupation at the Cerro Site to the fourteenth century A.D. In combination with the evidence from Transects 1 and 2, the dates suggest that the forest at Cerro was occupied by a large

settlement during the two centuries before the Spanish arrived in the New World.

Trench 4

This trench was located in a raised field platform to the north of the modern Cerro Ranch, just outside the fenced pasture in the open savanna. The trench was six meters long and fifty centimeters wide. No artifacts were recovered from Trench 4, nor was any charcoal obtained for radiocarbon analysis. The raised field platform and canal bisected by Trench 4 are associated with the Cerro Site by their proximity.

Interpretation

In summary, the Cerro Site is a large, deep deposit of anthrosol, covering between 8.5 hectares and 30 hectares to a depth ranging from 30 to 110 centimeters. An estimate of population based only on site area is difficult to make. A village of 1,000 or 2,000 people could fit easily within the lower area estimate of 8.5 hectares. The Cerro Site is evidence of the concentration of population along the Iruyañez into settlements of thousands of people.

A village of about 1,800 or 2,000 people could have produced the deposit of anthrosol. This is the size of the towns described by Zapata in his account of contact with the Cayuvava. It is not argued here that this location represents one of the towns that were visited by Zapata. Nor is it argued that Cayuvava speakers must have occupied the Cerro Site. However, the size of the site, combined with its chronological context, suggest that villages of the size described by Zapata for the 17th century A.D. could have existed in the fourteenth and fifteenth centuries A.D. The raised field evidence suggests a total population along this part of the Iruyañez between 1,000 and 10,000 people, and the evidence of levee settlement is consistent with this range of estimates (Walker 2004).

Settlement evidence indicates that the Iruyañez was settled at two points in time, each of which are associated with raised fields. The settlements are well dated, with one in the sixth century A.D. (Walker 2011b), and the second in the fourteenth and fifteenth centuries A.D. The association of both occupations with raised fields suggests that raised field farming was practiced at two points in time separated by about nine hundred years, and most likely during the intervening centuries as well. The dating of two sites to points separated by a millennium suggests that the inhabitants were

persistent in their use of raised fields. The chronology indicates that raised fields were in use at least one hundred years before the arrival of the Spanish into the New World, and at least three hundred years before the arrival of Zapata among the Cayubaba in 1695.

Ceramic description

The ceramics from the Cerro Site were described according to a modal analysis developed using assemblages from throughout central Mojos, from excavations, surface collections, and museum collections. The modes are organized into vessel form, surface treatment, and temper/paste.

Forms. Twenty-five vessel forms were reconstructed from ceramics at the Cerro Site, two from surface collections and twenty-three from strata 3, 4 and 6 at Trench 3. From twenty-six reconstructed vessel forms, nine distinct modes can be categorized, in addition to one transitional mode.

Carinated, lipped dishes have high, straight sides that slope outwards slightly (Figure 5). Two vessels are reconstructed in their entirety, one with a rim diameter of 28 centimeters, and one of 44 centimeters. The rim flares outward to form a distinct lip, which in one case is flattened on the top and on the outer edge. The base is slightly curved, and is thinner than the walls of the vessel. The overall form (although much smaller) is somewhat reminiscent of a “buckpot” or *ahukugu*, a large cooking pot as described from the Xingu (Heckenberger 2005). Another reconstructed vessel resembles this form, with a smaller rim diameter (14 centimeters), a flat base, and a less pronounced lip. This vessel also has a raised point along the rim with an indentation, almost in mimicry of an attachment for a handle.

Large cooking pots are represented by two examples (Figure 5). The openings of the vessels are large (100 centimeters and 104 centimeters or larger) and the lips of the vessels are thick (greater than two centimeters) and broad (about five centimeters). The rim profiles suggest outward sloping vessel walls, perhaps with a carination, and a shallow, curved base or a flat base. These are close analogues to the *ahukugu* described from both the modern and the precolumbian Xingu.

Flat-bottomed dishes are represented by two examples, with outslipping sidewalls and less than ten centimeters tall. The bottoms of the plates are about as thick as the walls of the dishes, and in one case the inside of the walls is decorated with rough incision, and the interior bottom of the dish has shallow grooves. Grooved platters are a common vessel form further south in Mojos (Jaimes Bentancourt 2010), although this example is distinctive in that the bottom is flat and not gently curved, and the grooves are more deep incisions than channels with rectangular profiles, as in other examples. These dishes are fairly large, about sixty and fifty-four centimeters in diameter.

Two vessels represent carinated, lipless dishes. They have straight, slightly outslipping sides, are less than ten centimeters tall, and have curving bases that are thinner than the walls. The rim is curved rather than flattened, and has no lip. Rim diameters are forty-two and forty-eight centimeters.

A single vessel, with a rim diameter of eighteen centimeters, represents shallow open bowls. The bowl has a rounded base and a rounded rim, with thick walls. The fabric of this vessel has a pinkish cast, perhaps from high iron content.

One straight-sided, slightly inward sloping neck is probably associated with a jar, although

the body and base cannot be reconstructed. The opening is twelve centimeters in diameter, and the neck is at least eight centimeters tall. This vessel form could be associated with brewing or storage.

One straight sided, slightly outward sloping, flattened rim could represent a small carinated dish with high sides (opening is twenty-eight centimeters in diameter) or possibly the neck of a jar.

Two examples of thin, outward flaring rims (both openings are eighteen centimeters in diameter) curve down and could represent necked jars, or less probably carinated dishes. One has an *adorno*² handle, less than one centimeter thick, and both are thin-walled (about five millimeters).

The remainder of the reconstructed rims represents a range of forms between the carinated, lipped dishes and the large “buckpots” (Figure 5). All have pronounced lips, eight flattened and three rounded. All slope outward; some are more straight sided and some more steeply sloping. As a group, they resemble the lipped, carinated dishes, but vessel reconstruction does not extend to the carination and the base. They may represent a large, necked vessel form, but a shallow dish seems more likely on the basis of other vessel forms present at the Cerro Site.

One ceramic grinder was recovered in excavation (and another from surface collection). This fired clay object has a rectangular cross section, the result of wear on the two opposite sides which changed a circular cross-section into a rectangular cross section (Figure 6). Ceramic grinders (*moleadores*, *manos de moler*) are common to the south, along the

² *Adorno* is defined by Raymond *et al.* (1957:6) as “modeling appended to the surface of a vessel”.

Apere River and in Southern Mojos (e.g. Jaimes Betancourt 2010:207, 226, 272, 314, 333). They were likely used for grinding and processing food, as seen in the wear pattern. Their use as bark beaters seems unlikely, because many examples are worn, and few are broken (which would presumably occur through percussive use). Their use as fire-dogs or vessel supports seems less likely because none of them show carbon deposits associated with long term exposure to fire. However, in the stone-free environment of Mojos, ceramic artifacts would presumably have multiple functions during their use-lives.

Several sherds have deep intersecting grooves that can be identified as shaft straighteners, and probably represent a reuse of broken pottery.

The final artifact type from the Cerro Site is a stone axe. Two T-shaped stone axes were recovered, one from the surface, and one from excavation. The excavated example had an uneven edge (Figure 7) suggesting that the axe was broken and resharpened. Stone of any type is not native to Mojos, and these artifacts must have either come from the Brazilian shield to the north (across the Guaporé or Iténez River) or from the Andes to the south.

Surface decoration

Ceramics from the Cerro Site are not usually decorated, but do present a range of surface decoration. By count (as opposed to weight), 14.29 percent of the sherd lots have surface decoration.

Fine-line painting, usually on sponge-tempered sherds, is known both from surface collections and excavation at the Cerro Site. No vessel forms with this form of surface decoration can be reconstructed. The appearance of these sherds is very similar to the fine-line painting on

sherds from San Juan, about twelve kilometers to the southwest. Fine-line painted, sponge tempered sherds are found in strata 3, 4, 5 and 6, which are all contemporaneous, according to the radiocarbon dates.

A few sherds from the Cerro Site have rough incision, present on the inside of grooved platters, for instance. This incision does not resemble the fine-lined incision present on ceramics in southern Mojos, or that combined with painting in other Amazonian contexts.

One sherd from Stratum 5 was corrugated, a distinctive surface treatment not otherwise present on the Iruyañez.

Fabric and temper

Three distinct pastes are represented at the Cerro Site: one dominant mode, and two subordinate modes. The most common is a grog-tempered paste, in some cases including some sponge temper. The surface of this fabric is smooth and abrades easily, having almost a powdery or soapy feel. The color of this fabric ranges widely, including buff, pink, pale tan, light gray, and light brown. All reconstructed vessels were made from this fabric.

The second paste is a sponge tempered fabric, usually better fired, lighter, and making a clear sound when struck. Painted sherds are all of this fabric (although not all sponge tempered sherds are painted). Colors are darker, with more grays and browns, and no buff or pink examples. No vessel forms can be associated with this fabric. Sponge tempered fabric is associated with fine-line painting in San Juan ceramics (Walker 2011b).

The third paste is a distinctive reddish color, with grit, sand, or rock temper. The appearance of this fabric is very rough, and it looks much like the *cascajo* or eroded lateritic rock of El

Cerro. The temper of this fabric is likely taken directly from the nearby El Cerro, and the red color of the fabric indicates large amounts of iron in the clay. No vessel forms or surface treatments can be associated with this fabric.

DISCUSSION

Radiocarbon dates place this assemblage in the fourteenth and fifteenth centuries A.D. Calibration indicates that these dates predate A.D. 1492, and direct contact with Europeans, who arrived in Mojos to stay in the mid-seventeenth century.

Analysis of the excavated ceramic assemblage suggests that the community was part of a regional system or ecumene that spanned at least several hundred kilometers. Both vessel forms and surface treatments, as well as one example of raw material (ground stone) illustrate four clear connections and one potential connection with other areas.

The two stone axes necessarily indicate a link with either the highlands of the Guaporé basin, or with the Andes to the south. No lithic raw material is available in Mojos, and so the presence of ground stone artifacts establishes such a link. T-shaped stone axes have long been associated with the Andes, rather than the Amazon (e.g. Lathrap and Roys 1963). Sourcing this raw material will establish the direction of this link, but both potential sources of stone should be considered.

Painted ceramics at the Cerro Site cannot be conclusively identified with the previous San Juan assemblage (Walker 2011b) but the surface decoration, fabric, and temper are very similar. No painted vessel forms are available from the Cerro Site, such as the distinctive flaring decorated rims from San Juan. The similarities in painting nevertheless argue for a degree of cultural continuity between the fifth and

fourteenth centuries A.D. along the Iruyañez River.

The ratio of painted to unpainted sherds between the two sites differs significantly. The San Juan Site has a higher proportion of painted sherds than the Cerro Site. At San Juan 65.22 percent of the lots contain painted sherds, while only 14.29 percent of the lots at the Cerro Site contain painted sherds. Additionally, sherds painted on both sides were found at San Juan, but not at the Cerro Site. It is possible that the Cerro Site represents a more generalized domestic context, with a cross-section of ceramic refuse including more utilitarian vessel forms. Without pushing the analysis too far, Cerro ceramics represent a more complete set of ceramic forms. The relationship between the Cerro Site and San Juan is one of some continuity within a larger sequence.

Vessel forms suggest a link between the Iruyañez and the Xingu Basin. The most common vessel form at the Cerro Site is a lipped, carinated dish with a flat or slightly curved bottom. The range of the mouth diameters of these vessels includes examples larger than one meter. In the largest examples, this vessel form is analogous to the *ahukugu* or “buckpot” described from the Xingu, both in modern and precolumbian contexts (Heckenberger 2005). Probably used for the preparation of foods in large quantities, this vessel form suggests a similarity in economy and cuisine across the Southern Amazon. For example, Dole (1964) suggested that flat bottomed and conical vessels are associated with cooking on raised platforms and dirt floors, respectively.

Two vessel forms: ceramic cylinders (interpreted as grinders) and grater plates (although with shallower grooves) demonstrate a link to Southern Mojos. Both vessel forms are well-known from the Apere River and also the mounds near Trinidad to the south (Jaimes

Betancourt 2010; Prümers 2000, 2001, 2002). Both forms are used for the preparation of food and drink. This argues for continuities in food preparation and cuisine across precolumbian Mojos. In the future, trace analysis of ceramic contents will address this question.

Jaimes Betancourt's superb study of ceramics from Loma Salvatierra (2010) was not extensively analyzed for this article, but a preliminary examination of the assemblage does not suggest a particularly strong relationship between the two locations. Loma Salvatierra ceramics include a wide range of forms, many of which are also common along the Río Apere. For example, grater plates and *moleadores* are two forms that are common at Loma Salvatierra and along the Río Apere, but are rare at the Cerro Site. Future studies will help illuminate the relationship between these assemblages.

A final point of comparison is tentative because it is based on a single corrugated sherd from Stratum 5. Nevertheless, because this form of surface decoration is strongly associated with Guaraní speakers in the ethnohistoric and archaeological literature, from southeastern Bolivia and Argentina (Alconini 2004:412-413), and corrugation is distinct from other surface treatments at the Cerro Site, this difference merits consideration.

CONCLUSIONS

The artifact assemblage at the Cerro Site suggests connections with four or five distinct regions, both within and outside Mojos. Previously, connections have been drawn between Mojos and the Andes, Southeastern Bolivia, Northwestern Argentina, and the Central Amazon (Lathrap 1970b). The assemblage at the Cerro Site fits into this picture of an interconnected Amazonian system, or perhaps even an integrated South American system that included the Andes (Lathrap 1971).

Similarities in material culture across the Amazon are also part of interpretations of the combination of archaeological data and linguistic data that support an expanded role for Arawak speaking societies in Amazonian culture history (Heckenberger 2005; Hornborg 2005). The firm dating of the Cerro Site's artifact assemblage to the fourteenth and fifteenth centuries places it at the same period as a variety of complex societies throughout South America, from Marajoara, to the Xingu, to the Inca empire.

The evidence from test excavations suggests that a large community of people, probably numbering in the low thousands, used these artifacts. The Cerro Site is not an isolated settlement, but a part of a landscape of raised fields that stretches for at least 50 kilometers from north to south, and 50 kilometers along the Iruyañez and Omi Rivers. In considering the deep history of this landscape, both settlement and landscape may be considered together, rather than as independent lines of evidence. Explanations of why Mojos was the setting for not one, but at least five distinct landscapes, each representing a distinctive investment of labor into infrastructure, is linked to settlement.

These five lines of evidence from the artifact assemblage at the Cerro Site suggest that links from the Xingu to the northeast, the Guaporé to the north, southeastern Bolivia and Argentina to the southeast, and Southern Mojos and the Andes to the south, were all part of the economic, political, and social universe that the Cerro community inhabited. The Cerro Site is within six kilometers of the confluence of the Iruyañez and Omi Rivers, and 25 kilometers of the confluence of the Iruyañez and Mamoré Rivers. It therefore occupies a central location within the continental network of South American rivers described in the *Handbook of South American Indians* (Lowie 1948). The lowlands of South America are connected across

thousands of kilometers by three river systems: the Orinoco in the north, the Amazon in the center, and the Parana to the south. From about A.D. 1330 to 1450, the Cerro Site was part of this larger world, interacting and exchanging material culture and ideas with a wide range of other societies and traditions.

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REFERENCES CITED

Alconini, Sonia

- 2004 The Southeastern Inka Frontier Against the Chiriguano: Structure and Dynamics of the Inka Imperial Borderlands. *Latin American Antiquity* 15:389-418.

Balée, William L. and Clark L. Erickson

- 2006 *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*. New York: Columbia University Press.

Bellwood, Peter

- 2001 Early Agriculturalist Population Diasporas? Farming, Language and Genes. *Annual Review of Anthropology* 30:181-207.

Bennett, Wendell C.

- 1936 Excavations in Bolivia. *Anthropological Papers of the American Museum of Natural History* 35(4):329-507.

Block, David

- 1994 *Mission Culture on the Upper Amazon*. Lincoln: University of Nebraska Press.

Brochado, José and Donald W. Lathrap

- 1982 Chronologies in the New World: Amazonia, edited by José P. Oliver (1999). Unpublished manuscript on file in the Anthropology Department reading room, University of Illinois, Urbana Champaign.

Clement, Charles R.

- 1999 1492 and the Loss of Amazonian Crop Genetic Resources, I: The Relation between Domestication and Human Population Decline. *Economic Botany*, 53:188-202.

Crevels, Mily and Hein van der Voort

- 2008 The Guaporé-Mamoré Region as a Linguistic Area. In *From Linguistic Areas to Areal Linguistics*, edited by Pieter Muysken, pp. 151-179. Amsterdam and Philadelphia: John Benjamins Publishing Company.

Denevan, William M.

- 1966 *Aboriginal Cultural Geography of the Llanos de Mojos*. *Iberoamericana* 48. Berkeley: University of California Press.
- 2001 *Cultivated Landscapes of Native Amazonia and the Andes: Triumph Over the Soil*. Oxford: Oxford University Press.

Dole, Gertrude E.

- 1964 Types of Amahuaca Pottery and Techniques of its Construction. *Ethnologische Zeitschrift Zürich* 1:145-159.

Eder, Francis J.

- 1985 [1791] *Breve descripción de las reducciones de Mojos*. Translated by Josep M. Barnadas. Cochabamba: Historia Boliviana.

Erickson, Clark L.

- 2000 An Artificial Landscape-Scale Fishery in the Bolivian Amazon. *Nature* 408:190-193.
- 2006 The Domesticated Landscapes of the Bolivian Amazon. In *Time and Complexity in Historical Ecology*, edited by Clark Erickson and William Balée, pp. 235-278. New York: Columbia University Press.
- 2010 The Transformation of Environment into Landscape: The Historical Ecology of Monumental Earthwork Construction in the Bolivian Amazon. *Diversity* 2(4):618-652.

Erickson, Clark L. and William L. Balée

- 2006 The Historical Ecology of a Complex Landscape in Bolivia. In *Time, Complexity and Historical*

- Ecology, edited by W. Balée and Clark Erickson. New York: Columbia University Press.
- Erickson, Clark L. and John H. Walker
2009 Causeways as Landscape Capital. In *Landscapes of Movement*, edited by James E. Snead, Clark Erickson, and J. Andrew Darling. Philadelphia, Pennsylvania: University Museum Publications.
- Glaser, Bruno and William I. Woods
2004 *Amazonian Dark Earths: Explorations in Space and Time*. Berlin: Springer-Verlag.
- Hanagarth, Werner
1993 *Acerca de la geoecología de las sabanas del Beni en el noroeste de Bolivia*. La Paz: Instituto de Ecología.
- Heckenberger, Michael
2005 *The Ecology of Power: Culture, Place, and Personhood in the Southern Amazon, A.D. 1000-2000*. New York: Routledge.
- Hornborg, Alf
2005 Ethnogenesis, Regional Integration, and Ecology in Prehistoric Amazonia. *Current Anthropology* 46:589-620.
- Jaimes Betancourt, Carla
2010 *Die Keramike der Loma Salvatierra/La ceramica de la Loma Salvatierra*. Doctoral Dissertation, Universität zu Bonn.
- Lathrap, Donald W.
1970a Review of *Archäologische Untersuchungen am Mittlern Amazonas*. *American Antiquity* 35(4):499-501.
1970b *The Upper Amazon*. New York: Praeger.
1971 The Tropical Forest and the Cultural Context of Chavín. In *Dumbarton Oaks Conference on Chavín*, edited by Elizabeth P. Benson, pp. 73-100. Washington, D.C.: Dumbarton Oaks Research Library and Collection.
- Lathrap, Donald W. And Lawrence Roys
1963 The Archaeology of the Cave of the Owls in the Upper Montaña of Peru. *American Antiquity* 29(1):27-38.
- Lehmann, Johannes, D. C. Kern, Bruno Glaser, and William I. Woods
2003 *Amazonian Dark Earths: Origin, Properties and Management*. Dordrecht, The Netherlands and Boston, Massachusetts: Kluwer Academic Publishers.
- Lombardo, Umberto, Elisa Canal-Beeby, Seraina Fehr, and Heinz Veit
2011 Raised Fields in the Bolivian Amazonia: A Prehistoric Green Revolution or a Flood Risk Mitigation Strategy? *Journal of Archaeological Science* 38:502-512.
- Lombardo, Umberto and Heiko Prümers
2010 Pre-Columbian Human Occupation Patterns in the Eastern Plains of the Llanos de Moxos, Bolivian Amazonia. *Journal of Archaeological Science* 37: 1875-1885.
- Lowie, Robert H.
1948 The Tropical Forests: An Introduction. In *Handbook of South American Indians*, Volume 3, *The Tropical Forest Tribes*, edited by Julian H. Steward, pp. 1-57. Washington, D.C.: United States Government Printing Office.
- Mann, Charles
2008 Ancient Earthmovers of the Amazon, *Science* 321:1148-1152.
- Meggers, Betty J.
1971 *Amazonia: Man and Culture in a Counterfeit Paradise*. New York: Aldine.
- Murra, John Victor
1972 El control vertical de un máximo de pisos ecológicos en la economía de las sociedades andinas, In *Visita de la provincia de León de Huánuco en 1562*, edited by John Victor Murra, 427-476. Huánuco, Perú: Universidad Nacional Hermilio Valdizán.
- Neves, Eduardo G.
2008 Ecology, Ceramic Chronology and Distribution, Long-Term History, and Political Change in the Amazonian Floodplain. In *Handbook of South American Archaeology*, edited by Helaine Silverman and William H. Isbell, pp. 359-379. New York: Springer.
- Nordenskiöld, Erland
1913 Urnengräber und Mounds im bolivianischen Flachlande. *Baessler Archiv* 3(5):205-255.
1924a Finds of Graves and Old Dwelling-Places on the Río Beni, Bolivia. *Ymer* 44:229-237.
1924b *The Ethnography of South-America Seen from Mojos in Bolivia*. Gothenberg, Sweden: Erlanders Boktryckeri Aktiebolag.
- Pärssinen, Marti, Denise P. Schaan, and Alceu Ranzi
2009 Pre-Columbian Geometric Earthworks in the Upper Purús: A Complex Society in Western Amazonia. *Antiquity* 83:1084-1095.
- Piperno, Dolores R.
2006 The Origins of Plant Cultivation and Domestication in the Neotropics: A Behavioral Ecological Perspective. In *Behavioral Ecology and the Transition to Agriculture*, edited by Douglas J. Kennett and Bruce Winterhalder, pp. 137-166. Berkeley: University of California Press.
- Prümers, Heiko
2000 *Informe de labores: Excavaciones arqueológicas en la loma Mendoza (Trinidad), 1ra Temporada, 1991*. Bonn: Instituto Alemán de Arqueología.
2001 *Informe de labores: Excavaciones arqueológicas en la loma Mendoza (Trinidad), 2da Temporada, 2000*. Bonn: Instituto Alemán de Arqueología.

- 2002 *Informe de labores: Excavaciones arqueológicas en la loma Mendoza (Trinidad), 3ra Temporada, 2001*. Bonn: Instituto Alemán de Arqueología.
- Raymond, J. Scott, Warren R. DeBoer, and Peter G. Roe
1975 *Cumancaya: A Peruvian Ceramic Tradition. Occasional Papers 2* (Department of Archaeology, The University of Calgary, Calgary, Alberta, Canada).
- Roth, Walter E.
1916 *The Arts, Crafts and Customs of the Guiana Indians*. Washington, D.C.: Bureau of American Ethnology. United States Government Printing Office.
- Snead, James E., Clark L. Erickson, and J. Andrew Darling, editors
2009 *Landscapes of Movement: Trails, Paths, and Roads in Anthropological Perspective*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.
- Stahl, Peter
2010 Adventive Vertebrates and Historical Ecology in the Pre-Columbian Neotropics. *Diversity* 1(2):151-165.
- Steward, Julian H. And Leslie C. Faron
1959 *Native Peoples of South America*. New York: McGraw-Hill.
- Troll, Carl
1966 *Landscape Ecology*. Delft, Netherlands: ITC-UNESCO.
- Walker, John H.
2004 *Agricultural Change in the Bolivian Amazon/ Cambio agrícola en la Amazonia boliviana*. University of Pittsburgh Memoirs in Latin American Archaeology 13. Pittsburgh, Pennsylvania: University of Pittsburgh, Department of Anthropology.
- 2008a Pre-Columbian Ring Ditches Along the Yacuma and Rapulo Rivers, Beni, Bolivia: A Preliminary Review. *Journal of Field Archaeology* 33(4):413-427.
- 2008b The Llanos de Mojos. In *Handbook of South American Archaeology*, edited by Helaine Silverman and William H. Isbell, pp. 927-940. New York: Springer.
- 2011a Amazonian Dark Earth and Ring Ditches in the Central Llanos de Mojos, Bolivia. *Culture, Agriculture, Food and Environment* 33(1):2-14.
- 2011b Ceramic Assemblages and Landscape in the Mid-1st Millennium Llanos de Mojos, Beni, Bolivia. *Journal of Field Archaeology* 36(2):119-131.
- 2011c Social Implications from Agricultural Taskscapes in the Southwestern Amazon. *Latin American Antiquity* 22(3):275-295.
- Woods, William I., W. G. Texeira, Johannes Lehmann, C. Steiner, A.M.G.A. WinklerPrins, and Lilian Rebellato
2009 *Amazonian Dark Earths: Wim Sombroek's Vision*. New York: Springer Dordrecht, The Netherlands.
- Zapata, Agustín
1906 [1693] Carta del Padre Agustín Zapata al Padre Joseph Buendía, en la que da noticias del Paititi. In *Juicio de límites entre el Perú y Bolivia*, edited by V. M. Maurtua, pp. 24-28. Barcelona: Imprenta de Henrich y Compañía.

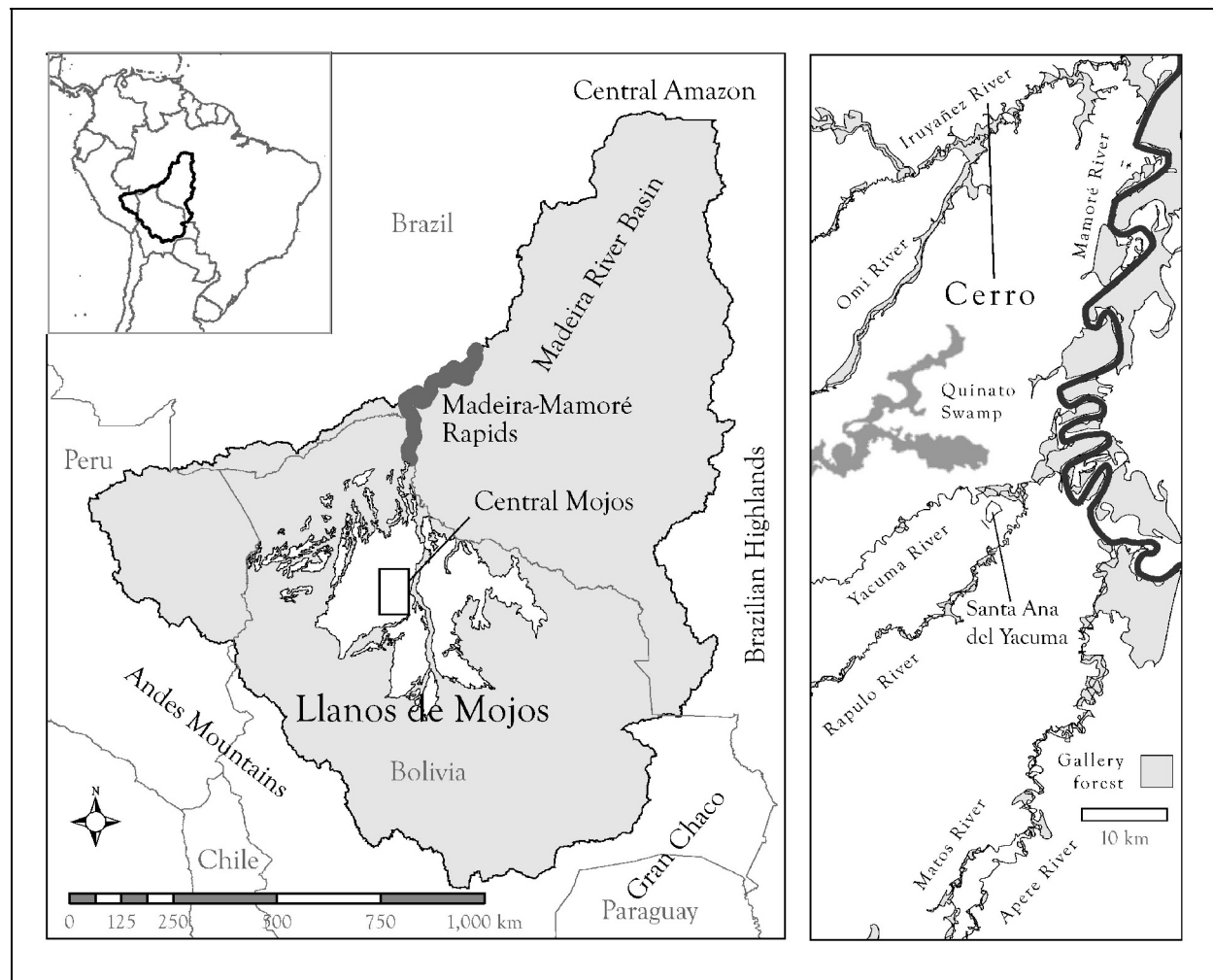


Figure 1: Cerro, located along the Iruyañez River, a tributary of the Mamoré, on the upper Madeira, within the Llanos de Mojos, Beni, Bolivia.

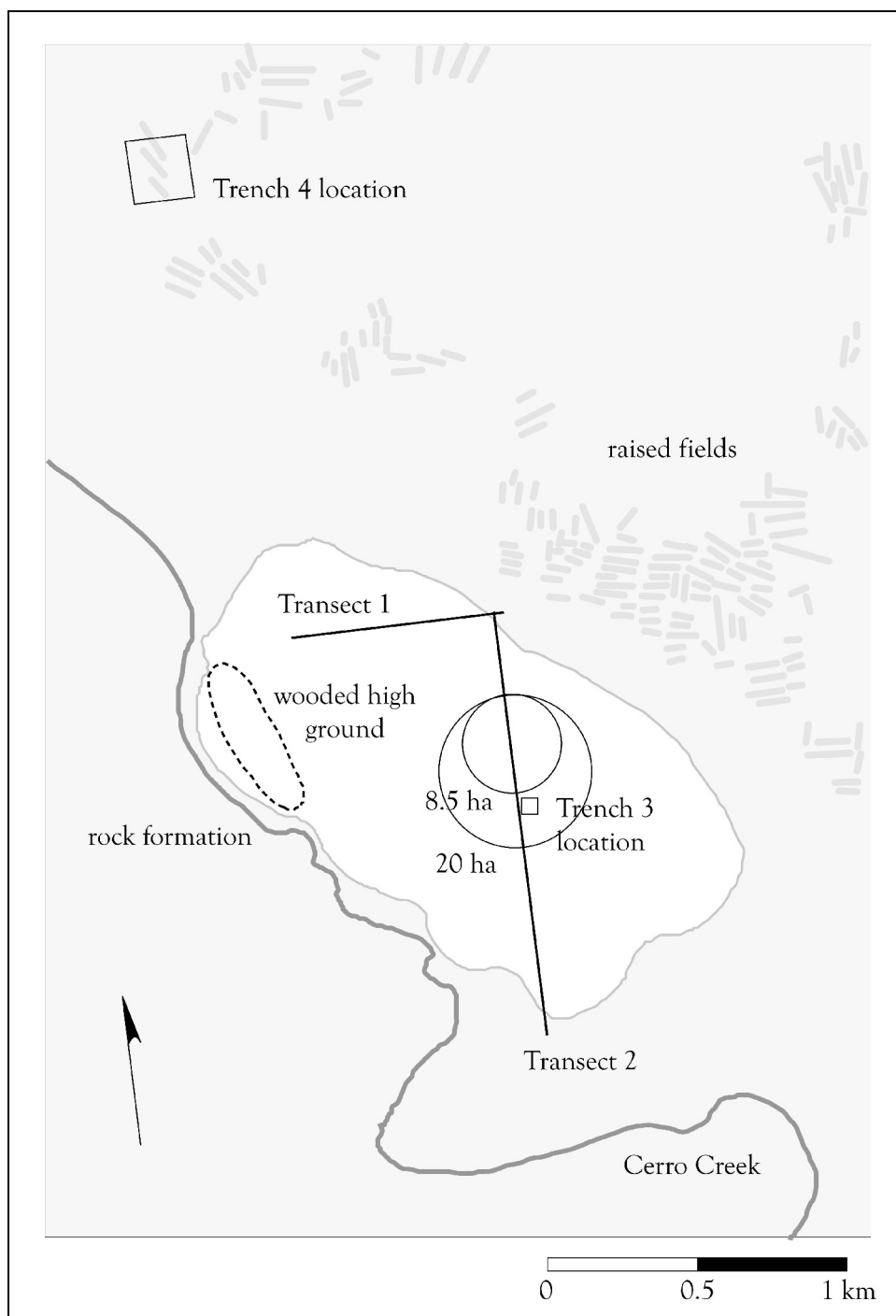


Figure 2: Map showing the locations of test excavations at the Cerro Site, including two transects of shovel test excavations totaling 1755 meters, trench 3 in the forest, and trench 4 bisecting a raised fields.

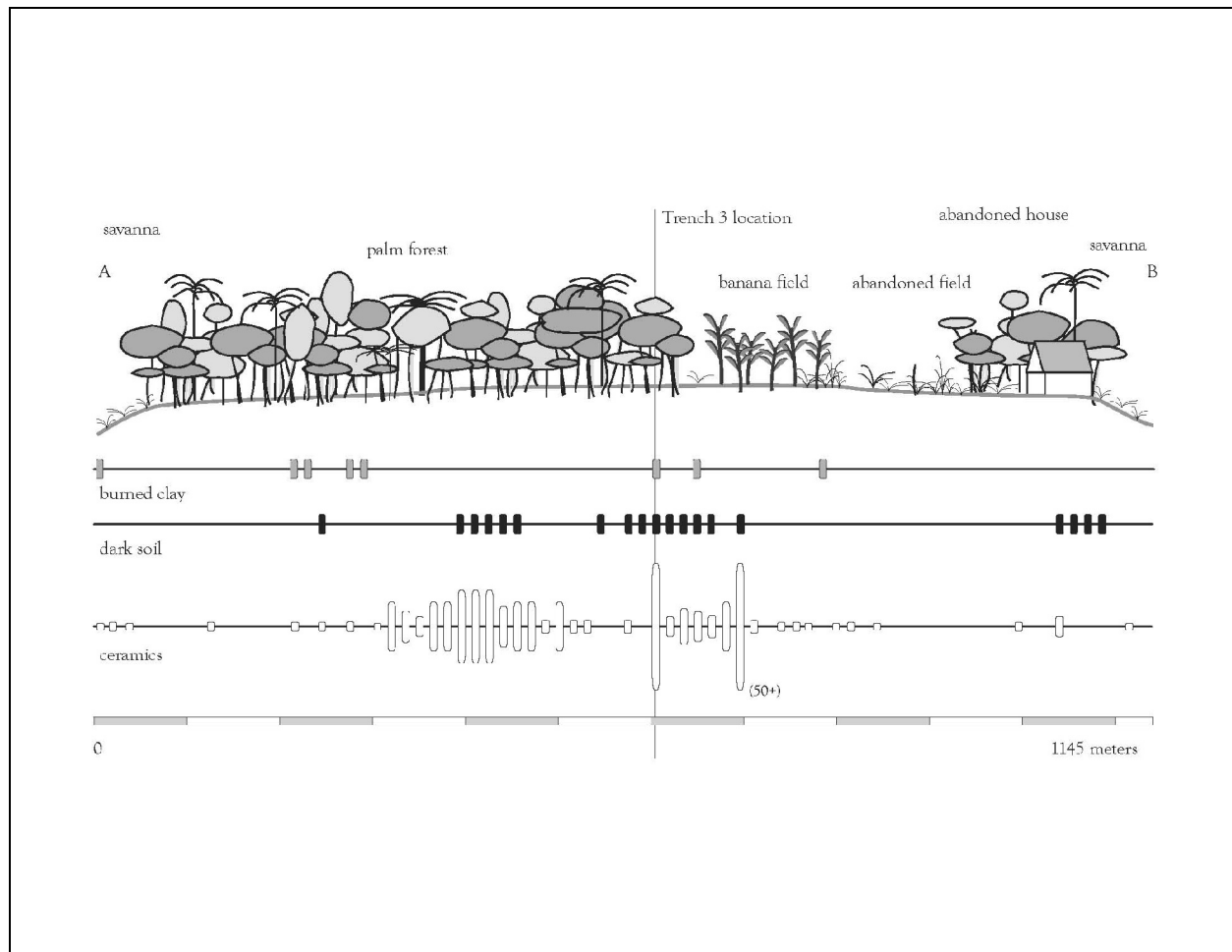


Figure 3: Schematic profile of Transect 2 at the Cerro Site, juxtaposing surface vegetation and land use, and subsurface ceramics, dark soil, and burned clay soil. The location of trench 2 is shown. Surface features are not to scale.

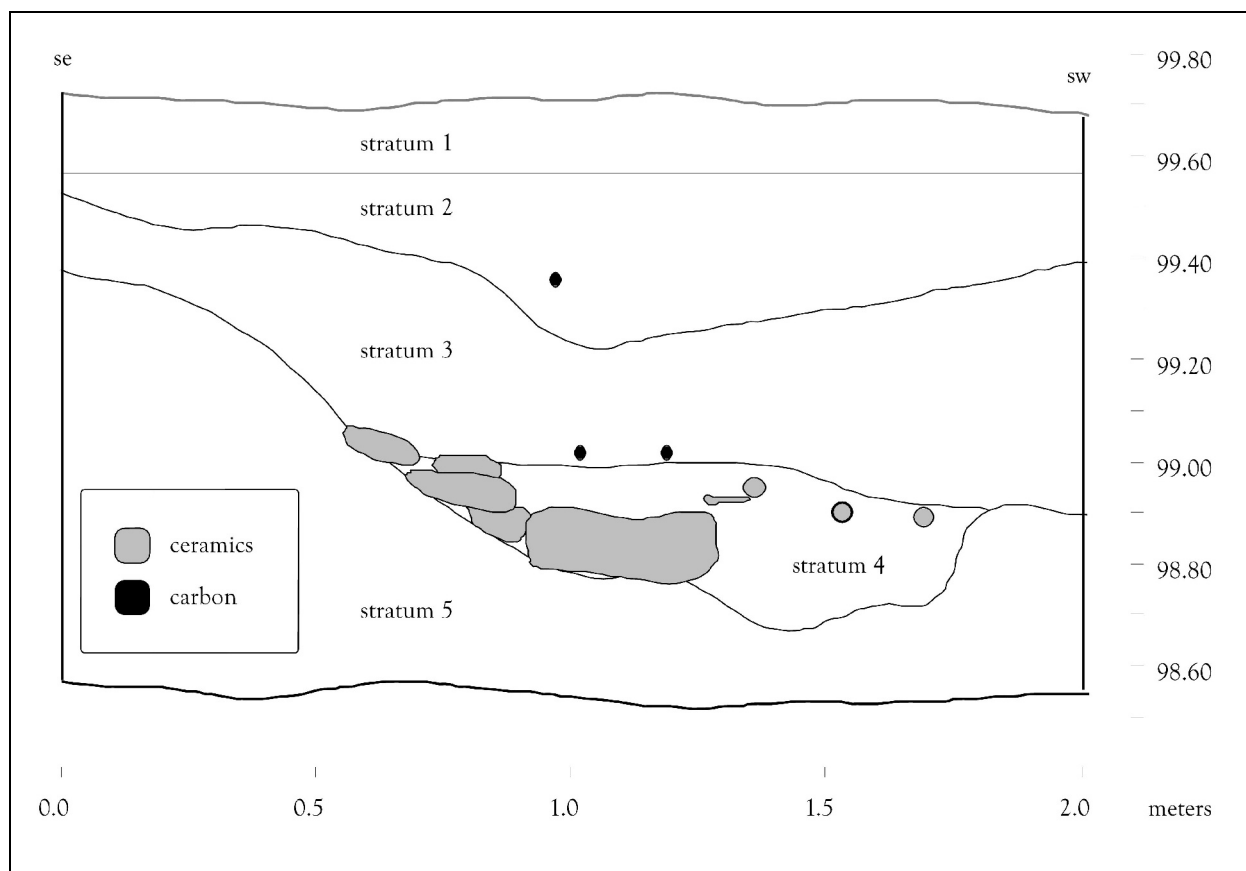


Figure 4: Profile from Trench 3 at the Cerro Site.

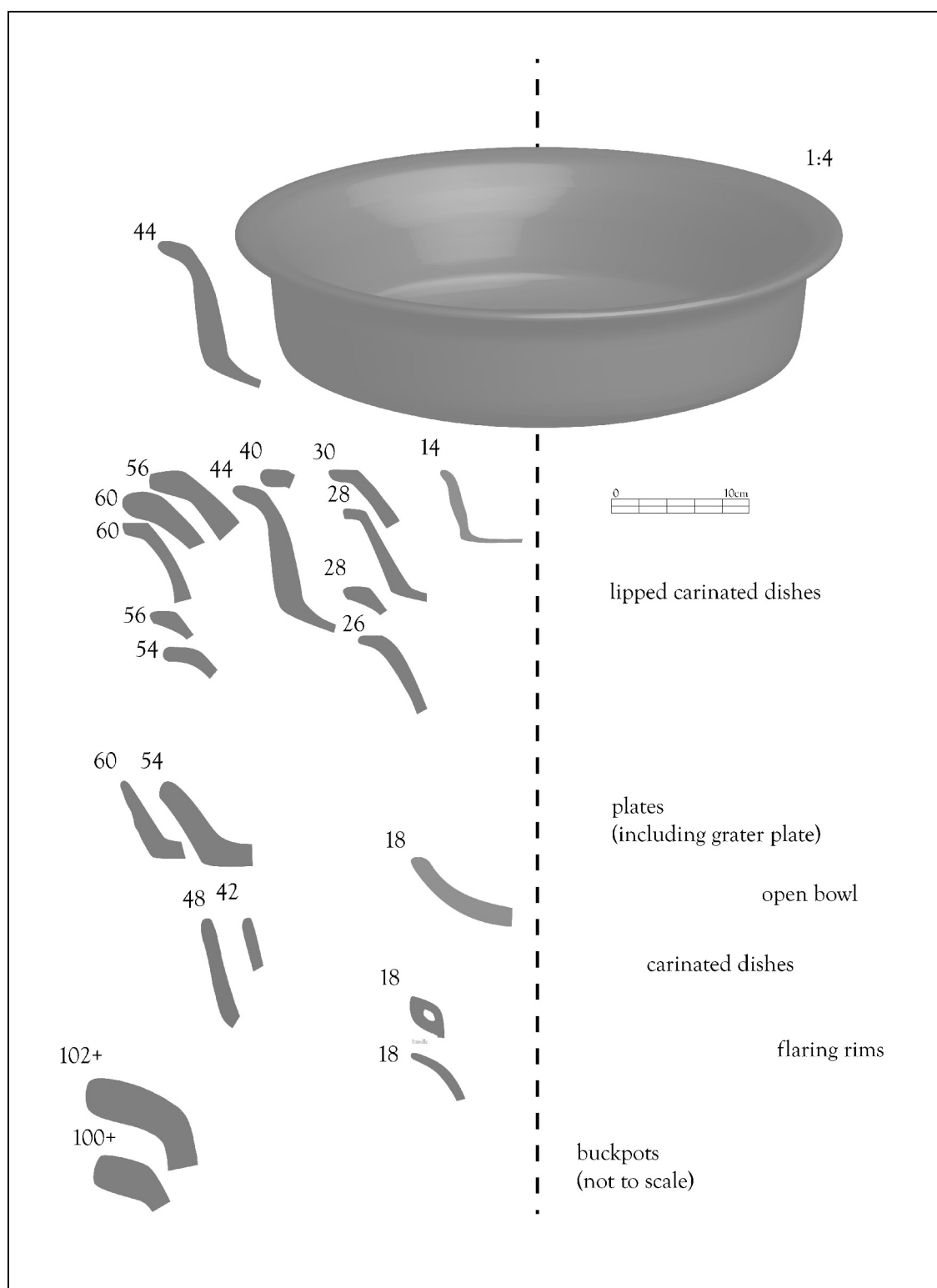


Figure 5: Reconstructed vessel forms from the Cerro Site.



Figure 6: Ceramic cylinders recovered from excavation (top) and from surface collection (bottom).

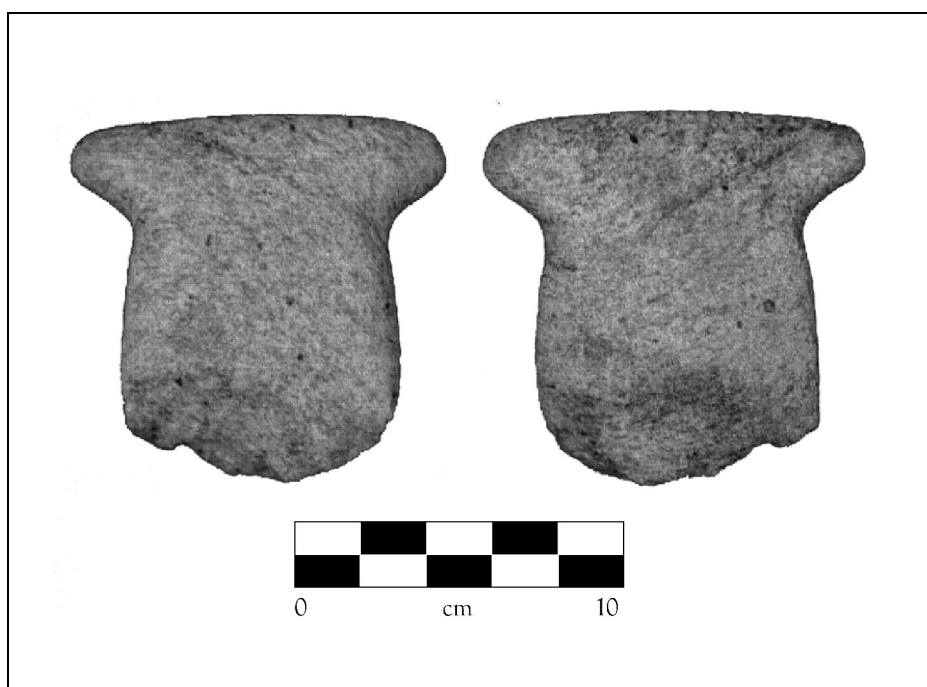


Figure 7: Stone axe recovered from shovel test excavation.

