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Papers of the 2011 Belize Archaeology Symposium

Edited by
John Morris, Jaime Awe,
Melissa Badillo and George Thompson

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Archaeological Investigations in the Eastern Maya Lowlands: Papers of the 2011 Belize Archaeology Symposium

Edited by John Morris, Jaime Awe, Melissa Badillo and George Thompson

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Meetings of this scope are never possible without professional participation. We therefore thank all of our colleagues who took time from their busy schedules to attend and present papers in our symposium. The various themes of their papers serve to reflect the diversity of Belizean Archaeology, and provide a wealth of scientific information to the people of Belize.

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John Morris and Jaime Awe
Belmopan, Belize, June 2012

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SECTION ONE: TRADE AND EXCHANGE IN THE EASTERN MAYA LOWLANDS

1 BELIZE RED CERAMICS AND THEIR IMPLICATIONS FOR TRADE AND EXCHANGE IN THE EASTERN MAYA LOWLANDS

Arlen F. Chase and Diane Z. Chase

Various models for Maya exchange have been advanced. Many are predicated on long-distance exchange, but local exchange can also be identified in the archaeological record. Trade routes have been charted based on presumed access routes through landscapes and on the distribution of certain resources. While we agree that water-based river and sea trade routes were widely used throughout Maya prehistory, there also must have been overland portage and land-based trade routes. The successes of both Calakmul, and Tikal have been ascribed to their positions on key portage routes running from east to west. More recently, an east-west land-based route has been suggested for the northern flank of the Guatemalan Highlands. Resource-based models identify concentrations of key raw materials and examine the eventual distributions of products. Thus, salt was obtained from sea coasts and shipped inland. Obsidian was acquired from the Guatemalan Highlands and from central Mexico. Granite, slate, and shale were secured from the Maya Mountains. Shells derived from both the Pacific and Atlantic coasts. Finished products were also extensively traded both locally and at a distance. In this paper, we look at the interface between long-distance and local trade and exchange with regard to Belize Red ceramics, suggesting that the distribution of this pottery reflects both an east-west riverine-portage route and a land-based north-south route circumventing the Maya Mountains in an extensive trading system that was largely controlled by Caracol, Belize.

Introduction

Trade and exchange is usually defined in the archaeological record by tracing the sources and depositional locations of artifactual materials and by analyzing their archaeological contexts to identify their systems of production and distribution. Various artifact classes – shell, lithics, and ceramic – have been studied in an attempt to understand ancient exchange. The existence of foreign ceramics at a Maya site can be revealed by neutron activation (Bishop and Blackman 2002), but other factors also make for ease of identification. Perhaps the best known Precolumbian ceramic tradeware is plumbate (Shepherd 1948); we know that this pottery originated in the Pacific coastal plain of Guatemala and is found in archaeological contexts ranging from Chichen Itza in the Yucatan Peninsula to Tula in central Mexico. While it is easy to identify because of its unusual "glazed" slip, we do not know how or why it enjoyed such a wide distribution. In the Terminal Classic Period, decorative techniques and paste help identify ceramics that were also widely distributed, but the sources of production and methods of distribution for modeled-carved and fine orange ceramics have yet to be resolved.

Recently archaeologists have begun to comprehend that our past economic models, largely deriving from Polanyi (1957), are seriously flawed in that they most likely underestimate the existence of market economies in the archaeological record (Blanton and Fargher 2010:207-209; Feinman and Nichols 2010; Garraty and Stark 2010). Stark and Garraty (2010:44, 51-52), following Hirth (2010), particularly note that market exchange should be evident for items such as domestic pottery, as "it is unlikely that ancient states or imperial powers invested in regular household provisioning of quotidian items." The archaeologically recovered distributions of ceramic materials align well with the homogenous distributions that are to be expected from market exchange (Chase and Chase 2009; Hirth 1998). Thus, the mechanism for the transmission of most pottery vessels (including polychromes) in the Late Classic Maya world was primarily through market exchange - and not solely through gifting, feasting, or other minor redistributive methods.

In any consideration of the eastern Maya lowlands during the Late and Terminal Classic Periods, Belize Red ceramics inevitably surface. These redware ash-tempered ceramics are widely distributed, being recovered along a corridor that extends from a northern boundary with the Yalbac Plateau in central Belize possibly all the way to the Naco Valley in Honduras. Their area of distribution extends westward into the Sibun River Valley and throughout southern Belize. They are reported in archaeological contexts from Lubaanatun,

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Nimli Punit, and Pusilha – and at least two burials at Pusilha contain a Belize Red vessel. They are exceedingly well represented in the Caracol sample described below, especially in the burials from that site (Figure 1), and are similarly found throughout the neighboring southeastern Peten. Thus, because of its widespread, yet differentiated, distribution, this regional ware can be used to shed light on Late Classic and Terminal Classic routes of trade and communication in the eastern Maya lowlands.

Identifying Belize Red Ceramics

As defined at Barton Ramie by James Gifford (1976:255), Belize Red ceramic materials are categorized as being members of British Honduras Volcanic Ash Ware. Belize Red may, however, be confused with other ceramic types. For example, Gifford (1976:255) noted that there was no paste difference between British Honduras Ash Ware and the Vinaceous Tawny Ware that was defined for Uaxactun (Smith and Gifford 1965:519-521). Both "are consistently volcanic ash-tempered (an outstanding feature)" and "surfaces are slipped and lightly polished, leaving a semi-matte finish" (Gifford 1976:267). However, whereas Belize Red evinces a red slip with a slight luster that is not glossy in finish, "Vinaceous Tawny Ware surface finish appears deeper tan in color" than Belize Red (Gifford 1976:267) – a distinction that may not be apparent in eroded and poorly preserved samples. The classification issue becomes tangible even in the initial defining ceramic study of Belize Red. At Barton Ramie, Chunhuitz Orange is included within Vinaceous Tawny Ware, but one of the reconstructable vessels classified as Chunhuitz is noted by Gifford (1976:268) as also being "probably a very weathered Belize vessel." And, it is very possible that Chunhuitz Orange is differentially preserved Belize Red in many cases. For Barton Ramie, 9 types are placed within Belize Red by Gifford and 3 types are placed within Chunhitz Orange. Belize Red comprises 38.78% of the sherds placed within the Late to Terminal Classic Spanish Lookout Complex at Barton Ramie; if Chunhuitz Orange is included with Belize Red, the two ceramic groups comprise 42.85% of the Spanish Lookout Complex.

Figure 1. Tomb from Caracol Structure F36, containing 2 Belize Red vessels at its western end

Because of the large amount of ceramics that contained ash within their cores at Barton Ramie, Willey (1965:371, 373) suggested that Belize Red was locally made – and most subsequent researchers have concurred (e.g. LeCount 1999; Reents et al. 2005). But, neither the ash source nor the production locale has been firmly identified in the Belize Valley (Ford and Spera 2007). Sunhara (2003:133) analyzed Belize Red as part of her petrographic analysis of the Belize Valley, concluding that there had to be a "trade in finished vessels, rather than local production" – something that is also indicated in our Caracol data. As Sunhara (2003:144) commented, "the data imply the presence of regional markets or a type of redistributive system by which locally made pottery as well as extraregional imports circulated."

Because of the early recognition of volcanic ash in Belize Red, a sizeable effort has been devoted to analyzing the origin of the ash that was used as a tempering agent. It is still not known how or where this ash was obtained, although El Chinchon (Illopongo) volcanic ash has been ruled out (Catlin et al. 2007; Ford and Spera 2007). Research on Belize Red, however, has led to the recognition of two paste varieties. One appears to have had a measure of ground calcite added to the paste as a tempering agent (Sunahara 2003). While the calcite ash paste variety is less common in the Belize Valley than the purer ash paste, it still is present in all vessel forms and at all sites (Sunhara 2003:97), thus suggestive of a possible second production locale or, alternatively, with inconsistent or unreliable ash resources.

There is a great deal of standardization of the forms that are found in Belize Red (A. Chase et al. 2005). The same kind of footed plate has been found throughout the area for which Belize Red is reported and many of the other forms are also fairly widespread. The standardized forms and minimal paste variation support the idea that there were limited production areas for these items. However, as noted above, any areas for the production of Belize Red vessels have yet to be identified. The fact that many of the Belize Red ceramics from Barton Ramie exhibit "crack-lacing" (Willey et al. 1956:380; Gifford 1976:255), characteristic of repair and continued use of vessels following initial breakage, suggests that these vessels became difficult to obtain in the lower Belize Valley, implying a point of origin somewhere else; alternatively, they may have become such a desirable trading commodity that, over time, fewer of these vessels were available for local consumption. Based on the numbers of Belize Red materials that have been recovered, the ceramics are being manufactured on an almost industrial scale somewhere within its distribution area. Based on the recognition that large-scale Late Classic ceramic production took place at Buena Vista del Cayo (Reents et al. 2000), Reents and her colleagues (2005:374, 378) make it clear that they believe that the Belize Red plates from Baking Pot (and elsewhere) were manufactured at that site or its immediate vicinity.

The fact that these ceramics are widespread areally and long-lived temporally, existing in some form from at least A.D. 650 through A.D. 900, is also suggestive of the long-term economic ties that existed in the eastern Maya lowlands.

Spatial Dynamics of Belize Red

Originally looking only to already excavated sites in neighboring regions, such as San Jose in the Yalbac Hills to the north (Thompson 1939) and Tikal (Culbert 1993) and Uaxactun (Smith 1955) in the Guatemalan Peten to the west, few ties to Belize Red were uncovered (Willey et al. 1965; Gifford 1976), leading to a focus on the ash paste and reifying the idea of Belize Red as a local production of the Belize Valley. However, excavations by Norman Hammond (1975) in the early 1970s at Lubaantun in southern Belize recovered 168 sherds of Belize Red, making up 1.24% of his total ceramic sample (N=13,567); neutron activation of these materials demonstrated that their paste was identical to the Belize Valley pastes (Hammond et al. 1975). At Lubaantun, most of the Belize Red was found within the central architecture and the most common form that was recovered appears to have been a footed plate (Hammond 1975:303-313). Elsewhere in southern Belize, Belize Red has also been recovered in a number of surface contexts (Bill and Braswell 2005:310) and in two burials from Pusilha (Braswell and Gibbs 2006:274). It is relatively common at Nimli Punit, making up almost 7% of the ceramic sample (Braswell, personal communication, 2011). It has also been recovered from within Stingray Lagoon in association with submerged settlement (McKillop, personal communication, 2011), presumably implying a commercial connection to the seacoast salt trade.

Even further south, an argument has also been presented that central Honduras was actively trading with the central Maya lowlands. Unusual marble Ulua vase forms, known to eminate from Honduras, occur within the ceramic repertoire of Terminal Classic Maya modeled-carved at Yaxha (Zralka 2008:267). Joyce (1986; Lopiparo et al. 2005) proposed that the Terminal Classic ceramics of Cerro Palenque, Honduras were related to the Boca

fine paste complex at Seibal. Sheptak (1987) has specifically argued that Belize Red was present at Quirigua, Guatemala, at Naco, Honduras, and at other sites in the Ulua Valley, but there are insufficient illustrations and descriptions to firmly establish this fact. Regardless, it is clear that Belize Red was somehow making its way to the southern limits of the Maya area at the end of the Classic Period. Thus, it was truly a widely circulated tradeware.

Willey and his colleagues (1965:371) noted that the widespread prevalence of volcanic ash within the Late Classic ceramics of the Belize Valley implied "a situation bordering on mass pottery production." Again, almost 43% of the recovered ceramic materials from Barton Ramie representing the Spanish Lookout Complex (N=59,929) were Belize Red (N=23,240) or Chunhuitz Orange (N=2,441). The subsequent excavations undertaken over the years at numerous sites in the Belize Valley have validated the widespread presence of these ash-tempered ceramics throughout the region. Sunhara (2003:93) studied ash-tempered ware from Cahal Pech, Pacbitun, Baking Pot, Xunantunich, Blackman Eddy, Ontario Village, Floral Park, and El Pilar. Lecount (2010:218), using rim sherd counts from single occupation contexts, extimates that Belize Red and Chunhuitz Orange comprise 23.8% of the Late Classic ceramics and 14.8% of the Terminal Classic ceramics at Xunantunich. For Chan, Kosakowsky (2012) notes that Belize Red and Chunhuitz Orange comprise approximately 10% of the Late Classic ceramics; large numbers of Dolphin Head red-slipped ceramics at Chan, however, contrast with the Xunantunich pattern of using blackwares, emphasizing the variability that exists within the ceramic complexes in the upper Belize Valley. At Cahal Pech, "partially complete Belize Red bowls were extremely common" in the *in situ* debris excavated from the Plaza A floor (Audet 2006:156), although no proportion is provided relative to general sherd collections. For Baking Pot, Audet (2006:319-320) commented that 90% of the Spanish Lookout equivalent ceramics at the site were ash-tempered (15,575 or 17,227 sherds), with 80.6% of them being categorized as being Belize Red (N=13,885).

Belize Red also occurs as burial offerings within the Belize Valley, particularly at Barton Ramie and Baking Pot. At Baking Pot, Belize Red vessels were recovered from a cache and from a burial in 1961 (Bullard and Bullard 1965:16, 18). Of 6 reconstructable Belize Red vessels recovered during BVAR excavations at Baking Pot, 3 Belize Red vessels were recovered from Burial 1 in Structure 209 (Audet 2006:329-330; Reents et al. 2005:378). At Barton Ramie, 12 burials and 3 caches yielded a total of 27 reconstructable Belize Red vessels (including 2 Chunhuintz Orange vessels). The forms include dishes, plates, and cylinders. At Barton Ramie, 77 polychrome sherds and 1 restorable polychrome vessel (Montego Polychrome) were also included within the Belize Red Group. The more common straight-sided ash-tempered polychrome bowls (Xunantunich Black-on-Orange; Benque Viejo Polychrome) were included in the Chunhitz Ceramic Group as Vinaceous Tawny Ware (Gifford 1976:267-272). Nine Benque Viejo Polychrome vessels were found in 6 burials (Gifford 1976:271); only 2 of these burials do not also include Belize Red materials, confirming their coterminous use (and presumably production). At Pacbitun a cache of 92 stacked vessels was placed in Structure 1 in a specially constructed chamber capped with limestone slabs; while Mt. Maloney Black was present most vessels were Belize Red (including its related types Planton Puctate, McRae Impressed, and ash-tempered polychromes); the cache chamber was placed approximately one meter above a Terminal Classic interment (Bu. 1-7) about mid-stair, thereby indicating a date of A.D. 800-900 (P. Healy, personal communication, 2011).

Belize Red vessels do not appear to have been placed as offerings at Buena Vista, Chan, or Xunantunich, highlighting the differences in Belize Red usage that existed between the upper and lower Belize Valley (Chase and Garber 2004). Belize Red, however, has great longevity in this portion of the valley and is noted as being a component of three Late Classic Ceramic Complexes (LeCount et al. 2002:47). One Belize Red form that appears to be fairly unique to Xunantunich is the footed incurved bowl (LeCount et al. 2002: Fig. 7a). Slightly south of the Belize Valley the presence of Belize Red is

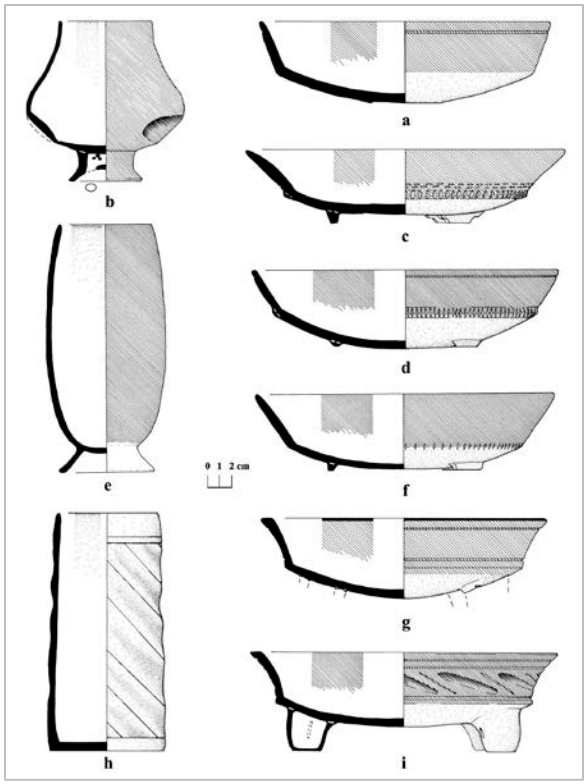

Figure 2. Late Classic Belize Red vessels from various Caracol burials

also reported from Arenal (Tashchek and Ball 1999) and from Minanha (Iannone 2005).

East of the Belize Valley, Belize Red occurs in smaller amounts. Within the Sibun Valley during the Terminal Classic, Belize Red comprises 4.85% of the ceramics at Hershey, 7.96% of the ceramics from Pakal Na, 1.39% of the ceramics from Pechtun Ha, 0.91% of the ceramics from Obispo, and 3.94% of the ceramics from Oshon (Harrison-Buck and McAnany 2007:123). It does not appear to occur in burials or caches at these sites.

Belize Red is present throughout the southeast Peten of Guatemala, but how much occurs there is unclear. Laporte (2004:216; Laporte et al. 1993:97) specifically notes that Belize Red and ash temper is present, but that these materials were all intentionally encompassed within Tinaja Red types. A brief perusal of the well-illustrated reports available in the *Atlas Arqueologia de Guatemala* permits the identification of 6 southeast Peten interments that contained Belize Red vessels (Laporte 2008; Vasquez and Laporte 2005). Two burials at Ixkun contained three Belize Red vessels (Ixkun Bu. 232 contained one McRae Impressed and one Platon Punctated plate; Ixkun Bu. 227 contained a Platon-Puctated plate). Two interments from Sacul contained one vessel each (Sacul Bu. 190 contained a Gallinero cylinder; Sacul Bu. 191 yielded a Belize Red plate [identified as a Cameron Incised]). Ixtonton also produced two burials with Belize Red vessels (Ixtonton Bu. 25 contained a Gallinero cylinder; Ixtonton Bu. 31 included a Belize Red plate [identified as a Cameron Incised]). In addition to the presence of Belize Red in burials in the southeast Peten, the presence of sherds are also specifically noted for the sites of El Chal and Calzada Mopan. Thus, it would appear that Belize Red was widely available within the southeast Peten, confirming the participation of this area within the trading sphere of the Belizean eastern lowlands.

In the central and northern Peten of Guatemala, ash temper is common in the Tinaja Red pastes (e.g., A. Chase and D. Chase 1983:98; Culbert 1973), but unlike the southeastern Peten, Belize Red forms are generally not in evidence. No vessels of this type can be identified in the Tikal burials, caches, and special deposits (Culbert 1990). However, Culbert (1973: Fig. 13f) illustrates a possible McRae Impressed from Terminal Classic contexts. Only one possible Belize Red vessel can be potentially identified at Uaxactun (Smith 1955: Fig. 51c2), where it was typologically designated to be Cameron Incised of the Tinaja Red Group. Belize Red does not appear in the Lake Peten area (A. Chase and D. Chase 1983) and also has not been specifically noted from any of the Naranjo collections (Fialko 2006).

Finally, we turn to the presence of Belize Red at Caracol, Belize, where it was demonstrably a valuable commodity and tradeware. Thus far in the course of the project we have been able to document that it is plentiful in the site's archaeological record, occurring in small amounts in almost all Late Classic building fills, although never as the dominant ceramic type that it appears to be in the lower Belize Valley. We estimate that Belize Red makes up about 5% of the overall Late Classic ceramic sample. However, Belize Red is commonly included within Caracol's

burials and tombs (Figure 1). Thus far, we have been able to document 49 interments that contain a total of 87 Belize Red vessels (Figure 2). These interments are fairly evenly distributed throughout the core of the site. An additional 28 reconstructable Belize Red vessels have been recovered, mainly from the floors of Caracol's buildings (Figure 3).

The Caracol contexts permit a fairly tight temporal sequencing of Belize Red forms. At Caracol, Belize Red is present from the inception of the late Late Classic and continues through the Terminal Classic Period. When introduced into burials at the site, the initial Belize Red forms are quite variable. Footed dishes, footed plates, cylinders, and large bowls are present (Figure 2). By the later part of the Late Classic Period, however, the widely-distributed Belize Red footed plate has become quite standardized; it is slightly sag-bottom in form with out-flaring sides and hollow bulbous feet (Figure 2g). During the Terminal Classic Period, large Belize Red footed plates display horizontal bottoms and the frontal vents on their bulbous feet are often enclosed withiin rectangular incisions (Figure 3e). Smaller Belize Red footed plates (or bowls) also appear at the end of the Terminal Classic Period (Figure 3a-3d) and, in some cases, exhibit decoration that foreshadows the notched flanges and incised decoration known from Postclassic ceramics at Lamanai in northern Belize (Graham 1987:84,89).

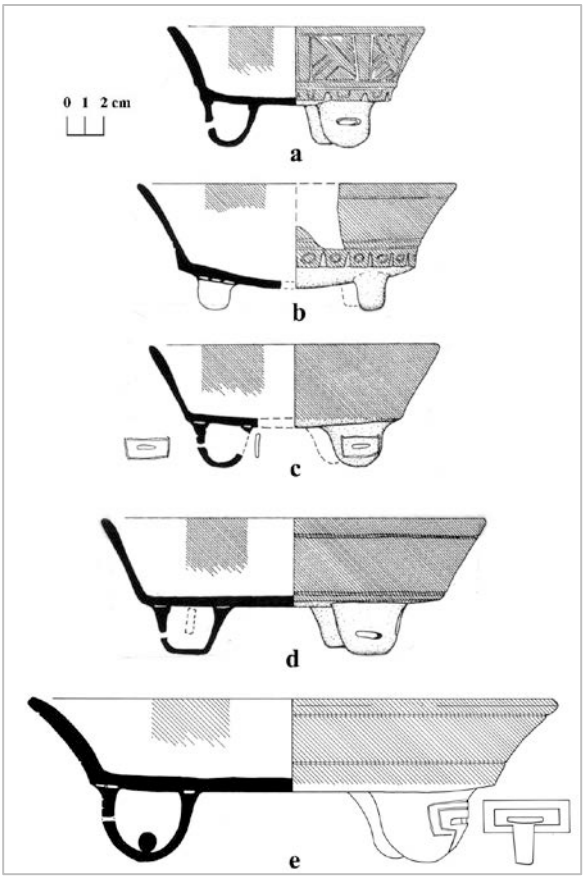

Figure 3. Terminal Classic Belize Red vessels associated with epicentral palace floors.

What Belize Red Tells Us about Trade and Interaction

Belize Red ceramics were distributed across a broad regional area that undoubtedly enjoyed extensive internal communication as well as trade. However, the archaeological contexts provide additional information on ancient behavior. What is especially intriguing are the differences that existed between the upper and lower Belize Valley in terms of the incorporation of this pottery into the social fabric. In the lower Belize Valley, Belize Red is found in both domestic and ritual contexts. In the upper Belize Valley, it apparently was used primarily in domestic, rather than ritual contexts. The concentration of Belize Red that is seen at Barton Ramie and Baking Pot strongly suggests that it was easily available in these locales and that it was indeed produced nearby. However, massive amounts of this pottery entered the trade network and went inland along the Belize River and then southward into the southeast Peten and down the western side of the Maya Mountains. At Caracol, Belize Red was used domestically, but also was an exceedingly important ritual element – even more so than in the Belize Valley. The use of these vessels in burial contexts at Caracol and elsewhere outside the Belize Valley signifies that this ceramic type was a valued commodity. The study of isotope levels in Maya skeletons indicates that many ancient people moved between Maya communities (Cucina et al. 2011; Hodell et al. 2004; Price et al. 2008) and it may be that the use of Belize Red in burials at Caracol, at Pusilha, and at multiple sites in the southeast Peten parallels these population movements and the inter-connectivity of a Maya Mountain corridor.

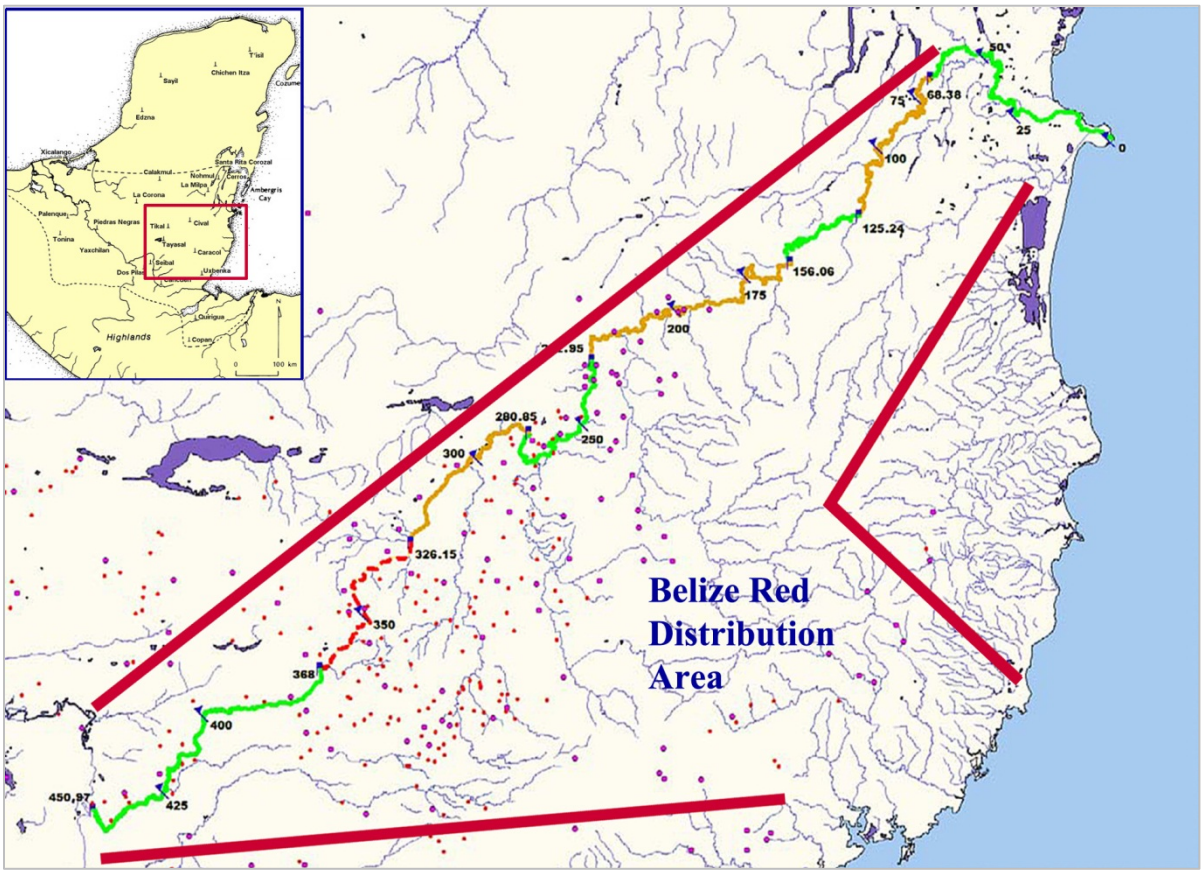

Figure 4. Riverine (409 km) and portage (41 km) trade route connecting the Caribbean Sea to the Pasion River using the Belize, Mopan, Salsipuedes, and San Juan Rivers (after Laporte et al. 2008); the distribution of Belize Red ceramics matches this riverine route and also suggests that it was additionally connected with a land route around the southern end of the Maya Mountains.

Examining the physical distribution of Belize Red – and the kinds of contexts in which it occurs – does permit the identification of a trade system that penetrated coastal Belize by means of the Belize and Sibun Rivers and also the southeast Peten by means of the Mopan River, as indicated by the presence of Belize Red at Calzada Mopan and points south. Where the Mopan River was no longer navigable, the route bifurcated into two overland routes through the southeast Peten (Figure 4). The first followed the edge of the Maya Mountains south, as can be seen by the presence of Belize Red at Sacul, Pusilha, Nimli Punit, and Lubaantun. The second went overland to the Pasion, using rivers to the extent possible, as seen in the presence of Belize Red at El Chal between the Salsipuedes and San Juan Rivers and at Ixkun and Ixtonton towards the headwaters of the Machaquila Rivers. While Laporte and his colleagues (2008) argued for a primary route to the Pasion River in Guatemala that followed the Salsipuedes River, the distribution of Belize Red in the southeast Peten would suggest that the Machaquila River was used as well. In fact, there may be great time-depth for this latter route, as seen in the positioning of the Early Classic site of Tres Islas (with its Teotihuacan-related iconography) at the confluence of the Pasion and Machaquila Rivers (Barrios and Quintanilla 2008). The significant Teotihucan presence at Caracol in the Early Classic Period (A. Chase and D. Chase 2011) and the heavy ritual emphasis on Belize Red in the Late and Teminal Classic Periods at Caracol strongly suggests that Caracol had a long-standing vested interest in these east-west trade routes.

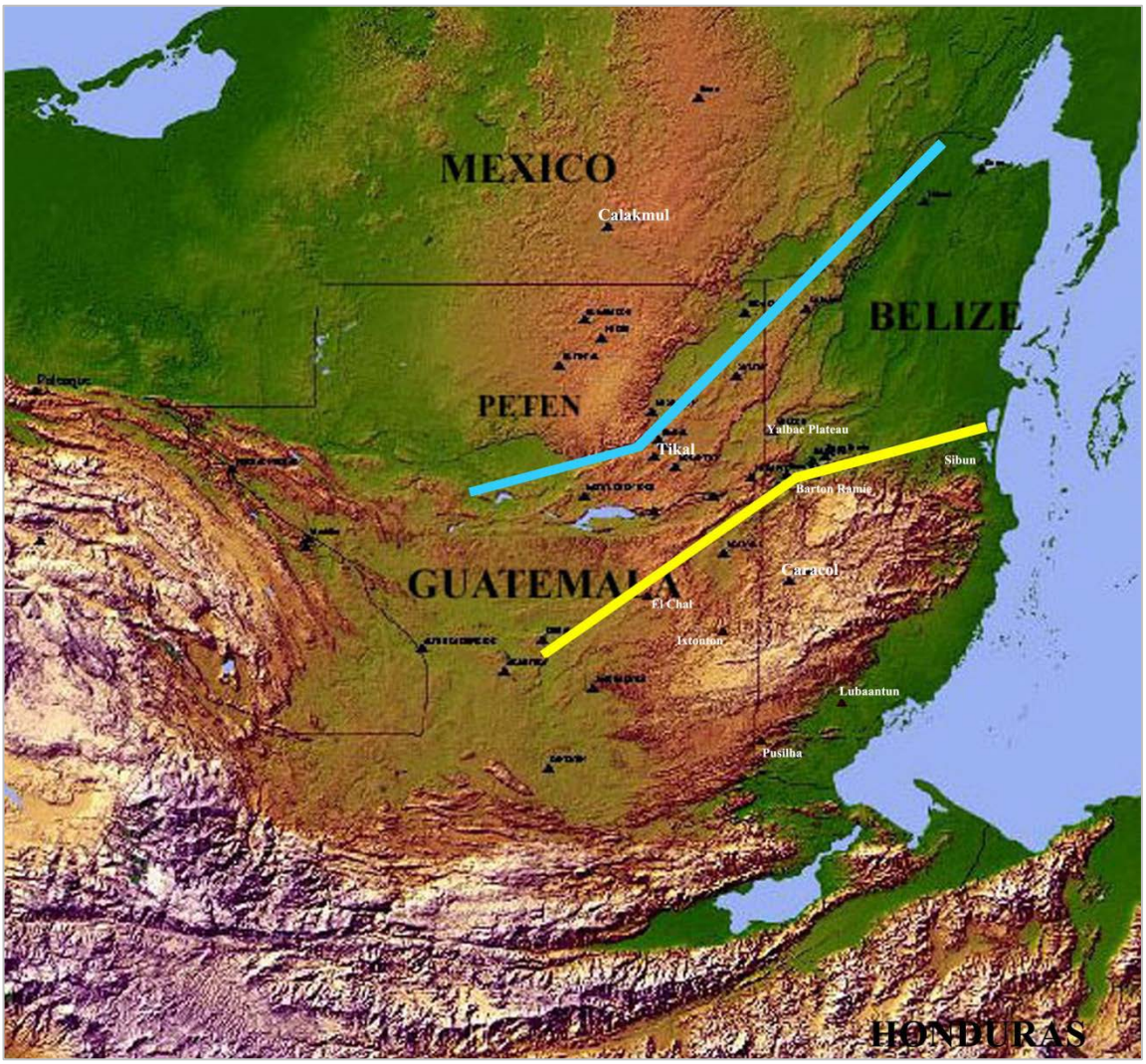

Figure 5. Two competing trade routes from the Maya heartland to the Caribbean Sea; both follow topographic features. The northern Hondo-Azul Trade System was anchored by Tikal, Guatemala and the southern Belize-Mopan Trade System was anchored by Caracol, Belize.

What is also significant is the recognition of at least two competing riverine-based Classic Period trade routes that integrated the sea with the interior (Figure 5), a more northern Hondo-Azul Trade System and a central Belize-Mopan Trade System. If Tikal was, in fact, a trans-shipment center for a water-based trade route to the Caribbean coast, that route would have passed through the Rios Hondo and Azul and did not encompass the Belize Valley, possibly explaining the different Late Classic ceramic spheres that are present in these two areas (Willey et al. 1967:301). To a large extent, these trade networks followed topographic features which facilitated movement and communication. But, recognition of these trade routes also holds implications for how the centers that articulated with these routes developed and declined. Long-distance trade was certainly a contributory factor in the fortunes of many Maya sites. And, the distribution and archaeologically recovered contexts of Belize Red demonstrate that even a mundane ceramic group can help distinguish and reflect the broader processes that impacted ancient Maya civilization. As noted above, Belize Red is not really known from the Hondo-Azul Trade System.

Demarest and his colleagues (2008) have suggested that during the Early Classic Period, Tikal controlled north-south trade routes through the Pasion to Kaminaljuyu and along the eastern edge of the Maya Mountains to Copan. Recovered archaeological data from Caracol demonstrate both a Late Preclassic connection to the Guatemalan Highlands (A. Chase and D. Chase 2005:22) and a relatively early Teotihuacan presence (A. Chase and D. Chase 2011) that call this model into question, but that make it quite clear why Tikal might have attempted to bring Caracol into its sphere of influence. Caracol was powerfully positioned relative to a potentially competing trade network. The wealth of items in Late Preclassic and early Early Classic Caracol – and the implied strength of elite ties at these times – indicate the importance of Maya Mountain resources to this trade route. Caracol's independence from Tikal after A.D. 562 at the onset of the Late Classic Period (A. Chase 1991) would have effectively provided the site with control of any southern Belize Valley-southeast

Peten trade routes. And, the distribution of Belize Red ceramics suggests that these routes were still functional through the end of the Terminal Classic Period. As the exchange system for Belize Red crossed a range of environmental boundaries and encompassed areas with a wide variety of resources, the interconnectivity of this sphere of exchange, interaction, and communication may have helped the eastern Maya lowlands survive and prosper after other regions had already collapsed.

Conclusion

Long-distance trade routes are often credited with the rise and fall of complex civilizations. The widespread archaeological distribution of Belize Red ceramics reflects the existence of one such long-distance trade route within the Maya area, an extensive trade system that must have articulated with local markets. Given the importance of Belize Red in the ancient funerary rituals of the Belize Valley, Caracol, and the southeast Peten, other cultural elements – and even people – may have been shared throughout the region in which these ceramics are found. The widespread use of Belize Red by the ancient inhabitants of Caracol also helps us understand why the site may have been established at the eastern edge of the Maya Mountains; Caracol was strategically sited in the Vaca Plateau so as to funnel key resources from east to west. The Belize-Mopan Trade System that is represented in the distribution of Belize Red ceramics was probably the same system that was used to transport other important resources that were obtained from the Maya Mountains. There was great antiquity to this trade system, extending back to at least the Late Preclassic Period; by the Late Classic Period, southern Belize was also included within its sphere. The broader Belize Red distribution and archaeological contexts indicate that this trade system was still in use at the end of the Terminal Classic Period. Thus, the Belize Red ceramic group serves as both a proxy for this trade system and as a symbol for the interconnectedness of the eastern Maya lowlands with the rest of Mesoamerica.

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2 CHARTING THE HISTORIES OF HINTERLAND SETTLEMENTS AROUND BUENAVISTA DEL CAYO

Jason Yaeger, Sarah Kurnick, Christina Dykstra, and Meaghan Peuramaki-Brown

Since 2005, the Mopan Valley Archaeological Project has sought to understand the social, political, and economic complexity of the Mopan River valley, with special attention paid to the relationships between Xunantunich and Buenavista. Previous research has focused on Buenavista and its near-peripheral settlements. In 2010, we began significant excavations on the opposite side of the Mopan River at the minor center of Callar Creek and the Callar Creek North settlement zone. In this paper, we present the results of our 2010 field efforts, paying special attention to the long settlement histories revealed in Callar Creek and surrounding settlement and their possible implications for the valley's political dynamics. We complement this with the results of the final season of extensive excavations in the Buenavista South settlement zone. These data speak to the social complexities of near-hinterland settlements and their place within the Classic-period Buenavista polity, particularly as it began to decline.

Introduction

During the Late Classic period, the upper Belize River valley witnessed the florescence of several large political centers, including Arenal, Baking Pot, Blackman Eddy, Buenavista del Cayo, Cahal Pech, Lower Dover, and Xunantunich. The centers are closely packed—generally separated by less than 8 km (Figure 1; also Driver and Garber 2004)—and each has a significant Late Classic component characterized by a similar array of architectural features, which in turn suggests a high degree of functional equivalence. Over the last two decades, archaeologists working in the valley have produced increasingly fine-grained data from the centers listed above, as well as those adjacent to the valley like Pacbitun and El Pilar, that support a model of the Classic Belize valley as a particularly dynamic region in which the major centers went through cycles of political ascendency and decline as their rulers competed for resources in an increasingly densely populated landscape (e.g., Helmke and Awe in press; LeCount and Yaeger 2010; Leventhal and Ashmore 2004). This competition and the strategies it engendered underpinned the programs of public art and architecture at these centers (e.g., Fields 2004), structuring their layouts and design decisions (Keller 2010).

Political strategies likely shaped the hinterland zones between these centers in complex ways, as well. The region's hinterland zones present a landscape of densely packed but non-nucleated farmsteads, artisans' households, hinterland elite households, and minor centers (e.g., Ford and Fedick 1992; Hoggarth et al.

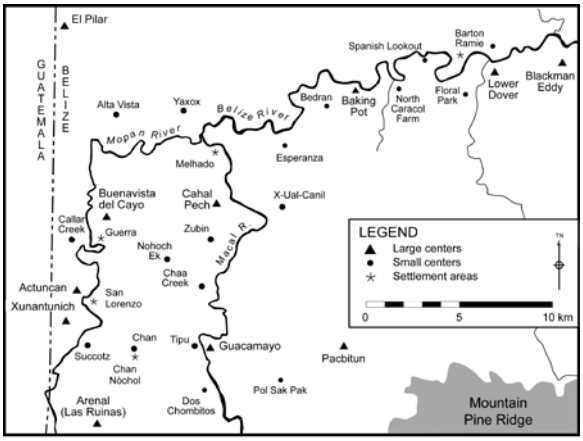

Figure 1. Map of the upper Belize River valley.

2010;Yaeger 2010). Archaeological investigations of the minor centers in particular have documented a remarkable diversity of layouts and histories, and Mayanists now widely recognize the functional heterogeneity that hides behind the monolithic term "minor center" (Driver and Garber 2004; Iannone 2004; Iannone and Connell 2003).

Some were built under the direction of the region's rulers in efforts to extend their political reach into the hinterland (Iannone 2004; Yaeger 2000), while others were long-standing residential complexes of hinterland families who controlled prime land and other local resources (Connell 2003; Taschek and Ball 2003), sometimes enduring for centuries as significant seats of political authority (Robin 2012). One of the goals of the Mopan Valley Archaeology Project is to reconstruct the varying roles that minor centers and the intervening farming and

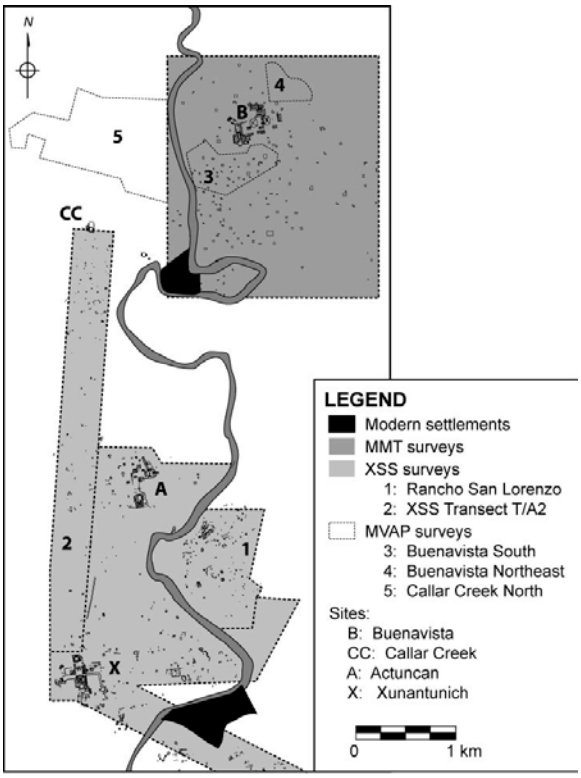

Figure 2. Map of the Mopan valley.

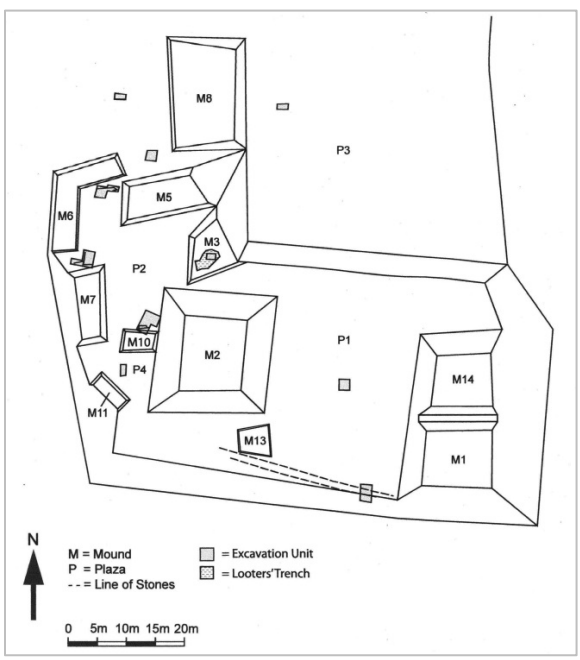

Figure 3. Map of Callar Creek.

crafting households played in the valley's political dynamics—both how their inhabitants' lives were shaped by those political dynamics and how they in turn shaped them. This goal requires close study of a range of these settlement units, and here we report on recent excavations in one minor center and two settlement zones (Figure 2) in the hinterland of Buenavista del Cayo (hereafter Bueanvista), in western Belize, and we discuss their relevance to the questions outlined above.

The Callar Creek Minor Center

Callar Creek is a minor center located 2 km southwest of Buenavista (Figure 2), north of Xunantunich and Actuncan. The site's main plaza is flanked on the west by a 5-m high pyramid side and on the east by a tall substructure with two summit buildings (Figure 3). A courtyard with a morphology that suggests a residential function lies west of the pyramid, while broad flat areas to the north form two additional plazas. With the exception of the major center of Actuncan, Callar Creek is the largest site recorded to date between Xunantunich and Buenavista.

Callar Creek was first mapped and tested by the Xunantunich Archaeological Project (XAP) and Xunantunich Settlement Survey (XSS), who labeled the site T/A2-087 (Ehret 1995). Their test pits suggested an occupation that began in the Middle Preclassic and extended into the later Late Classic (Ehret 1995; Yaeger 2008). In 2009, MVAP personnel visited the site (Yaeger et al. 2011), and Sarah Kurnick initiated her dissertation research there the following year.

Kurnick seeks to elucidate the operation of political authority among low-level ancient Maya elites, and Callar Creek presents an excellent site to investigate this topic. Her 2010 investigations had two primary objectives: (1) to clear the site, map its architectural features, and identify any monuments; and (2) to undertake excavations and analysis of the artifacts recovered in order to establish the site's occupation history and begin to understand the political strategies the Callar Creek elites. Here we highlight six of Kurnick's findings: (1) a long record of occupation, particularly robust in the Middle Preclassic and Late Classic II periods; (2) a foundational deposit that established the site as a sacred place; (3) a Middle Preclassic refuse deposit suggestive of feasting; (4) ritual offerings associated with

Structure 2; (5) one possible stone monument; and (6) a possible defensive feature.

Kurnick began her investigations by clearing the secondary growth that covered the site and remapped the site using a Trimble R3 differential GPS and a Topcon GTS-605 total station. The result (Figure 3) is largely consistent with the earlier map produced by XSS, with three small alterations to Plaza 1 and its surroundings. First, she found that the mound that forms the plaza's eastern side seems to have two summit structures rather than one. Second, she identified two parallel lines of large stones along the plaza's southern edge, discussed in more depth below. And finally, she noted a small mound just off the southwest corner of the plaza.

Following the mapping, Kurnick placed excavation units in 10 locations, distributed as shown on Figure 3. Analysis of diagnostic ceramic material recovered from these units demonstrates that Callar Creek was inhabited from the Middle Preclassic (900–300 BC) period through the Terminal Classic (AD 780-ca. 900) period. The frequencies of diagnostic sherds and the architectural sequences identified in excavations both suggest that the periods of greatest activity were the Middle Preclassic and the Late Classic II (AD 670–780).

Occupation begins to the early Middle Preclassic, indicated by sherds of the early facet Jenney Creek complex. The occupation was extensive, as we recovered Middle Preclassic sherds in the lowest layers of almost all units that we excavated to bedrock. This may have been preceded by an earlier occupation in the Early Preclassic (1100–900 BC), suggested by a handful of Cunil sherds found mixed in Middle Preclassic levels. Excavations yielded only limited evidence of Late Preclassic and Protoclassic occupation, which were recovered only in Ops 362C and 362J. Early Classic diagnostics are also rare, found primarily in the fill of Plaza 1.

The frequencies of ceramic diagnostics indicate a significant increase in activity in the Late Classic period, particularly during the Late Classic II. Late Classic II sherds are found throughout the site, and several of the architectural features date to the Late Classic II period or later, including the later phases of Structures 3, 6, and 7 and the lines of stones along the southern edge of Plaza 1. Activity at the site declined significantly by the Terminal Classic period apparently, although Structure 10 appears to have been used during this time. We found only one sherd that may date to the Postclassic period, suggesting the site was virtually abandoned by the end of the Terminal Classic period.

Our excavations discovered a particularly interesting feature in Op 362A. We placed this unit placed in the center of Plaza 1 in order to document the plaza's stratigraphy, determine the number of construction phases and date them, and find any central caches. We found a torso of a figurine in the humus layer, below which we found an eroded plaster floor—the plaza's surface—that capped approximately 20 cm of fill (Figure 4). Surprisingly, the plaza seems to have had only one major construction episode. Although the humus layer contained sherds dating to the Late Classic, the fill contained sherds dating to the Late Preclassic and possibly Early Classic periods, making this construction difficult to date reliably.

Below the cobble fill layer, we found a cache. Its contents and location at the center of the plaza suggest that it was a foundational offering. The heart of the cache was a large piece of polished green jade (5.6 cm by 2.4 cm by 1.4 cm). A white *Pomacea sp.* shell was found approximately 60 cm north of the jade, while an unusual yellow pebble and a piece of chert painted red were recovered in the screen. These additional objects suggest that the jade could have been the center of a directional cache marked with color symbolism (green as center; white as north; red as east; yellow as south). Unfortunately, the fact that the yellow and red objects were not found *in situ* leaves us unable to confirm this possibility.

The jade is remarkable for its size, and we suggest it was part of a centering ritual that established the plaza as sacred space. Ancient Maya political authority was closely tied to the concept of the world center, often symbolized by jade, and interring a cache such as the one at Callar Creek established a site as the center of the cosmos (Chase and Chase 1998; Matthews and Garber 2004; Taube 2005). A few other artifacts were recovered from this layer,

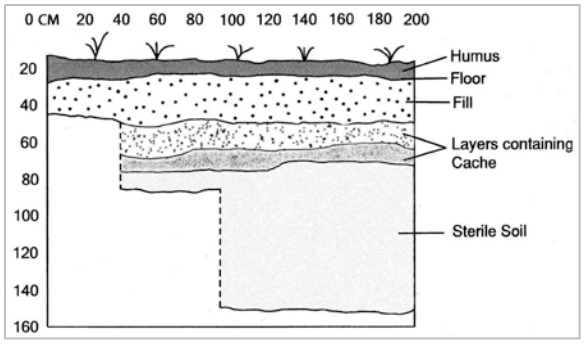

Figure 4. Profile of Op 362A.

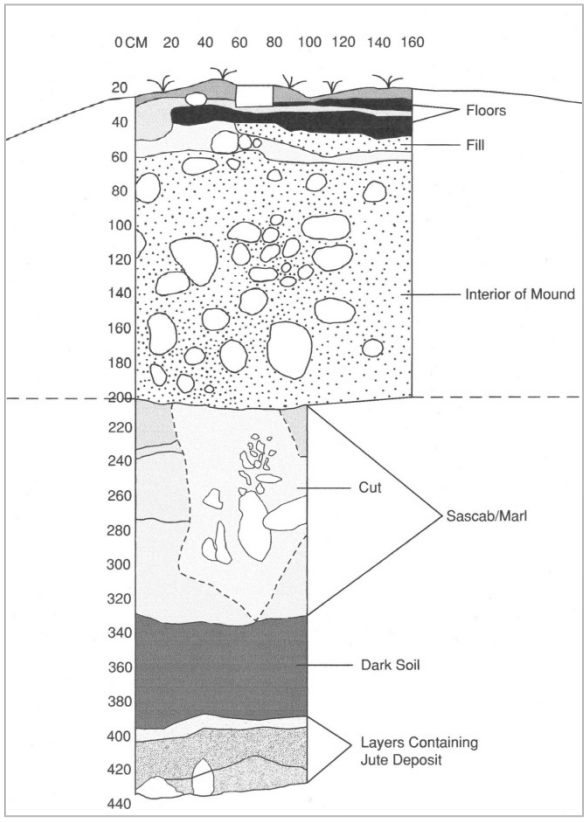

Figure 5. Profile of Op 362C.

including shells, obsidian blades, and ceramic sherds, the latest of which date to the Late Preclassic or Early Classic. Approximately 15 cm below and almost directly under the jade, excavators uncovered a cluster of 10 small jute (*Pachychilus ssp.*) shells, perhaps representing the watery underworld. Below this, excavators began to hit sterile sediment overlying bedrock.

In Op 362C, we encountered another interesting deposit. Op 362C was placed at the base of a looters' trench in Structure 3 to document the structure's construction history. It was the deepest unit we excavated in 2010, and it revealed a long occupation history (Figure 5). The looters' trench revealed that the substructure had been erected in one major construction episode; the presence of two plaster floors indicate that the structure was remodeled at least once after its initial construction. All ceramics from the fill date the structure to the Late Classic.

Underlying the mound was a white sascab or marl layer that may correspond to the top of the fill laid down to level off the surface for the adjacent courtyard. Below that, we found a 60-cm thick stratum of darker matrix with many artifacts. It contained Late and Middle Preclassic sherds, but lacked any Late Classic diagnostics. Under this, we found a Middle Preclassic refuse deposit, approximately 40 cm thick and densely packed with jute shells. In approximately 0.4 m^3, we recovered 13,003 jute shells. In number and density of shells, this deposit is second only to deposits at Chan and a handful of cave sites (Halperin et. al 2003; Healy et. al 1990; Keller 2008). Also, somewhat surprisingly, 9,614 (73.9 percent) of the jutes in this deposit are intact. Throughout the Belize valley, most jutes found in archaeological contexts have broken spires or small holes in their sides, suggesting that the Maya broke the shells to remove the meat inside. While most jute in the Callar Creek deposit are intact, they still could have been used as food, as today they are prepared as a broth by boiling them in water in the shells (Halperin et. al 2003).

In this deposit, we also recovered other faunal remains, including a crab claw, and fragments of serving vessels, including a tubular spout from a chocolate pot. These suggest that the deposit was the product of food consumption, and the spout suggests prized foods might have been consumed, as in a feast. This deposit could have been the result of a few large events, such as feasts, or it may represent the gradual accumulation of detritus from many small events. Unfortunately, the exposure of this deposit was so small—only 1 m by 1 m—that we have very little contextual information to aid us in evaluating these alternatives.

On the south side of this courtyard, Kurnick found an interesting set of features associated with Structure 10, the low linear

platform that extends off the southern edge of the pyramidal Structure 2. Op 362D revealed three limestone steps on the northern side of Mound 10 (Figure 6). In front of the lowest step, she found a burned deposit, measuring approximately 30cm by 40cm, on top of the courtyard's plaster floor, which was perforated by two small postholes. The deposit suggests that the steps may have been a designated place for burning, possibly as an altar for ancestor or deity veneration. A Terminal Classic Mount Maloney Black rim sherd near the bottom of the unit suggests that the burning dates to that period.

One of the goals of clearing the site was to determine whether there were stone stelae at Callar Creek. XAP investigators documented four large pieces of limestone, but they disagreed as to whether those stones were monuments (Ehret 1995). Through careful reconnaissance, we located four large slabs that are consistent in size and location with those described by XAP.

Three of the three large pieces of limestone were found pushed up against trees in Plaza 3. Their current location is probably the result of efforts to clear the area so that it could be mowed with a brush hog. The stones measured 72 cm by 42 cm by 34 cm, 65cm by 69cm by 34cm, and 81 cm by 54 cm by 23 cm. We are unconvinced that these fragments were in fact monuments; they are smaller and less formally shaped than one would expect of a monument.

The fourth stone was found south of Plaza 1. It is a large limestone slab measuring 96 cm by 83 cm by 47 cm—by far the largest of the four limestone slabs. Although it bears no visible carvings, it does appear to have been intentionally shaped by flattening its broad sides. It is consistent with a monument fragment, although not conclusively so. If it is an altar fragment or stela, its location approximately 10 m south of the edge of Plaza 1 and down a steep slope seems unlikely to have been its original placement. It seems most likely that the stone would have been set originally in Plaza 1 and either toppled in antiquity or moved recently. It is also plausible that it is in situ and marks an entryway into the site.

The possible monument is located near

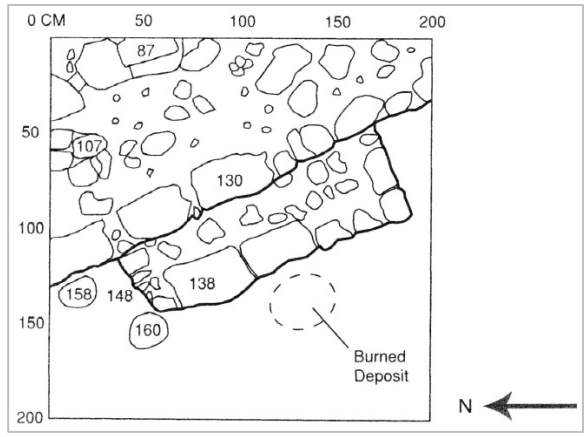

Figure 6. Plan of Op 362D.

another unusual feature documented in 2010, two parallel lines of large cobbles that extend across the plaza's entire south edge. They are located on the edge of the plaza, just as the contours begin to slope steeply down to the south. The location suggests the possibility that this feature was the foundation for a palisade of posts sealing off this side of the plaza, and Kurnick placed a 2 m by 2 m excavation unit on the feature to evaluate that possibility, which was later expanded with an additional 1 m by 2 m unit.

These excavations revealed that the cobble lines did not retain fill, as they had been placed on top of the plaza's cobble fill. Furthermore, the absence of any cut limestone facing stones suggests that the feature was built with little concern for its final appearance. While these observations are consistent with a defensive feature associated with the final plaza, our excavations did not reveal any postholes or other traces of a palisade. Thus, elucidating the feature's function must await fuller investigation. Diagnostic ceramics associated with the feature indicate a Late Classic date, and the lowest excavated level included an LCII Mount Maloney Black bowl rim sherd, providing a *terminus post quem* date for its construction.

The material recovered in 2010 allowed Kurnick to begin assessing the strategies used by Callar Creek elites to acquire and maintain political authority. She had hypothesized three possible strategies: (1) sponsoring communal activities, such as feasts, and public work events; (2) ancestor veneration; and (3) marking extra-

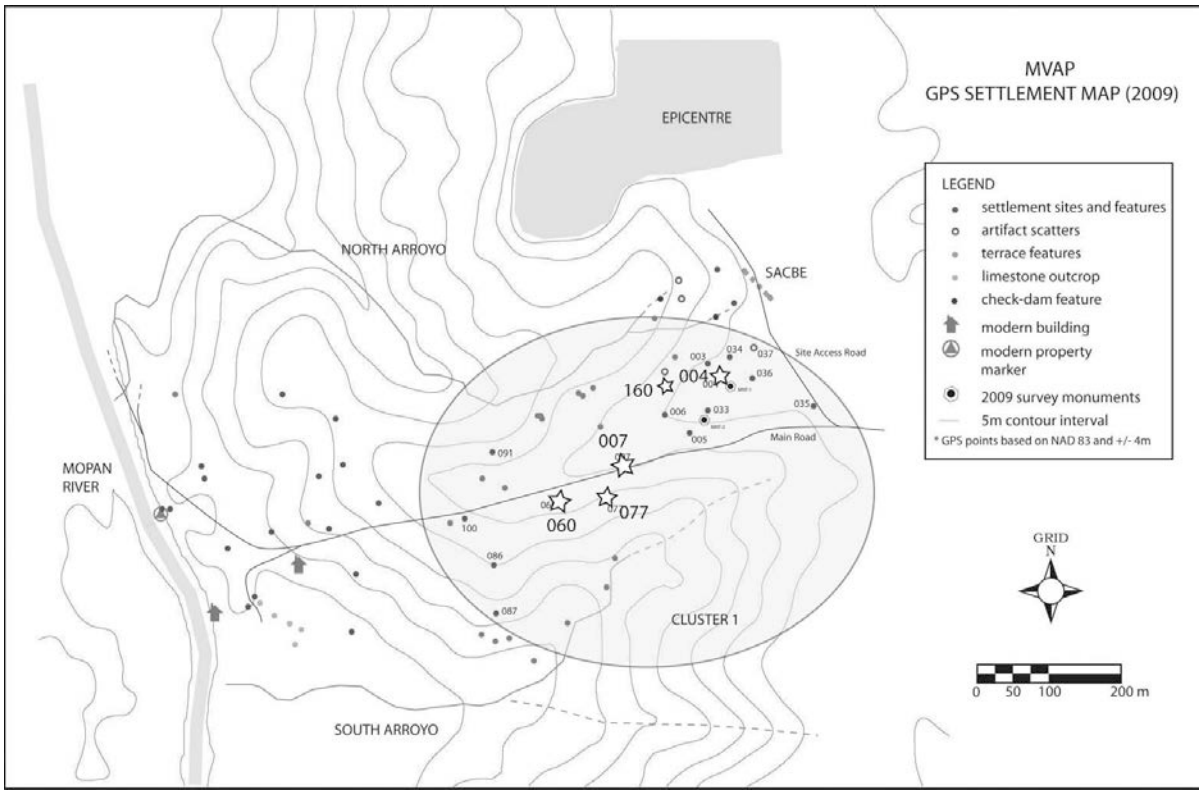

Figure 7. The Buenavista South settlement zone.

local connections.

The first and third of these are best supported by the 2010 data. Above we described evidence of feasting during the Middle Preclassic period, and of the importance of objects made from exotic raw materials, represented by the polished piece of jade found in the foundation cache, twenty pieces of obsidian found throughout the site, and seven pieces of marine shell.

To date, she has not found strong evidence for the importance of the construction of monumental architecture. Each plaza had only one construction phase, and the same is true of Structure 3. It appears that the Callar Creek elites did not use the frequent remodeling of monumental architecture as a strategy by which to acquire or maintain authority. And as noted above, evidence for the creation and erection of stone monuments remains inconclusive, and the only evidence of possible ancestor worship is the altar associated with Structure 10.

These interpretations are preliminary and are based on only one season of fieldwork. Additional excavations and analyses planned for future seasons will allow her to further understand how the elite at Callar Creek acquired and maintained their authority.

The Callar Creek North Settlement Zone

In 2009, Christina Dykstra, Kurnick, and Sebastián Salgado-Flores mapped a 161-ha zone located north of Callar Creek (Figure 2). They identified a dense settlement of 33 groups, a surprising number of which are large (Yaeger et al. 2010). In 2010, Dykstra returned to begin collecting data for her dissertation research studying identity in hinterland communities. Given its proximity to Buenavista and Xunantunich, the Callar Creek North settlement zone would have been impacted by political competition in the Mopan valley as discussed above. Dykstra is particularly interested in how hinterland elite materialized political affiliations and the ways in which those changed or did not change over time as the valley's political dynamics changed.

Dykstra began pilot excavations in 2010,

choosing sites CCN-7 and CCN-10. They were chosen because of their different morphologies and functions—CCN-7 is a U-shaped three mound group that is presumably domestic; CCN-10 is a 3-m high single mound with the form of ancestor shrine. Test units were placed on the outer edge of the sites' mounds in order to collect artifact data relating to style and to reveal the architectural profiles of the structures.

CCN-10 was classified tentatively as an ancestor shrine, based on its size and shape. The mound did not appear to have been disturbed in any way, although it was located close to relict channel of the Mopan River, and some erosion of the eastern side might have taken place. A 1 m by 4 m trench revealed architectural slump and, under that, the limestone facing blocks and fill of the ancestor shrine. The excavations produced ceramic sherds, many from large serving vessels; complete bifaces; a projectile point; obsidian blades; and jewelry, including ear spools and both jade, shell, and ceramic beads. We also recovered a partial snake or frog figurine. Finally, a large amount of daub was collected, including a large piece with a pole impression.

The jewelry, figurine, jade, and complete lithics could suggest the deposition of ritual caches. If redeposited from refuse associated with the structure, the high number of serving vessels and animal bones suggests that feasts were held at the location. The presence of daub is also interesting, suggesting the presence of some sort of superstructure associated with the shrine at some point. While the construction units identified in 2010 date to the Late Classic period, a Postclassic sherd indicates longer occupation or use of this locus.

CCN-7 was composed of three mounds, all under less than 2 m in height, arranged in a U shape and tentatively classified as a domestic group. The northern and eastern mounds appeared largely undisturbed, and several 1 m by 2 m test units were placed along their outer edges. Cultural material collected from the test units include a fragments of both serving and storage vessels, as well as partial metates and manos, a spindle whorl, and a large number of chert flakes, an assemblage consistent with domestic trash discarded outside the home, which supports the interpretation that the mound group represented a domestic structure. The stratigraphy suggests at least two distinct construction layers. As with CCN-10, preliminary artifact analysis suggests occupationthroughout the Late Classic period and possibly into the Postclassic.

Our results show this zone of the Mopan valley was occupied for a significant period of time, specifically during the politically dynamic Late Classic period, when sites such as Buenavista and Xunantunich were experiencing changes in power. More detailed examination of the ways in which these political shifts may have impacted the political affiliations and identities of the residents of this area await fieldwork planned for the near future.

The Buenavista South Settlement Zone

The Buenavista South settlement zone (Figures 2 and 7) is the site of Meaghan Peuramaki-Brown's dissertation research, which examines how Buenavista's decline at the turn of the 9th century (Taschek and Ball 2004) affected the social landscape of a non-elite sire core community through the outlining of individual household biographies. Employing ideas from the New Urbanism Theory (Talen 1999) and High-Modernist State schemes (Scott 1998), she hypothesizes the effect on the core-community cluster investigated will be primarily visible in the decay of physical integrative urban strategies, but the impact on daily activities and decisions of many may have been minimal. She also hypothesizes that households more immediately affected by decline, those who may leave or "vote by foot" following the decline, did not possess enough *mētis* knowledge (practical, local, experiential) to survive, due primarily to the Principle of First Occupancy and the guarding of local knowledge bases.

The 2010 investigations were the final season of research, and they were designed (1) to excavate a possible midden located after 2010 plowing of the eastern end of Cluster 1, (2) to initiate large horizontal excavations at two new settlement sites (BVS-060 and BVS-077) whose occupation ended before the Terminal Classic period, and (3) to complete excavations at two sites (BVS-004 and BVS-007) that had occupations extending into the Terminal Classic.

In 2007, we mapped several surface

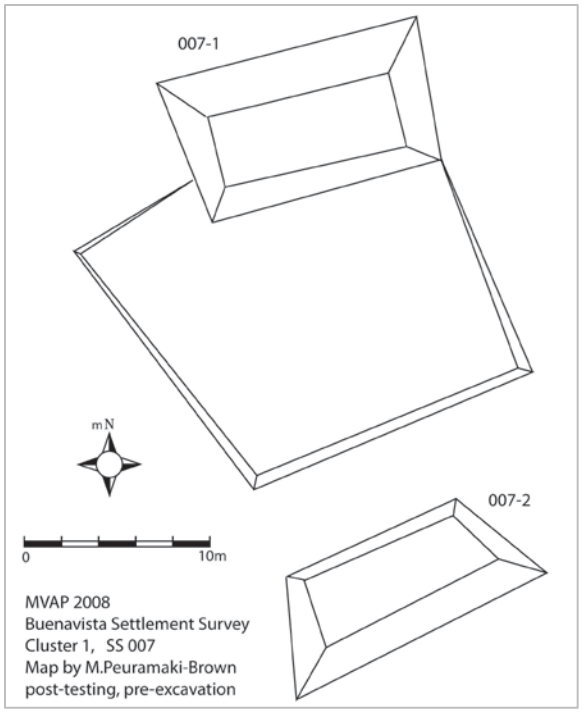

Figure 8. Malerized Plan of BVS-007.

scatters of ceramic material on the north slope of the Cluster 1 area. When this area was plowed in 2010, a new scatter was discovered and temporarily designated as a midden. We conducted a surface collection and excavated a 1 m by 1 m unit in the feature in order to recover a large sample of the assemblage. The feature had a radius of 3.8 m and extended 50 cm below surface, the upper 10–15 cm impacted by plowing. Large sherds dominate the assemblage, and a high number of open forms suggest a special function assemblage. The assemblage dates to the LCII-Terminal Classic periods, and it is probably associated with BVS-006, a nearby group that was occupied into the Terminal Classic.

BVS-060 and BVS-077 are both household groups with short occupations. BVS-060 was originally mapped as two mounds in an L-shaped configuration, but excavations revealed three mounds in a C-shaped configuration. Structure 1 was found to have at least three construction phases, spanning from the LCI to the LCII period, while Structures 2 and 3 had only two construction phases. Structure 1 is believed to be the group's principal residence. The first phase is surprisingly the most complex and labor intensive of the three phases. The final construction phase is poorly preserved due to the ancient removal of facing stones, which caused a "spill over" appearance that is not atypical around Baking Pot. This supports previous suggestions of the prevalence of material "pillaging" in the Buenavista South settlement zone, likely due to the scarcity of limestone construction material in the immediate surroundings.

South of Structure 3, we identified a depression in a terrace area surrounded by a scatter of ceramic sherds, primarily from open forms. Excavations ruled out the presence of a firing feature, and it was instead likely used to seat a large, possibly heavy artifact (e.g., a metate, a large jar). Ethnographically, bowls or jars have been found placed in patio and terrace surfaces for the purpose of water collection and storage, and they are often associated with maize washing and cooking areas that are out of the way of high traffic zones. This feature may reflect such activity. Another depression in the patio area had no associated artifacts.

BVS-077 is a small, single mound. It appears to be a low intensity, short-lived household site. Testing in 2008 found relatively few cultural materials, revealing that the group was built near the end of the LCI phase and occupied primarily during the LCII phase, with no later occupation. Excavations in 2010 exposed roughly half the mound, revealing a single-phase platform supporting an upper platform. The use of large, nicely hewn limestone blocks juxtaposed with poorly hewn blocks and the date of the platform's construction suggests that building materials were pillaged from a nearby group, likely BVS-007 Structure 2, where facings of distinctive large limestone blocks were removed after its initial abandonment in the LCI phase. This is important as it factors in to the possible functional explanation for BVS-007.

BVS-007 is the largest site in Cluster 1, composed of two long mounds that held perishable superstructures and low outset terraces facing a formal patio area (Figure 8). Its location at a narrow point on the finger of land between two steep arroyos effectively creates a choke point for monitoring and controlling movement from the high traffic river floodplain

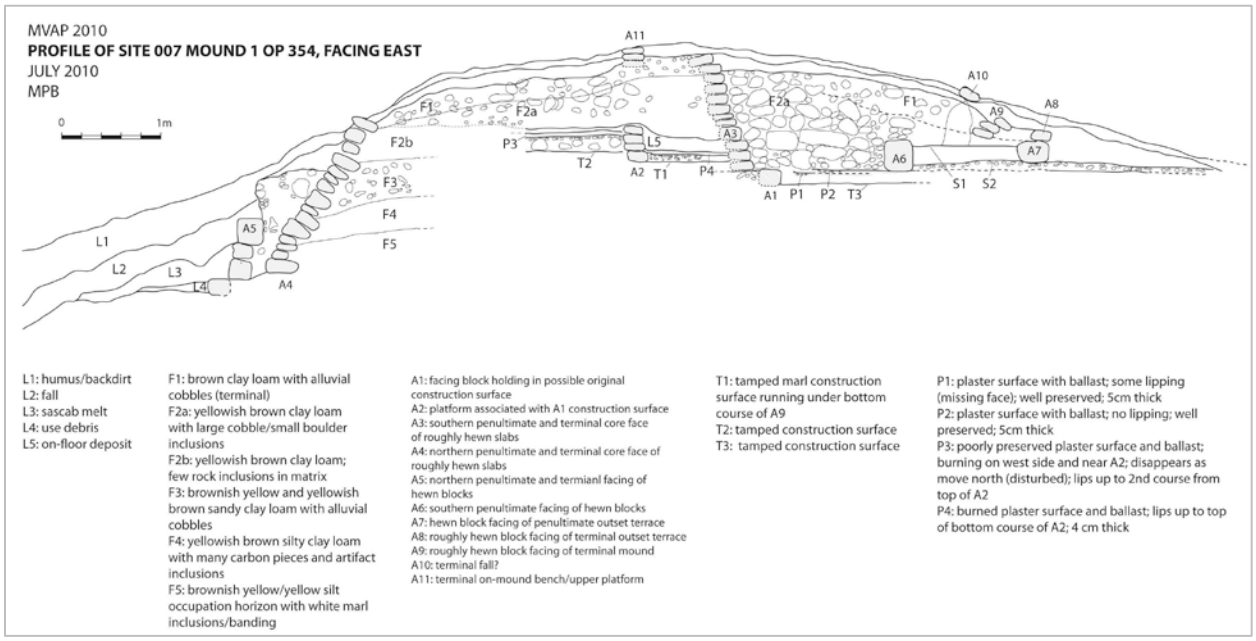

Figure 9. Profile of BVS-007 Structure 1.

to Buenavista's site core. In 2010, Peuramaki-Brown expanded upon her previous excavations of Structure 1 and began investigating Structure 2.

At both mounds, construction began in the Early Classic. This is not the earliest construction in the cluster—some groups were occupied by at least the Middle Preclassic—but it does correspond with a time when Buenavista was gaining momentum within the valley. Remodeling of both buildings and the addition of a formal paved space occurred during the LCI phase. Structure 2 has at least one earlier phase, but Structure 1 has a particularly complex series of at least 5 phases of renovations (Figure 9). Both buildings have low terraces facing the patio, which could have served as stages for activities. Toward the end of the LCI, Structure 2 ceases to be used and its limestone block facings are pillaged. A poor refurbishing of the south face and sides of Structure 1 occurred during the LCII phase, and the use of the mound continued into the Terminal Classic, beyond the point of Buenavista's civic decline. This difference in the mounds' occupation histories may reflect different functions. Peuramaki-Brown (2011) argues that Structure 1 was ritually oriented and more associated with local, horizontal identity, while Structure 2 served a secondary administrative or vertical integrative function.

BVS-007 is distinct from the other groups excavated in this settlement cluster in the large and carefully hewn limestone blocks that are used in most phases of both mounds. These blocks comprise the formal exterior facings, while roughly hewn slabs were used in interior core face construction. Possible task units, reflected in fill materials of different matrix compositions within the same construction phases, suggests multiple households were involved in construction, another architectural technique not seen in other sites in the cluster. Finally, the placement of trace stones along the facings of Structures 1 and 2 and the patio—a technique used when constructing on sloping surfaces (Loten and Pendergast 1984:15)—may reflect the use of formal or civic-state architectural knowledge in the construction of this particular site.

The artifact assemblages from final use-oriented deposits at both mounds suggest administrative and ritual activities, questioning a previous domestic interpretation. In Structure 1, we recovered a higher number of serving vessel fragments; body fragments, lids, and solid clay cones from three-pronged censers; copal resin; burned infant/child human phalanges; a drum

fragment and a whistle; figurine fragments; a large finely flaked lenticular biface; quartz crystals; unaltered and carved marine shell and personal adornments of exotic materials; Pachuca and other rare-source obsidian; and ceramic sherds with painted hieroglyphic texts (Helmke 2010). This assemblage resembles that found in the north patio of SL-13 at San Lorenzo, a group believed to have served as a hinterland administrative-ritual locus for Xunantunich's rulers (Yaeger 2000). The lack of typical domestic or ritual assemblages at Structure 2 suggests it may also have served administrative functions. Furthermore, administrative tasks are typically associated with range-like mounds, and Structure 2 is a long low mound with interior bench features, and it lacks domestic occupation debris. Structure 1's abandonment toward the end of royal rule at Buenavista is consistent with this interpretation. Construction materials were removed from Structure 1's exterior facings and core facings at the end of its life-history.

One unusual find suggests that the disturbance of Structure 1 was accompanied by offerings. In a deposit comprised entirely of Early Classic and LCI material, we found a single LCII sherd belonging to a codex-style Zacatel Cream vessel (Figure 10). The sherd features the "grapes of Cauac" motif, the diagnostic element of the logogram **TUN**, or stone (Helmke 2010). This sherd's anomalous dating and the fact that it was broken neatly around the symbol for stone has led Peuramaki-Brown to tentatively suggest that this important exotic and rare item was placed as an offering to the building when stone, and possibly other materials, were removed.

Peuramaki-Brown's investigations of the Buenavista South settlement zone provide a rich picture of the zone's settlement history and the relationship of its inhabitants and architectural groups to the rulers of Buenavista. The first households were established in the Buenavista South settlement zone during the Middle Preclassic, contemporaneous with the earliest settlement documented at Buenavista itself (Ball and Taschek 2004). Most Preclassic sites are located on the upper shelf of the cluster, and they are generally single mound sites, some of which develop into multi-mound sites over time.

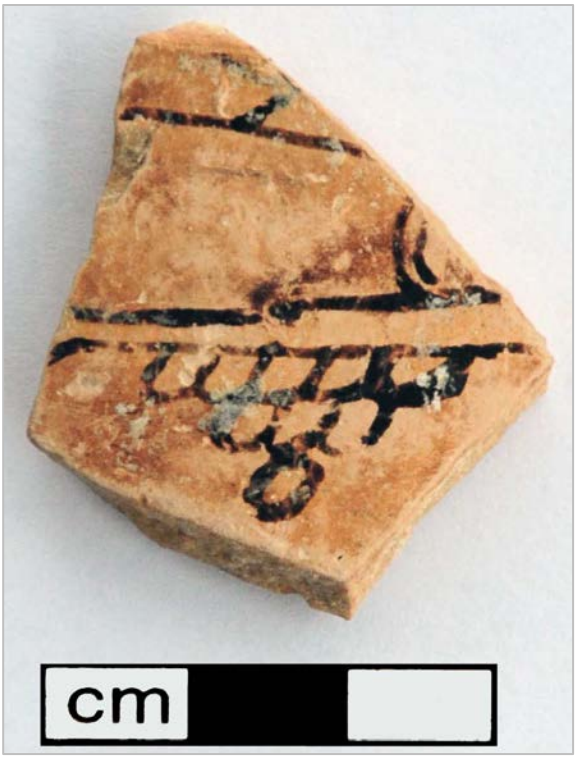

Figure 10. Zacatel Cream sherd from Op 354V/13, BVS-007 Structure 1 (Sherd 7, see Helmke 2010).

Population grew and new groups were established during the Early Classic, as activity in the epicenter was increasing significantly. It is during this time that possible community-oriented buildings like BVS-007 were built, possibly as a means of tying these communities and associated lineages to the royal court.

During the LCI phase Buenavista experienced a civic boom as reflected in architectural construction in the epicenter (Ball and Taschek 2004), and all sites within the Buenavista South settlement zone are occupied by this time. The LCII phase sees the continuation of occupation and activity in the epicenter, but by the turn of the 9th century, large construction projects are abandoned in the epicenter, including the cessation of causeway construction (Ball and Taschek 2004). Some sites in the Buenavista South zone are abandoned during this period, in particular those that were founded later in the settlement's history. During the Terminal Classic phase, the zone's founding groups continue to be occupied, but they do not extend into the late 9th and 10th centuries. At this time, Ball and Taschek report

some continued use of the epicenter, while the Buenavista South settlement zone seems to have been entirely abandoned.

Conclusions

MVAP continues to study the Mopan valley's Precolumbian political dynamics and the roles played by hinterland households and communities. Our excavations have focused on settlement zones near Buenavista (Buenavista South) and across the Mopan River (Callar Creek North). Although the residents of these settlement zones represent a range of socio-economic positions, most were relatively humble. They may have had few resources with which to actively shape the valley's political dynamics, but one should not underestimate the ability of tactics that Scott (1998) called weapons of the weak to impede and complicate state strategies and thus shape state institutions and political dynamics. To provide a broader view of hinterland political dynamics, however, we are also investigating minor centers like Callar Creek, which represents the seat of powerful family that had access to more resources than most hinterland residents. They potentially could have parlayed those resources into a greater role the valley's political dynamics; at the same time, those resources likely represented a source of competition with the rulers of major centers like Buenavista and Xunantunich.

Our work to date reveals a hinterland population history that roughly parallels the occupation history and political fortunes of Buenavista itself. We have recovered Middle Preclassic materials in all of the zones we have studied, a finding that supports settlement research around Xunantunich (Yaeger 2010). Populations peak in the Late Classic period, roughly corresponding to Buenavista's political apogee (Ball and Taschek 2004). Two observations suggest that Buenavista's political rise was accompanied by more assertive strategies to integrate its hinterland. The first of these is the establishment of BVS-007 in the Early Classic and its expansion in the LCI period. The group's architectural layout and construction techniques, coupled with an unusual artifact assemblage, have led Peuramaki-Brown (2011) to argue that BVS-007 was a venue for activities that integrated this part of Buenavista's hinterland into the larger state as described above. The dates of BVS-007's maximum use correspond with Buenavista's apogee, while its decline and partial dismantling toward the end of the LCI period correspond with Xunantunich's rise, a development that likely led to competition between the rulers of Xunantunich and Buenavista for the valley's resources.

We do not yet have a robust body of data from Callar Creek, but it is interesting to note that site's main plaza and the adjacent courtyard group were all built in the Preclassic or Early Classic periods and not significantly modified later. This fact, coupled with the simple architectural sequence of Structure 3, suggests that Callar Creek's residents were unable to consistently draw on hinterland labor, presumably because it was directed to architectural projets at Buenavista. A more detailed construction history for Callar Creek will allow us to assess this possibility in greater detail in future publications, but the present data suggests that Buenavista's rise had a definite impact on hinterland elite families like those at Callar Creek.

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3 KNAPPING IN THE MARKETPLACE: LITHIC PRODUCTION AND MARKETPLACE EXCHANGE AT BUENAVISTA DEL CAYO, BELIZE

Theresa Heindel, Bernadette Cap, and Jason Yaeger

We argue that specialized production and marketplace exchange were key components of the chert biface economy at Buenavista del Cayo during the Classic period. While every household at Buenavista consumed chert bifaces, only a few produced them. Several lines of evidence indicate that householders obtained bifaces at a central marketplace in the Buenavista's East Plaza. Investigations in the East Plaza revealed several direct lines of evidence of marketplace activities, including the production of chert tools. To investigate the volume and nature of chert production that took place in the East Plaza, we tested an unusual deposit of chert debitage in the East Plaza, which covered approximately 120 m^2 and had a density of 211,437 chert artifacts per m^3. These excavations and subsequent artifact analysis indicate that this deposit is the result of specialized production focused on the finishing stages of bifacial tool manufacturing and the resharpening of bifaces dulled from use. These findings support the identification of the East Plaza as a marketplace.

Introduction

Chert was a critical resource in Precolumbian Maya civilization, as it was used to create stone tools that were essential in agriculture and other productive activities. Chert is naturally abundant in the upper Belize River valley, where it can be found in beds eroding from the limestone bedrock and as nodules redeposited in ancient and modern alluvial deposits. As a result, Precolumbian inhabitants of the valley had relatively easy access to chert, and most of them could flake and chip chert into simple tools (VandenBosch 1999; VandenBosch et al. 2010). The production of more complex tools, however, was the purview of specialized artisans. In this paper, we examine evidence of chert biface production, exchange, and consumption at the site of Buenavista del Cayo, Belize, during the Late Classic period. We conclude that chert bifaces were produced for and exchanged in a marketplace that was held in the site's East Plaza.

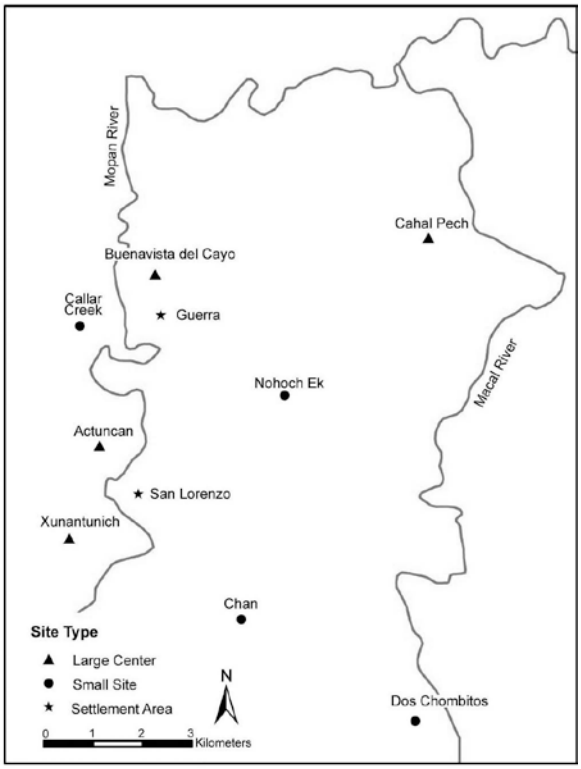

Figure 1. The upper Belize River valley, showing sites discussed in the text.

Marketplace Exchange at Buenavista del Cayo

Buenavista del Cayo (hereafter referred to simply as Buenavista) is located near the east bank of the Mopan River in the upper Belize River valley (Figure 1), surrounded by limestone hills. Settlement began at Buenavista during the Middle Preclassic, and reached its florescence during the Late Classic period (Ball and Taschek 2004:163). Several lines of evidence lead us to argue that a system of market exchange structured the organization of chert biface production and consumption at the site.

Scholars have developed both direct and indirect arguments in their attempts to identify market exchange, in particular marketplace exchange, in ancient economies. The indirect arguments entail expectations of consumer behavior and producer behavior, as outlined by Kenneth Hirth (1998) and Gary Feinman and

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Linda Nicholas (2010). Hirth (1998) argues that an economy in which most people obtain goods through marketplaces results in household assemblages that are very similar in the types of goods consumed, and in which variation in the quantity of goods is the product of differences in household needs and purchasing power. Feinman and Nicholas (2010) argue that household craft specialization—production beyond the needs of an individual household—is both common and varied in a marketplace economy. In these economies, households do not produce all of the goods they consume, and only a few households (relative to the size of the population and consumer demand) specialize in making a particular good. In economies lacking marketplaces, they expect households to show greater self-sufficiency, leading to redundancy in craft specialization and generally low levels of craft production.

At Buenavista, excavations of households near the site's monumental core conducted by Meaghan Peuramaki-Brown (Peuramaki-Brown 2007, 2008, 2009, 2010) and Jennifer Taschek and Joseph Ball (1986) reveal patterns of production and consumption that appear to be consistent with those expected in a market economy as outlined above. In the settlement zone immediately south of Buenavista, Peuramaki-Brown found that all households consumed chert bifaces, but only one household showed substantial evidence of chert knapping, that occurred at an intensity low enough to suggest production for that household and a perhaps few neighbors (Peuramaki-Brown, personal communication 2010). Most stone bifaces used in this settlement zone were apparently produced elsewhere. While Taschek and Ball are currently finalizing the analysis and publication of their materials from the settlement of Guerra (personal communication, Joseph Ball, 2011), located 1 km south of the site core, but a summary report indicates that several households there produced chert bifaces during the Classic period (Taschek and Ball 1986).

These data suggest that most households did not produce the bifaces they consumed, and that a relatively small number of artisans specialized in making bifacial tools. A similar pattern is apparent in the Xunantunich polity, located immediately south of Buenavista, where most Late Classic households engaged in basic flint knapping to make simple and expedient tools while relying on a few specialized household workshops for tools that required a greater degree of skill to make, such as general utility bifaces and thin bifacial knives and points (Hearth 2008, 2012; VandenBosch 1999; VandenBosch et al 2010; Yaeger 2010).

These patterns in chert biface production and consumption provide indirect support to conclude that some lithic tools were distributed via marketplace exchange at Buenavista. Direct evidence for this same conclusion comes from the second author's archaeological investigation of Buenavista's East Plaza.

Bernadette Cap supervised three seasons of extensive excavations and posthole testing in the East Plaza, complemented by soil chemistry analysis and micro- and macro-artifact analysis of the recovered materials. The study was designed to allow her to evaluate a suite of archaeological correlates of the activities and architecture expected in a marketplace. She concluded that the East Plaza was the venue of a marketplace during the Late Classic period (Cap 2011). The East Plaza was an ideal location to host a marketplace because it was the largest plaza in the site center, and its layout and placement made it the most accessible to the surrounding countryside.

Indications that the East Plaza was a marketplace include the segregation of ceramic, obsidian, and chert artifacts into distinct zones, the presence of chert biface and obsidian blade production that is restricted to the final stages of production, and wattle and daub structures built on top of the Late Classic surface that in one case separates zones of distinct production activities. These and other findings indicate that chert bifaces, obsidian blades, organic materials, and possibly ceramics were exchanged in the East Plaza. We focus in more depth on the data regarding chert bifaces in the next section.

Chert Biface Production in the East Plaza

In 2008, the first author directed excavations in an unusual deposit of chert debitage in the East Plaza to assess the nature of lithic production at this locus. Previous studies conducted by Richalene Kelsay (1985) and Joseph Rieth (2003) as part of Ball and

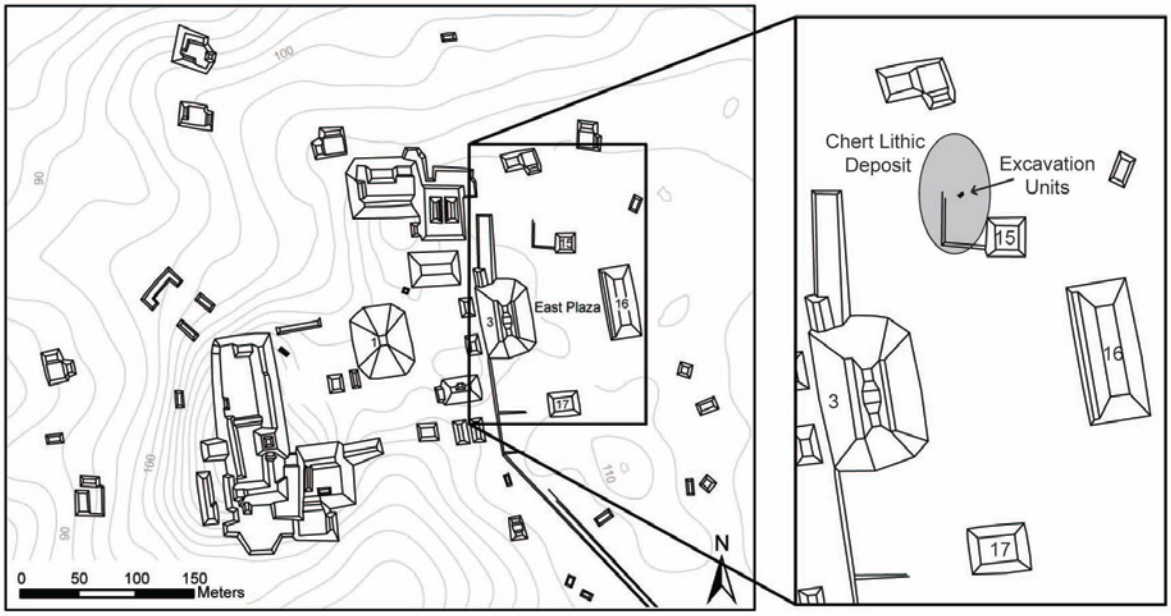

Figure 2. Map of Buenavista del Cayo (after Joseph Ball and Jennifer Taschek), showing the East Plaza and the location of the chert deposit discussed in the text.

Taschek's Mopan–Macal Triangle Project had documented the extent and dense nature of the deposit and an assemblage characterized by a relative abundance of small flakes with late-stage lithic production attributes, as well as a few flakes with use wear. They dated the activities to AD 675-800. Both investigators interpreted the debitage as having been created in association with a woodworking craft workshop. Our investigations led us to propose an alternative interpretation: that this was a locale where chert tool producers put the finishing touches on bifaces that were initially prepared as preforms in other locations, presumably in household workshops.

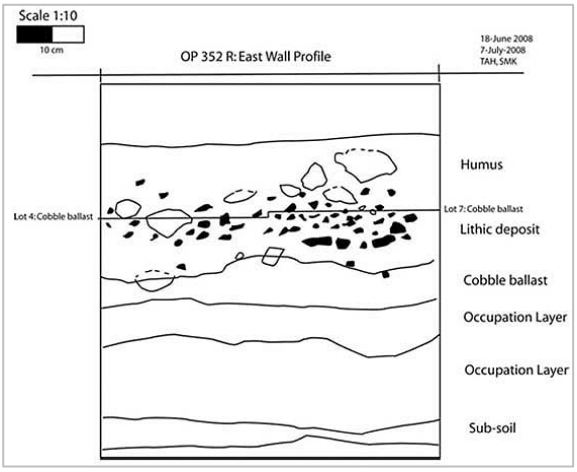

Figure 3. East profile of Op 352R

Excavations

During her testing of the East Plaza, Cap relocated the lithic concentration first found and described by the Mopan–Macal Triangle Project. A systematic shovel testing program across the entire East Plaza revealed that the densest concentration of chert debitage is located west of Str.15. encompassing a horizontal area of approximately 120 m^2 (Figure 2). The shovel tests suggested that the chert debitage was concentrated in a single layer starting 10-15 cm below the ground surface. This layer varied in thickness from 13-18 cm and was characterized by a predominance of chert artifacts over soil and other artifacts.

Given their limited size, the shovel tests could not provide a detailed understanding of the deposit's stratigraphy and assemblage. Thus, to better understand its stratigraphy and collect a sample of standardized volume for detailed assemblage analysis, the first author led excavations of a 1 m x 2 m test unit (Op 352R) where the volume of chert artifact was highest

and the layer of chert debitage was thickest (Figure 2).

After excavating the test unit, we excavated an additional 40 cm x 40 cm column (Op 352AW) adjacent to the southwest corner of the test unit to recover a sample for detailed artifact analysis from tightly controlled contexts. In the column, we collected all of the material from each cultural layer separately and processed the matrix through a flotation system so as to recover all of the artifacts present, including microartifacts down to 1/16th inch in size. The result was an excellent sample of lithic debitage, which was then subjected to detailed analysis.

Stratigraphy

Op 352R revealed a more complex stratigraphy than we had expected (Figure 3). Before beginning to knap in this area, the Maya created a prepared surface, represented by a dense cobble layer approximately 5 cm thick that extended across the entire 1 x 2 m unit. Similar cobble layers in other areas in the East Plaza represented fill and ballast under the plaza surface and the fill of small platforms. Given the small horizontal exposure in Op 352R, we cannot determine if this cobble layer represents plaza fill or a low platform.

We recovered few dateable ceramics from Op 352R; approximately 9 percent of the collection comprised diagnostic sherds, and those were generally attributable to only broad time periods. This data is still helpful in ascertaining the depth of time over which the chert debitage accumulated. The dateable ceramics associated with the cobble layer just described are predominantly Preclassic (by count and weight), including sherds from the Savanna and Joventud groups. We recovered occasional Preclassic diagnostics in the thick layers of nearly sterile matrix that lie below the cobble layer, and we believe much of this material is redeposited fill. We recovered one recognizable Late Classic Belize Red ceramic fragment, leading us to conclude that the cobble layer was laid down in the Late Classic period, a conclusion consistent with Cap's findings elsewhere in the East Plaza (Cap 2011).

Knapping activities took place above the surface or contact that capped the cobble layer, and they resulted in an accumulation of lithic debitage 10-15 cm thick. The deposit was extremely dense, with little soil in the matrix. It seems to be an accumulation of debitage from knapping activities that took place over time rather than a single production event.

We excavated this layer of lithic debitage in multiple lots, with an arbitrary maximum thickness of 5 cm. The lot immediately above the aforementioned cobble layer contained Middle Preclassic (Savanna and Joventud groups) and Late–Terminal Classic (Belize Red group) diagnostics. The overlying lots contained only Late–Terminal Classic ceramics (Belize Red and Mount Maloney groups), some of which were more narrowly attributable to the early Late Classic or LCI period, equivalent to the Samal phase (AD 600–670) defined by LeCount at nearby Xunantunich (LeCount et al. 2002).

After the accumulation of this thick layer of chert debitage, another thin cobble layer was laid down. This cobble layer covered only one quarter of Op 352R. As with the earlier cobble layer, we cannot determine whether this second cobble layer represents a plaza resurfacing or the fill of a small platform. The ceramics recovered from the second cobble layer date predominantly to the Late Classic period, with many sherds of the Belize Red group. As in earlier layers, these were mixed with Middle Preclassic sherds, in this case, 2 small sherds of the Savanna group.

A posthole, located in the northeast corner of the unit, extended through this second layer of cobbles, indicating the presence of a superstructure of some kind associated with the surface of the cobble layer, perhaps a perishable building or a framework for an awning. The absence of lithic material in the posthole and the fact that it extended up through the upper lithic deposit suggest that knapping debitage accumulated around an *in situ* post. We did not recover any dateable ceramics from the posthole.

In Op 352AW, we found a small, dark soil stain with a curved edge in the very southeast corner of the unit. Its location prevented us from excavating it, but its appearance is similar to the posthole found in Op 352R, and we suspect it is a second posthole. If so, the two postholes were aligned roughly north-south and set about two meters apart.

The knapping that occurred above the second cobble surface resulted in an accumulation of debitage varying from 5-10 cm thick. Dateable ceramics from this layer are exclusively from the Late Classic period, predominately Belize Red.

The stratigraphy exposed by Ops 352R and 352AW reveal that this feature that was originally identified as a "deposit," is more complex, and the two stratigraphically distinct accumulations of chert knapping debitage suggest that lithic reduction occurred here over an extended period of time. The timing of the activities that generated this debitage is consistent with the history that Cap (2011) has reconstructed for the East Plaza: activities began in and around the plaza by at least the Middle Preclassic period; the area was significantly modified in the LCI period, when the plaza was established as a marketplace; and it was used into the Terminal Classic period.

Lithic Analysis: Methodology

The first author undertook a detailed analysis of the lithic assemblage recovered in our excavations in order to determine the nature of the lithic reduction that occurred in the East Plaza (Heindel 2010). She chose an approach that heuristically conceptualized lithic reduction as a series of stages, and she assigned flakes to a particular stage of manufacture using the criteria listed below. She designed an analytical protocol very similar to that used by Whittaker et al. (2008) in their analysis of the LDF lithic deposit at the site of El Pilar. The LDF deposit was the result of chert biface production, and she wanted closely compare the East Plaza deposit with this well analyzed deposit. Furthermore, this allowed her to use observations from Whittaker's experimental reproduction of Maya general utility bifaces, as he analyzed the resulting debitage using the same typology.

The first step was to remove microdebitage, defined as lithic artifacts with a maximum dimension of ¼''; macrodebitage was any debitage larger than this. Given the small size and general lack of diagnostic features on these artifacts, the microdebitage was not analyzed or counted. The microdebitage in each lot was grouped together and weighed. This use of bulk weight for microdebitage follows Whittaker et al.'s protocol.

Macroartifacts were subjected to morphological analysis. Flakes and flake fragments with platforms were analyzed in the greatest depth by recording attributes of size, percentage of cortex on dorsal surface, and number of dorsal scars. To measure size, Heindel (2010) sorted all macroartifact flakes by their maximum dimension (length or width) into four size categories: 1) <2.01 cm; 2) 2.01-4 cm; 3) 4.01-6 cm; and 4) >6 cm. This attribute is can be helpful in determining stage of production, as smaller flakes are produced in greater frequency in the later stages of production, whereas larger flakes tend to be removed during decortication and the preparation of preforms (Sullivan and Rozen 1985).

After sorting the flakes by size, she determined by the amount of cortex present on the dorsal surface of each artifact, using 25-percent increments, and she then counted the number of dorsal flake scars on each flake.

These attributes were the basis assigning flakes to the following typology that highlights behavioral/technological inferences:

1) decortication flakes: 0-2 dorsal scars, 26-100% cortex on the dorsal side;
2) core preparation flakes: 2+ dorsal scars, 1-25% cortex, usually large and thick;
3) general/hard hammer flakes: 0-25% cortex, a large bulb of percussion;
4) thinning flakes: 3+ dorsal scars, 0-25% cortex, a thin or diffuse bulb of percussion;
5) resharpening flakes: same morphology as thinning flakes, but with arrises polished from use; and
6) indeterminate flakes: flake fragments that lacked a platform.

This flake typology follows the idealized stages of production, from the initial processing a chert nodule (decortication flakes) to the final finishing of a chert tool (thinning flakes) as well as their refurbishment (resharpening flakes). We recovered other types of debitage such as shatter, cores, and tools, albeit in very low frequencies, and they were identified according to morphology.

Site	Deposit	Density (artifacts/m^3)	Context	Source
Colha	Op 2007	4,956,125	Workshop	Roemer 1991; Shafer and Hester 1986, 1991
Yaxox hinterland	Yaxox Quarry	1,541,600	Quarry	Ford and Olson 1989
Chan	C-199	970,000	Household workshop	Hearth 2012
El Pilar	LDF	800,000	Public space	Whittaker et al. 2008
Xunantunich hinterland	TA/1-002 and TA/1-003	200,000-400,000	Household workshop	VandenBosch 1999
Buenavista	East Plaza	211,437	Public Plaza	Heindel 2010; Reith 2003
Xunantunich	Lost Plaza	5,578	Public Plaza	Keller 2006
Chaa Creek	CC25 and CC30	1,369-1,799	Household	Connell 2000

Table 1. Comparison of selected lithic assemblages in northern and central Belize

Debitage Type	Weight (g)	% of Total
Decortication Flakes	591.9	4.1
Core Preparation Flakes	63.7	0.5
General/Hard Hammer Flakes	1683.5	11.7
Biface Thinning Flakes	3411.5	23.8
Resharpening Flakes	138.1	1.0
Indeterminate Flakes	4917.0	34.2
Shatter	33.3	0.2
Tools	20.1	0.1
Microdebitage	3507.8	24.4
Total	**14,366.9**	**100.0**

Table 2. Composition (by weight) of the lithic assemblage from Op 352AW

Lithic Analysis: Results

Heindel's analysis of the column sample assemblage from the Op 352AW documented 8,177 identifiable flakes, 9,685 indeterminate flakes, 138 pieces of shatter, and 2 tools. This results in a density of 211,437 lithic macroartifacts per m^3. When compared to other deposits with high densities of lithic artifacts recorded in the upper Belize River valley and nearby regions, the East Plaza chert production locus appears to be a smaller, lower intensity workshop (Table 1).

Heindel's analysis further revealed an assemblage dominated by debitage that is produced during the final stages of chert biface manufacturing. As can be seen in Table 2, after excluding indeterminate flakes and microdebitage, biface thinning flakes are the most abundant artifacts by weight, comprising 23.8 percent of the assemblage. In contrast,

flakes usually created during the early stages of production (decortication and core preparation flakes) are remarkably low in frequency, comprising only 4.6 percent of the assemblage.

The other flake attributes Heindel analyzed further support our inference that this was a locus dedicated largely to end-stage production. Most flakes are small, as 85.5 percent of the assemblage had a maximum dimension of 2 cm or less. Furthermore only 8 percent of the flakes (by count) showed any cortex on their dorsal surface, and only 5 percent had more than 25 percent cortex.

She also recovered a surprisingly high count of 138 resharpening flakes (1 percent by weight). These flakes were identified by the presence of polished arises on the dorsal side of the flake and the absence of wear on their edges and ventral side. The absence of edge wear suggests that these worn flakes were not used as tools themselves, but rather that they were struck from a tool that had been used and worn, most likely to resharpen the tool. While many people in the Classic Maya lowlands likely could have struck a flake from a worn biface, resharpening these tools required both skill and knowledge in order to properly balance the resharpened tool so that it could be rehafted and used (Hearth, personal communication, 2009).

In our analysis of the column deposit, we also recovered two tool fragments, a strikingly low count that comprises 0.1 percent of the assemblage by weight. One tool is a unifacially worked drill that exhibits some use-wear at the tip and margins that is consistent with a drilling motion. The second tool is a thick biface. It also appears to have been used, as use wear is evident on the proximal center portion of the fragment. Given the breakage and wear pattern on this biface, we suggest that it broke during resharpening and was discarded. With the recovery of only two tool fragments in the column sample, it is difficult to determine the exact types of bifacial tools that were finished and sharpened in the East Plaza. In the larger assemblage in Op 352R, we recovered only four additional tools including two chisel fragments, a medial portion of a macroblade (unused), and a shaft scraper.

As noted above, the stratigraphic and contextual relationships of the two lithic layers lead us to infer that the lithic reduction that generated these contexts occurred here. This is supported by the high frequency of microdebitage. After indeterminate flakes, the largest proportion of the assemblage by weight is microdebitage (24.4 percent). The presence of large amounts of microdebitage is often used as an indication of *in situ* production activities. While John Clark (1986) has shown that microdebitage can be produced by the secondary deposition of lithic debitage, the great abundance of microdebitage coupled with the location of the deposit in a public space and the separation of artifacts by material type in the East Plaza, lead us to conclude that the microdebitage here is not the result of secondary redeposition. Instead, it indicates primary production of lithic artifacts at this locale.

The limited scope of production at this locale—largely restricted to end-stage production—meets expectations of the type of production that we expect to find in a marketplace. For the sake of efficiency, lithic tool producers often conduct the initial steps of the reduction process—testing and selecting raw material, initial decortication—close to the raw material source. Although reduction through the preform stage can be conducted at the source, the possibility of breaking performs during transportation encourages knappers to create preforms in their workshops. In contexts where knappers also sell their wares at marketplaces, least-effort models suggest they would only bring finished and nearly-finished tools to the marketplace because of their lighter weight and the possibility of selling them instead of carrying them back home. Therefore, in a marketplace we expect to see an emphasis on the very last stages of production.

As noted above, the high frequencies of small flakes and bifacial thinning flakes found in the East Plaza deposits are consistent with late-stage production. Furthermore, the extremely low tool:flake ratio in the assemblage—2 tools and 8,177 identifiable flakes—indicates a low rate of tool breakage, as one would expect if only tools likely to be successfully completed for sale were carried to market. Finally, marketplace activities also entailed the sharpening of old tools brought by consumers to have a professional sharpen their more valuable

tools, leading to the high number of resharpening flakes discussed above.

It is worth estimating how many bifaces were produced at the East Plaza. To do this, we use methods described by Whittaker et al. (2008:150-151). In replicative experiments, Whittaker found that the production of one chert general utility biface produces approximately 600 flakes weighing 1000-1500 g. If we extrapolate the assemblage documented in Op 352AW to the entire lithic deposit, estimated at 30 m^3 and apply Whittaker et al.'s estimates, we calculate that the deposit represents debitage from the production of roughly 3,700 or 12,500 bifaces, using flake weights and counts, respectively. We recognize these kinds of estimates are ball-park figures, at best. In this case, given that the East Plaza deposits are the result of a restricted range of reduction activities, they are highly conservative ball-park estimates at that. We present them here only to underline our interpretation that that the number of bifaces produced in the East Plaza was significantly higher than any single household would need and therefore represents specialized production activities. Furthermore, because some tools—perhaps most—were likely finished in the workshop before being brought to market, these figures are probably much lower than the number of bifaces actually exchanged in the marketplace.

Discussion

Our investigation of the East Plaza chert production locus has three significant implications. First, it adds weight to Cap's interpretation that the East Plaza was a marketplace. The characteristics of the assemblage are consistent with the focus on end-stage production that Cap (2011) posited should occur in marketplaces. For the sake of efficiency, artisans who sell their own products usually bring light-weight goods that are nearly finished to marketplaces. In the absence of beasts of burden, decreasing transportation costs would likely have been particularly important. As discussed above, transporting preforms rather than finished goods is also an indication of conservation as it decreases the possibility of breaking nearly completed tools. Thus, the predominance of late-stage production debitage meets our expectations for marketplace behaviors.

Second, this study provides insight into the activities that occurred in Maya marketplaces and the social dynamics of marketplace exchange. The fact that chert tool production occurred in a marketplace allows us to make a key observation about producer-consumer relationships. At least some knappers who produced stone tools also sold those goods to consumers, resulting in a direct relationship between producers and consumers without a middleman. As a result, consumers could hold producers accountable more readily for faulty and poor quality goods (Yaeger 2010:185). This situation may also have resulted in deeper bonds between seller and consumer, such that consumers relied on the same producer to sharpen older tools. Thus, the examination of chert debitage in the East Plaza and the context in which it was found reveals marketplace exchange in which the absence of middlemen makes more intimate producer-consumer relationships possible.

Finally, this study provides an important piece of data for reconstructing the broader lithic economy at Buenavista. The East Plaza marketplace was apparently a primary source of finished chert bifaces. While householders were consuming chert bifaces, there is little evidence that they were also producing them, a pattern that also holds for nearby Xunantunich. As data from the Guerra site become available, we may find that chert biface workshops existed in this settlement zone. However, since we do not yet know the stage and intensity of production that took place in these households we cannot determine, for the present, if the East Plaza was the main source for finished chert bifaces or just one of several locales providing these tools. In either case, the homogeneous consumption pattern of bifaces and the presence of specialized production locales of bifaces in the Buenavista settlement meet expectations of a market economy as outlined by Hirth (1998) and Feinman and Nicholas (2010).

Although there are important questions remaining yet about Buenavista's economy, it is clear that the chert biface economy was a complex network of interactions of producers and consumers who were making decisions and

forming relationships based on market exchange principles. These findings offer new insights into the organization of Buenavista society and have implications that will allow for future research on the role of Buenavista as a center for economic activities in the broader upper Belize River valley.

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XX EVERYDAY PRACTICES IN MAYA CIVIC CENTERS: PRELIMINARY RESULTS OF TESTING IN THE WEST PLAZA AT ACTUNCAN, BELIZE

Angela H. Keller

With their impressive pyramids and grand plazas, Maya centers reflect the complexity, variability, and ingenuity of Maya society. Surprisingly, though, we know little about what people actually did on a daily basis in their civic centers. Using ethnographic and historical sources, archaeologists have hypothesized that a wide variety of activities occurred in Maya centers – from blood sacrifice to market trade – but we have scant archaeological documentation of those activities. Here we present the preliminary results of archaeological investigations in open plaza spaces at the Maya center of Actuncan, Belize. Our ongoing work is aimed at identifying the archaeological correlates of daily practices in public plazas through the use of rapid systematic collection methods, soil chemistry analysis, macroartifact and microartifact analysis, remote sensing, and targeted excavations.

Introduction

Considering the wealth of information available concerning the beliefs, customs, and history of the ancient Maya, the idea that we do not know, in any concrete fashion, what Maya people did on a daily basis at their civic and ceremonial centers seems absurd. Of course we know what they did. From their accounts, and by analogy with later practices, we know that the Maya staged elaborate ceremonial events, played ballgames, offered blood sacrifices, conducted administrative and judicial business, hosted foreign dignitaries, and walked in procession, among other things. These various activities surely occurred in some manner at most centers some of the time.

Nevertheless, at any specific site in any one corner of any particular plaza, we cannot say with certainty that a specific activity, such as sacrifice, occurred without the support of more direct evidence. That direct evidence could include architectural features, use-related artifacts and microartifacts, chemical residues in soil and plaster, burning events or other non-structural features, and subtle compaction features identifiable through remote sensing or micromorphology. Archaeologists have made few attempts to collect these data from plaza spaces due to the difficulty of excavating such large areas and the real paucity of features and artifacts. The Maya were remarkably fastidious in their public spaces and, therefore, very little in situ evidence exists that might be used to reconstruct their past practices.

One might question why we would attempt to recover the ephemeral residues of ancient activity when we know, in general terms, how the Maya used their civic centers: for administrative, ceremonial, and economic activities. The answer is twofold. First, knowing that the Maya probably conducted ceremonies and dispatched administrative duties in their centers in no way situates specific practices in particular spaces. That is, we are still unable to reconstruct the use of one plaza or one structure relative to others without archaeologically collected data sets. Second, we are beginning to realize that the particular constellations of power and authority maintained at different centers and by different rulers were quite diverse. Smaller centers were not necessarily mini versions of larger centers, but sometimes entirely different kinds of places with rulers who based their authority on different precepts, from divine right to communal enterprise (Keller 2012; Robin 2012). These differing constellations of power were likely supported by differing kinds of centers and differing daily practices.

Maya Centers as Instruments of Power

David Freidel (1992:129) has argued that Maya centers were designed as "viable instruments" of power. More recently, Jason Yaeger (2003:123) has suggested that a Maya center was a "nexus" of interaction, knowledge, wealth, and power: a magnetic place that attracted the allegiance and talents of its sustaining populace. Stated more simply,

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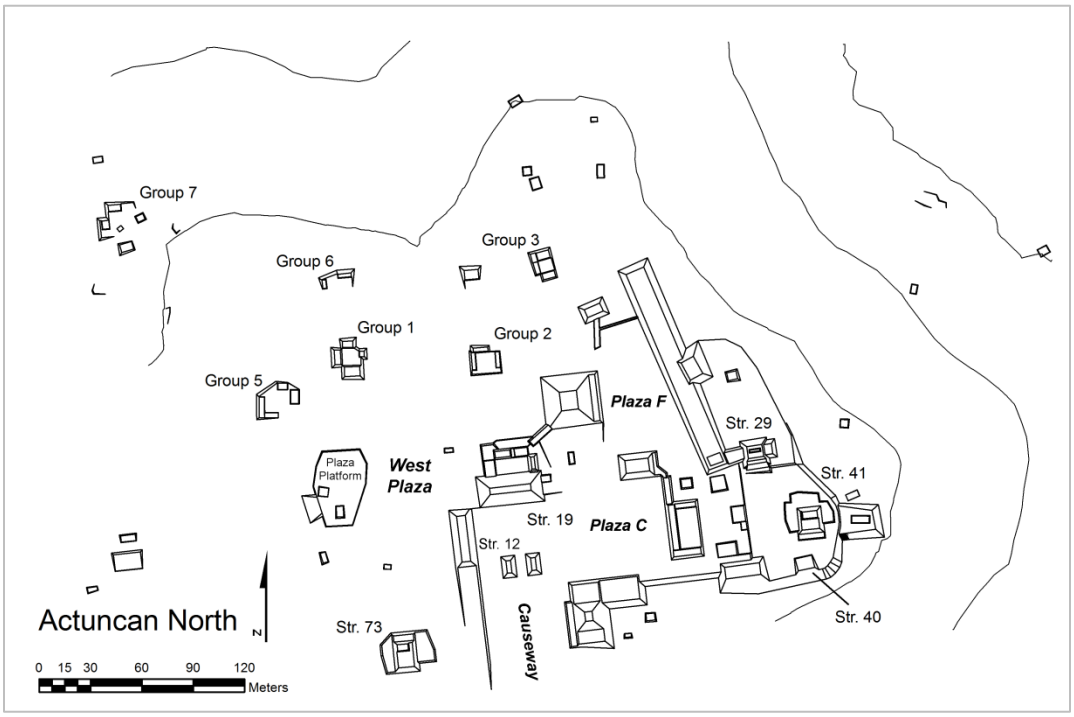

Figure 1. Map of Actuncan North showing the location of the West Plaza.

centers were the primary seats of power and authority in the ancient Maya world. While it would be disingenuous to say that Maya rulers did not carry a sort of embodied power with them wherever they went, in some important manner their power was bound up in the places where they lived (McAnany 1995). As David Webster (2001:132) explains, "the most respectable and legitimate Maya kings [and queens] were those firmly ensconced in ancient places of impressive scale located on sacred landscapes hoary with dynastic tradition." In a recent assessment of ancient Mesoamerican aesthetics and architecture, Kathryn Reese-Taylor and Rex Koontz (2001:1) take up this same thread arguing that Mesoamerican groups "fashioned spaces for the purposes of accruing political power," and further that they designed their monumental centers as "effective settings for communicating power relations."

Maya centers were the places where power and authority were most clearly proclaimed, negotiated, and manifested on a daily basis. Therefore, the diversity of activities that elites and commoners conducted within their centers should speak to the diversity of power structures maintained by those centers. Instead of looking at Maya centers through a normative lens and assuming that plaza spaces were used for the same kinds of generalized functions, we suggest that researchers should investigate the subtle differences in the specific practices enacted in specific plazas and at specific times.

Locating Practices: From Theory to Method

This practice-oriented research is rooted in the concepts of individual agency and transformative relations advocated by prominent social theorists including Pierre Bourdieu (1977, 1990), Anthony Giddens (1984), and Michel Foucault (1980), particularly his discussions of "productive" power. More immediately, our attempt to identify specific practices rather than generalized behavior is inspired in large measure by Timothy Pauketat's meticulous and insightful work in the American Bottom (e.g., Pauketat 2001; Pauketat and Alt 2005). Pauketat makes a useful distinction between normative *behaviors* (e.g., construction behavior) and historically situated *practices* (e.g., the construction of a specific building). He argues that "behavior" is

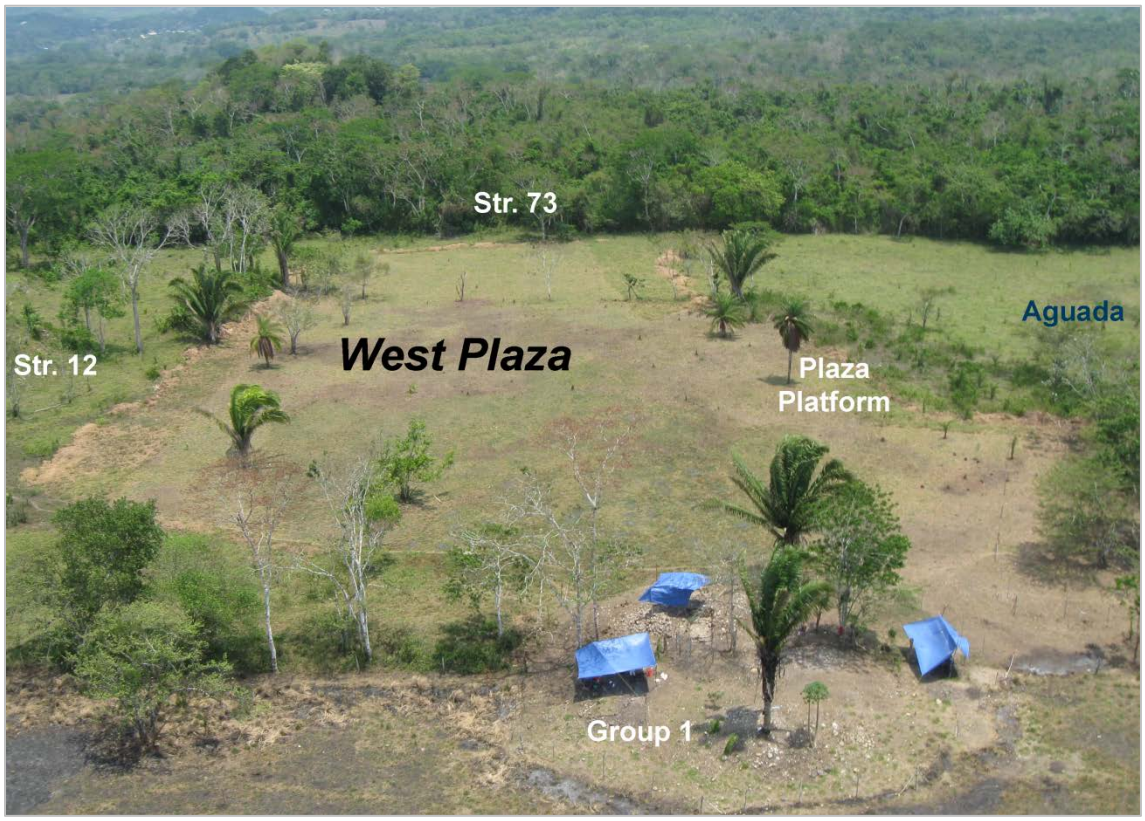

Figure 2. Aerial photograph of the West Plaza facing south. Group 1 in foreground. [Photo taken by Dr. Chet Walker with a kite-mounted aerial photography system.]

not equivalent to "practice," and further that "the locus of microscale *and* macroscale change is people acting out or representing their dispositions in social contexts" through specific practices (Pauketat 2001:86, emphasis original). Furthermore, Pauketat suggests that investigating practices as the locus of cultural change requires not less but more methodological rigor and a "tacking back and forth between lines of evidence at multiple scales of analysis" (Pauketat and Alt 2005:231).

To locate the fugitive traces of ancient Maya practices at the site of Actuncan, we designed a research program incorporating diverse lines of evidence at multiple scales of analysis. Archaeologists are justifiably daunted by the prospect of "excavating" large public plazas. The spaces are simply too large for the usual methods of hand excavation, and the potential for the recovery of buried features and use-related artifacts is relatively low. Simply digging more, in the usual manner, will not result in the nuanced picture of ancient practice that we hope to achieve. Our approach, therefore, combines broad, systematic coverage of entire plazas using relatively small, standardized collection units: posthole tests (Fry 1972). From the 2011 posthole tests, we recovered soil samples for chemistry analysis, macroartifact and microartifact samples, pH readings, and limited stratigraphic data. In tandem with the posthole testing, we placed a small number of probing excavations to identify plaza surfaces. Additionally, during the 2011 field season, Dr. Chet Walker conducted a geophysical survey of the West Plaza using a magnetometer. When combined, these various data sets allow us to detect patterns that may be the shadows of past practices in the West Plaza.

The 2011 Field Season: Identifying a Classic Period Marketplace

During the summer 2011 field season, as part of the larger Actuncan Archaeological

Project directed by Dr. Lisa J. LeCount, Dr. Angela H. Keller initiated the Plaza Research subproject with funding from the University of Texas at Arlington. The Plaza Research program will examine the physical correlates of everyday practices in plaza spaces at the Actuncan center with an emphasis on materials dating to the Classic period (A.D. 250-900). As an initial test, we investigated one large plaza, the West Plaza, located at the western edge of the Actuncan North civic center (Figure 1). We selected this plaza because it appeared to be a likely location for an ancient marketplace based on its open access and relationship with other site architecture including a causeway. The West Plaza afforded us the opportunity to build upon Keller's previous examination of a probable marketplace at the nearby Classic center of Xunantunich, Belize (Keller 2006, 2007) and recent parallel work by other scholars (Bair 2010; Cap 2010, 2011; Dahlin et al. 2007). Researchers in the Maya lowlands have created detailed models of the subtle residues and artifact patterning consistent with market trade (e.g., Chase and Chase 1987; Dahlin 2003; Fry 1979; Jones 1996; Tourtellot et al. 1992). The material correlates of other ancient activities, such as ritual performance or administrative activity, have not been modeled in such detail.

The proposed Actuncan marketplace, the West Plaza, is an open area covering roughly 1.5 hectares adjacent to the site's central civic and ceremonial plazas (Figure 2). The rectangular, level space is bounded by a causeway to the east, a reservoir to the west, and household groups to the north and south. The location, size, and accessibility of the proposed marketplace are similar to probable marketplaces at other Classic period sites including Xunantunich (Keller 2006, 2007), Chunchucmil (Dahlin et al. 2007), Sayil (Tourtellot and Sabloff 1994), and Caracol (Chase and Chase 1987). With the exception of the formal marketplaces at the sites of Tikal and Calakmul (the superpowers of the Classic Maya world), probable marketplaces at Maya centers are large, open spaces with minimal formal architecture. The lack of distinctive "market" architecture has contributed to the difficulty of identifying ancient marketplaces in the Maya lowlands.

Despite the documented existence of a robust market economy in the Maya lowlands at the time of Conquest, many scholars continue to doubt the existence of marketplaces and market trade during the Classic period (Coe 1961; Potter and King 1995; Sanders and Webster 1988). As described by early Spanish chroniclers, market trade was a vital component of the Maya economy at Conquest (e.g., Tozzer 1941: 94). The extrapolation of a market-based economy back into the Classic period, though, remains controversial largely for two reasons: (1) the lack of undisputed archaeological evidence for marketplaces, and (2) the perception that the documented Classic period Maya environment and system of tribute and gift exchange was inimical to market trade (Coe 1961; Dahlin et al. 2007; Masson and Freidel 2002). This project seeks to provide clear physical evidence for a proposed marketplace at Actuncan. Ultimately, the careful documentation of a Classic period marketplace will allow for a reconceptualization of Classic Maya political economy incorporating elite-controlled market trade, royal tribute, and gift exchange.

Field Methods and Results

In the absence of clear architectural features, recent archaeological work on Maya plazas, and marketplaces specifically, has focused on limited artifactual remains and soil chemistry (e.g., Bair 2010; Cap 2010, 2011; Dahlin et al. 2007; Keller 2007). Researchers have identified regularly patterned artifact distributions and soil chemistry signatures indicative of the end-stage production of durable goods and the chemical residues of perishable goods. These residues may be found in linear patterns conforming to our understanding of the spatial organization of ancient Mesoamerican marketplaces in rows of vendors, as documented most clearly among the Aztec (Hutson 2000). Thus far, the most compelling data derive from two procedures: the analysis of artifact distributions, and the interpretation soil chemistry patterns.

The focus of the 2011 Plaza Research field season was the West Plaza. Rather than attempting to excavate the entire space, we created a grid across the West Plaza and systematically collected a number of

overlapping data sets: geophysical survey data, soil samples for chemical analysis, pH data, and macroartifact and microartifact samples.

Geophysical Survey

The West Plaza geophysical survey was part of a larger site-wide project conducted by Dr. Chet Walker and funded and coordinated by Drs. Lisa LeCount and John Blitz (Blitz and Nelson 2012). In the West Plaza, the most notable characteristic of the geophysical magnetometry survey was the relatively "quiet" magnetic signature of the plaza area relative to the more "noisy" North Neighborhood, which is filled with mounded residential structures and features (Figure 3). In the West Plaza, several subtle linear features are evident in the magnetic map that correlate with low, raised structural features. Surrounding the Plaza Platform, a large platform mapped in the 2010 field season (Perez 2011), the magnetic survey revealed a broad sub-platform visible only after extensive vegetation clearing. In addition, we noted an east-west trending feature in the magnetic survey data that likely relates to a very low rise running from the edge of the Plaza Platform toward the northwest corner of Structure 12 on the eastern side of the plaza (Salberg 2012). Other notable magnetic anomalies do not correlate with surface features, and appear to reflect buried structures, floors, pit features, and pathways (Blitz and Nelson 2012). One probable pathway in the southern portion of the survey block runs in a meandering line from the back of Structure 12 toward the western edge of the plaza. This minimally magnetic linear feature is not visible as a path on the surface any may reflect a historical feature, a prehistoric feature, or possibly a combination of both.

Test Units

After the completion of the geophysical survey and before conducting the posthole testing, we excavated a small number of test units to investigate magnetic anomalies and to provide stratigraphic data to guide the posthole program (Blitz and Nelson 2012). Our goal with the posthole program was to probe down to, but not through, the final plaza surface to collect soil and artifact samples. Without the preliminary view of the West Plaza stratigraphy afforded by

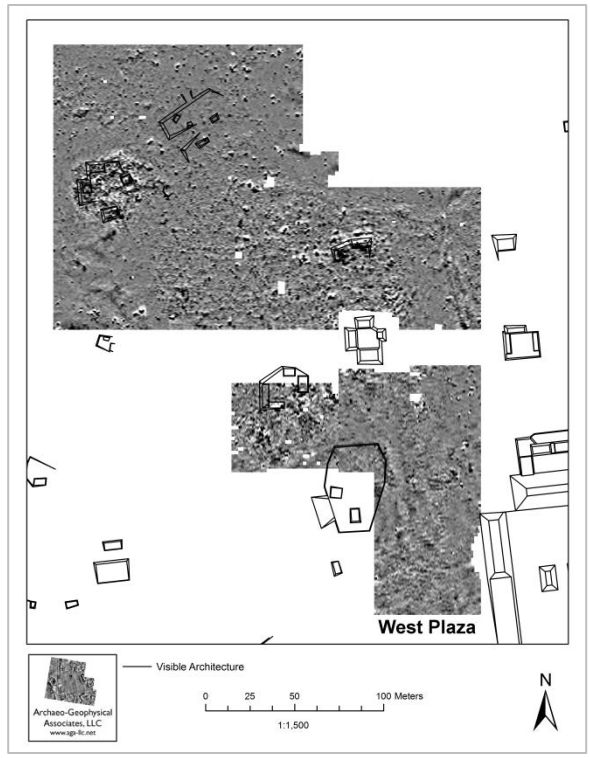

Figure 3. Geophysical magnetometry survey data overlaid on a schematic map of site architecture, showing data blocks in the West Plaza and the Northern Neighborhood. [Geophysical data produced by Dr. Chet Walker.]

the test units, we would have had no data to guide our posthole probes. Our test excavations revealed that the entire west plaza is covered by a 20-30cm thick, dark black mollisol that has developed since the final use of the space by the Maya in the Late to Terminal Classic periods (Figure 4). The location of the terminal plaza surface appears to be the base of this black mollisol, where a structurally recognizable B horizon has developed between the mollisol and the underlying clay fill layers. The construction fills and features rest upon a deep natural deposit of yellowish-to-greenish, reduced silty clay that is likely Pleistocene or very early Holocene in age.

Posthole Testing

During the summer 2011 field season, we placed 364 posthole test probes (posthole tests) across the West Plaza at 5m intervals (Table 1, Figure 5). To extract the samples, we used standard clam-shell type posthole diggers which

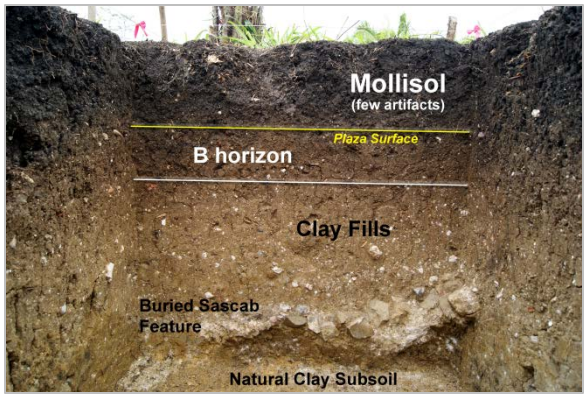

Figure 4. Photograph of Unit 15B North Wall, demonstrating West Plaza stratigraphy.

Figure 5. The 2011 posthole testing grid placed over the West Plaza geophysical survey grid.

created uniform 19cm diameter holes. The posthole tests were excavated down to the latest plaza surface or other architecture (stones, plaster, and gravel). From each posthole test, we collected macroartifact samples and soil samples from the final plaza surface. In a select subset of postholes, we also collected microartifact samples[1]. Readings of soil pH levels were taken at 20 m intervals.

All soil extracted from the posthole probes were screened through 1/4-inch mesh and all artifacts were collected. The collected artifacts (macroartifacts, greater than 1/4-inch in greatest dimension) were identified to class and counted in the field. We also recorded disturbance as Low, Medium, or High. Most posthole test locations had very little (Low) evident disturbance. At the base of each posthole, the field crew recorded the final probe depth and the color and texture of the soils encountered. Some planned postholes were not excavated because they were located on structures or below excavation backdirt.

The field macroartifact counts were later verified in the lab and entered into a database along with the other posthole testing data. The resulting counts of ceramics, lithics, and all artifacts combined were plotted as contour maps and overlaid on the West Plaza testing grid (Figures 6, 7, 8). Ceramic highs correlate closely with overall artifact highs, as ceramics are the most numerous artifacts in the collection. Most of the ceramic and total artifact highs align with the outline of the Plaza Platform and the east-west rise emanating from the eastern edge of the platform. These artifact highs seem to reflect greater quantities of debris along the edges of the structures. One dramatic artifact high spot in the northwest corner of the testing grid, though, may not reflect the use of the space, but rather its construction. Crew members noted large limestone blocks and limestone rubble at the base of two postholes from which an unusually large number of artifacts were collected, suggesting the presence of a buried masonry feature.

The distribution of lithics is somewhat different from that of ceramics. East of Structure 12, in an area with only faint magnetic features, we identified a notable concentration of lithics including the only collected piece of obsidian. The lithic highs here may reflect small-scale lithic reduction in the Plaza. Targeted test unit excavations in the 2012 field season should enhance our understanding of the practices enacted in this area.

	Maximum Value	Minimum Value	Mean Value	Standard Deviation	Totals
Depth	43 cm	2 cm	26 cm	6.5	364 postholes
Sherds	58	0	4	5.9	1562 sherds
Lithics	8	0	1	1.3	349 lithics
Shell	2	0	less than 1	0.2	13 shell frags
Phosphorus	3	0.5	1.2	0.6	202 analyzed samples

Note: [a] Posthole tests were 19 cm in diameter, and placed at 5m intervals.

Table 1. Posthole Testing Summary Data[a].

Phosphorus Testing

Phosphorus (P) is one of the three important macronutrients, along with Nitrogen (N) and Potassium (K), required for plant growth and present in soils worldwide. The relative quantity of P in soils reflects both natural and anthropogenic inputs. Very high P values in cultural landscapes, such as Maya civic centers, often reflect past human actions, such as food preparation and service, waste disposal, and active soil amending, that tend to increase soil P values due to increased organic waste inputs (Bair 2010; Dahlin et al. 2007).

At the end of the 2011 season, we conducted simple P tests in the field to reduce the number of soil samples exported from the country for analysis. We tested the soils from a 50% sample of all of the posthole test locations, analyzing soil samples from every other posthole test in a 10m-interval lattice pattern. Only a small amount of soil from each selected sample was required for the in-field testing procedure, and portions of all soil samples were retained for more extensive chemistry testing during the 2012 field season.

To test the relative quantities of P in the West Plaza soils, we used an inexpensive extraction method (LaMotte Soil N-P-K kit) that produced distillates ranging in color from very light to very dark blue. To allow for spatial mapping of the P value data, we converted the qualitative values (light to dark blue) into an ordinal scale from 0.5 (very light blue) to 3.0 (very dark blue), with 0.5 increments between each color class. We maintained exemplars of each color value over the course of the P testing to standardize the classification of the samples. Keller determined all color values during a two-week period.

The resultant P value data were plotted and overlaid on the West Plaza grid area (Figure 9). Most notable are lines of high P values along the northern and southern edges of the plaza grid. Presently, we suspect that these high values reflect organic trash disposal from Group 1 and Structure 73. The lines of high P values appear similar to “rings” of high P values that Cynthia Robin (1999) identified surrounding small household groups, typically at a distance of roughly 20m from mounded architecture. Robin interpreted the rings of high P values as the result of ancient trash disposal, specifically, the transport of organic waste to the edges of individual houselots (Robin 1999). Similarly, in the West Plaza we may have identified the chemical residues of the edges of household groups to the north (Group 1) and south (Structure 73). By extension, the lines of P high values may mark the northern and southern boundaries of the plaza’s public space, which might have been marked in antiquity by organic post and tree-lined fences. Most of the other high P values in the West Plaza are spatially associated with the Plaza Platform and a subtle east-west rise emanating from the platform. These high P values likely reflect activities involving organic materials conducted along these structural features.

In the 2012 season, we plan to experiment with a portable X-ray fluorescence (PXRF) spectrometer to analyze the chemical composition of soils in the field. The PXRF device should offer us much greater precision and speed, as well as the ability to detect the presence of a variety of other significant

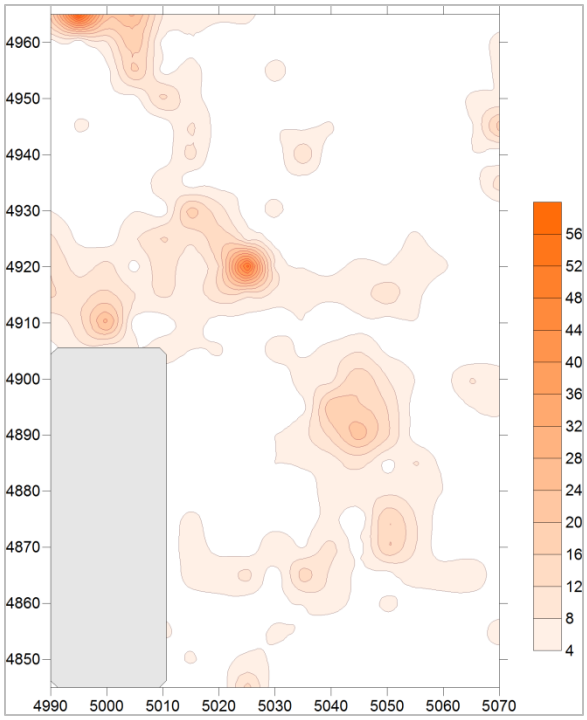

Figure 6. Interpolated contour map of ceramic artifact distribution across the West Plaza (darker orange reflects higher quantity of ceramics).

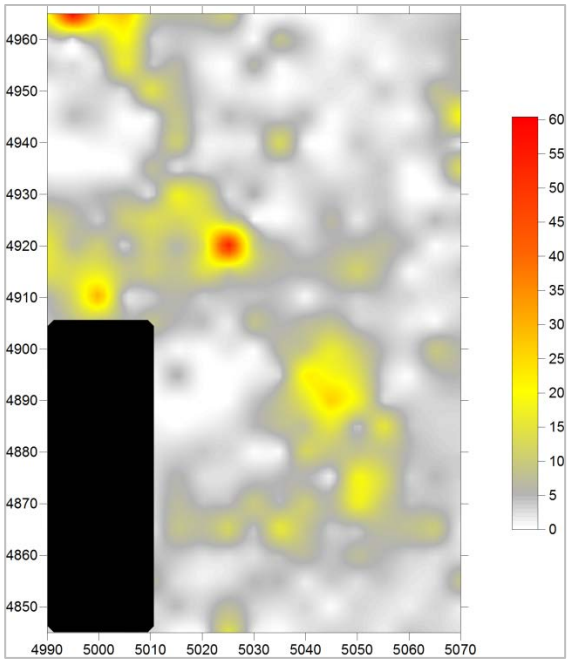

Figure 8. Interpolated contour map of total artifact distribution across the West Plaza (yellow and red areas contain higher quantities of artifacts).

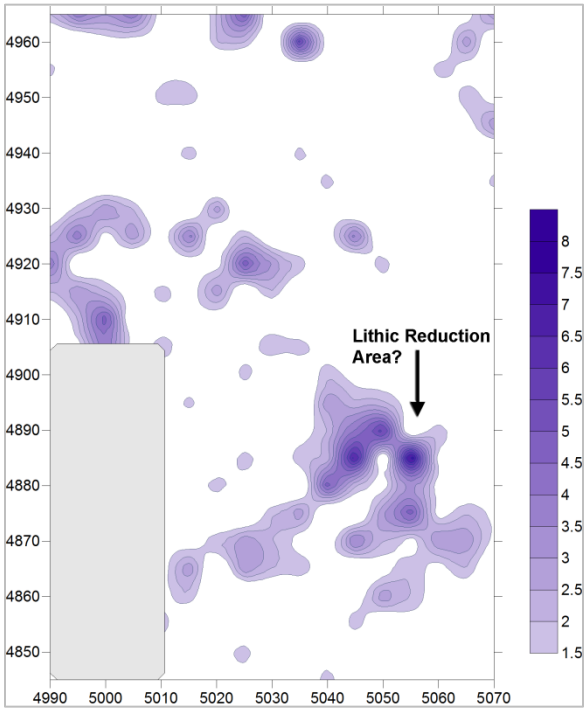

Figure 7. Interpolated contour map of lithic artifact distribution across the West Plaza (darker blue reflects higher quantity of lithics).

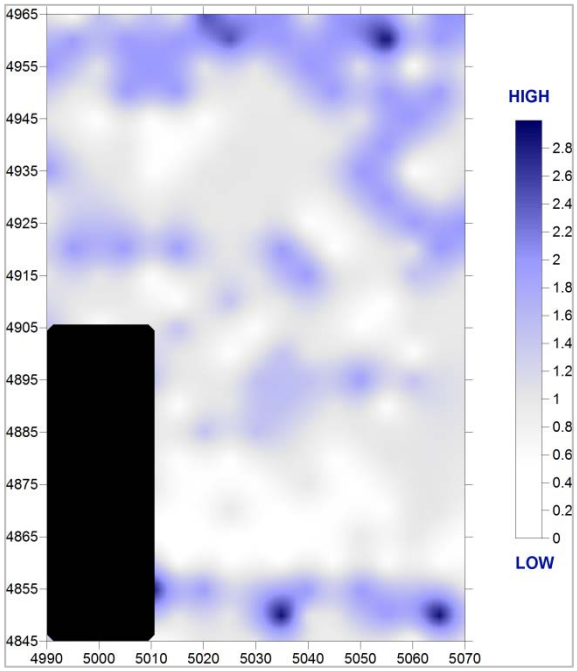

Figure 9. Interpolated contour map of relative P values across the West Plaza (darker blue reflects higher total P values).

elements (Calcium, Zinc, Magnesium, Lead, and Copper, among others) that may reflect anthropogenic inputs. Recent soil chemistry work in the Maya area suggests that the analysis of the relative chemical composition of soils at archaeological sites has the potential to aid us in reconstructing spatially discrete, ancient practices (e.g., Antonelli and Rothenberg 2011; Bair 2010; Robin 2006; Wells 2004). Soil samples from plaza spaces will be analyzed in consultation with Ms. Kara Rothenberg, who is analyzing the chemical signatures of soil and plaster surfaces at Group 1 as part of her dissertation research.

Summary

At the outset of our research in the West Plaza, we were confronted by a large, flat, virtually featureless space. We had no data upon which to reconstruct discrete practices during its final use in the Late to Terminal Classic periods. Clearing the entire plaza with excavation units was neither practical nor desirable. We needed a way to collect, rapidly and systematically, a number of independent data sets that together might shed some light on the ancient use of the space. As described above, we created a grid over the West Plaza and collected geophysical magnetometry survey data, macroartifacts, soil samples for chemical analysis, and a sample of microartifacts. Our primary collection unit was the posthole, as originally described by Fry (1972) for use in the Maya area. Preliminarily, we can combine the magnetometry, macroartifact, and soil Phosphorus (P) data sets to create a multi-layered picture of the residues of human action in the West Plaza (Figure 10).

Our preliminary 2011 data suggest a few discrete areas of activity in the West Plaza and along the Plaza Platform. To the north and south, elevated P values suggest organic trash disposal along perishable features forming the boundaries between public and residential space. Adjacent to the Plaza Platform, the magnetometry data indicate a low subplatform and an east-west trending structural feature, both of which are visible as subtly elevated features on the landscape today. Along the edges of these features, artifact counts and P values are slightly elevated. To west of Structure 12,

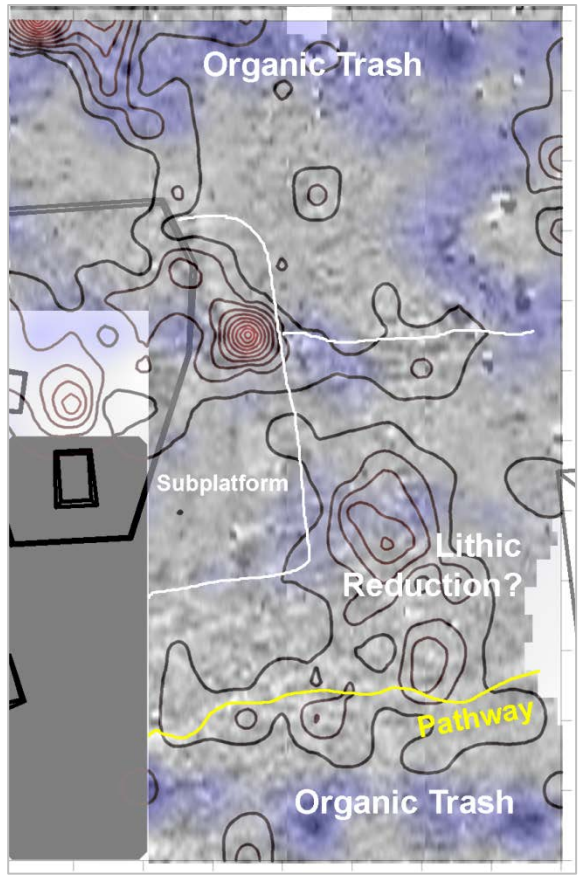

Figure 10. Combined map of total artifact distribution, P values, and geophysical magnetometry survey data (contour lines represent artifact quantities, blue colored image map represents P values, grayscale image map represents geophysical magnetometry data, and straight lines represent visible architecture).

artifact distributions suggest in situ lithic reduction in the West Plaza. This lithic reduction most likely occurred in association with market trade or as attached production for the royal court. Finally, the magnetometry data revealed a minimally magnetic linear feature that appears to be a pathway of indeterminate age. No path or other feature is evident in this area at present. Nevertheless, elevated artifact counts and low P values along the length of this possible pathway suggest that it is a genuine cultural feature.

During the 2012 field season, we will place several test units in the West Plaza to investigate the possible lithic production area, the pathway, and other notable features identified through artifact, soil chemistry, and

magnetometry spatial patterning. The use of a PXRF spectrometer for in-field soil chemistry analysis, and the collection and analysis of micromorophology samples will increase the number of independent data sets available for interpretation. We will also expand our data universe by collecting comparable data from two other plazas with distinct probable functions: Plaza F, a likely ceremonial plaza; and Plaza C, a sprawling mixed-use civic and ceremonial space.

The ongoing Plaza Research program is designed to document the subtle material traces of activity in several distinct plaza spaces. Our research uses a variety of scientific techniques rarely combined in one project. These multiple, independent lines of evidence will dramatically enhance our ability to document the fugitive residues of past human action. Ideally, our work will identify discrete activity areas and distinct material patterns for the different Actuncan public plazas, which, arguably, would have had very different functions in the past. These material patterns, in turn, will help us model the kinds of power relations enacted at Actuncan as a distinctive polity in the greater Belize Valley political sphere.

[1]The analysis of the microartifacts is ongoing and will form the basis of Ms. Krystal Craiker's Honor's Thesis for the Anthropology Department at the University of Texas at Arlington. The microartifact data are not presented here. Please refer to Keller and Craiker (2012) for a description of the microartifact sampling strategy.

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XX DYNASTIC CAPITAL, MINOR CENTER, OR BOTH? RECENT INVESTIGATIONS AT NIM LI PUNIT, TOLEDO DISTRICT, BELIZE

Mikael D. H. Fauvelle, Megan R. Pitcavage, and Geoffrey E. Braswell

Members of the Pusilha Archaeology Project and its successor, the Toledo Regional Interaction Project, have been studying political and economic process and integration within Toledo District since 2001. In 2010, we began new investigations at Nim li Punit, the northeastern most site of five southern centers containing monuments with hieroglyphic inscriptions. Our excavations consisted of a modest set of test pits designed to recover ceramic and lithic artifacts for study and comparison with similar collections from Pusilha and Lubaantun. Our paper presents preliminary data and interpretations concerning the economic relationship of these three sites and the integration of the Southern Belize Region.

Introduction

The Southern Belize Region encompasses the foothills of the Maya Mountains from the Temax River on the Guatemalan border to Monkey River (Figure 1). Within this region are five major sites. Southwest to northeast, these are Pusilha, Uxbenka, Lubaantun, Xnaheb, and Nim li Punit. On the edges of the Southern Belize Region and clearly related to it are the coastal and island sites of The Port of Honduras and further south, as well as sites known along the Bladen Branch within the Maya Mountains and even across the border in southeastern Peten Department (Dunham and Prufer 1997; Laporte and Mejía 2000; McKillop 1996).

The Southern Belize Region is an interesting microcosm within the Maya lowlands. The five major sites—as well as a few minor ones—all have hieroglyphic texts, although those known from Lubaantun are quite limited in number and content. In fact, the vast majority of hieroglyphic texts known from Belize are found either at Caracol or in the Southern Belize Region. The architecture of Toledo District differs greatly from that of other parts of Belize and from all of the Maya lowlands (Leventhal 1990). The corbelled Maya arch was not employed in the Southern Maya Region, and even superstructures with stonewalls are quite uncommon. For the most part, masonry is unimpressive, but the sheer size of the Gateway Hill Acropolis at Pusilha and the great quality of the stonework at Lubaantun are certainly worthy of note. The two largest ballcourts in Belize are found at Pusilha and Lubaantun, and the only Hieroglyphic Stair in the country is at Pusilha (Braswell et al. 2004). Studies of ceramics from the region continue,

Figure 1. Location of principal sites in the Southern Belize Region

but particularly strong ties have been noted with the southern—and even southwestern—Peten (Bill and Braswell 2005).

The five major sites of the Southern Maya Region were not all founded at the same time. Uxbenka, the oldest site, was first settled during the Terminal Preclassic period (Prufer et al. 2008). Hieroglyphic and ceramic data tell us that Pusilha was founded towards the end of the Early Classic period during the 6th century A.D. (Braswell et al. 2004). Lubaantun was first occupied sometime during the 8th century, that is, during the second half of the Late Classic period (Hammond 1975). We are still lacking complete data from both Nim li Punit and Xnaheb, but it is clear that these two sites also

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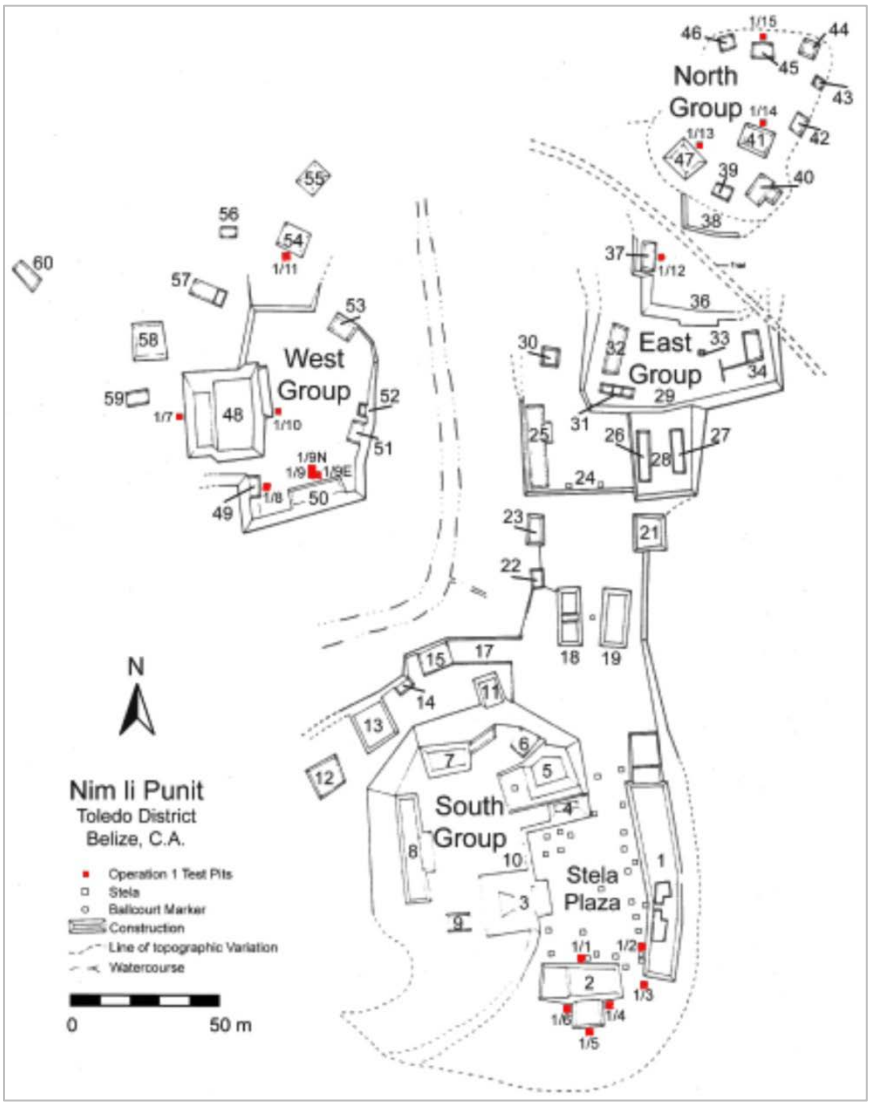

Figure 2. Map of Nim li Punit, showing location of 2010 test pits (after Leventhal 1992: Figure 2).

were at their peak at this time. In fact, ceramic data, radiocarbon dates, and hieroglyphic inscriptions all demonstrate that the major sites of the Southern Belize Region all were occupied and raising stone monuments dedicated to their rulers during the 8th century A.D. They were all, therefore, at least partially contemporaneous. The straight-line distance separating the five major sites amounts to just 47 km, a distance that can be walked in one long day. Yet four of the sites (all but Xnaheb) are known to have emblem glyphs, implying that their rulers claimed to be independent kings (Wanyerka 2003). How could at least four—and possibly five—independent polities flourish in such a small region?

Sadly, the hieroglyphic texts of Southern Belize do not tell us. Although there are many mentions of battles and other events involving named places, we do not know where any of these places are with certainty. An Early Classic monument at Uxbenka depicts a king of Tikal (see Leventhal 1992). Moreover, there are possible and oblique references to sites such as Quirigua, and perhaps Altun Ha and Copan, but these other references are far from proven and even further from being understood. Most frustrating is the fact that, as far as we can now tell, the major sites of the Southern Belize

Region do not refer to each other even once in their texts (Braswell et al 2004). In order to understand how they coexisted, we therefore need to look for evidence of *economic interaction* at the regional level by looking at artifacts such as pottery and lithic tools. This is the focus of the Toledo Regional Interaction Project, or TRIP.

TRIP grew out of eight years of research at Pusilha. There, our initial focus was on foreign relations between Pusilha and distant capitals such as Copan. We soon found that evidence for such contacts was limited, and came to realize that we needed to better understand inland Toledo District as an interactive region. In 2009 and at the invitation of the Institute of Archaeology, we began research at Lubaantun. In 2010, we continued structural excavation and consolidation at Lubaantun and also conducted a test-pitting program at Nim li Punit. The purpose of the test-pitting program was to: (1) gather information about occupation at Nim li Punit beyond the 81-year span discussed in its hieroglyphic corpus; (2) collect pottery so as to begin to build a ceramic typology and chronology for the site; (3) to compare ceramic data with what we already know about Pusilha and Lubaantun; and (4) to gather other artifacts (such as stone tools and faunal remains) that might tell us something more about differing external trade networks and regional exchange dynamics.

In this publication, we describe our excavations at Nim li Punit in 2010 (Pitcavage 2010), discuss the pottery of Nim li Punit (especially how it is similar to and different from that at nearby Lubaantun), and discuss obsidian procurement and consumption patterns at Pusilha, Nim li Punit, and Lubaantun. Our conclusion is that the underlying material culture of Nim li Punit and Lubaantun share much in common, but that the elites of Nim li Punit had greater access to a much richer variety of locally produced and imported pottery than that consumed at Lubaantun. Moreover, the rulers of Nim li Punit had somewhat different external trade networks with distinct partners. Over all, we see relatively little evidence of direct trade between the two sites or of participation in the same market system, suggesting that they probably did form independent polities.

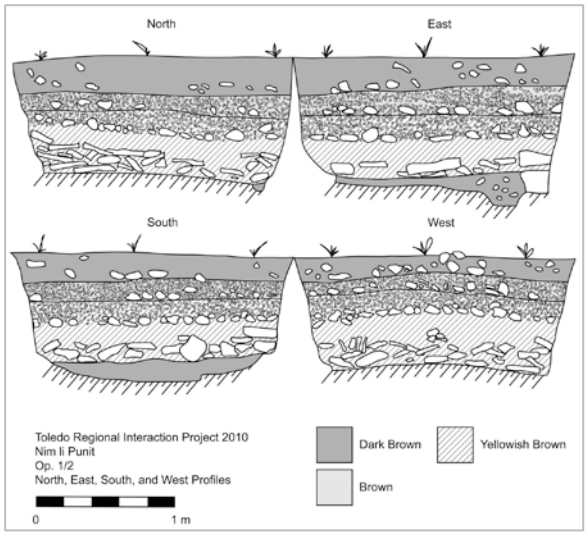

Figure 3. Nim li Punit Test Pit 2 (Pitcavage Figure 5.3).

Excavations at Nim li Punit

Nim li Punit is a small site that consists of three separate hilltop habitation groups linked by public space containing a ballcourt (Figure 2). In all there are 60 mapped structures. At the south end of the site and adjacent to what appears to be the royal residential group is a stela plaza that also includes two range structures that may have served public or administrative functions. There is nothing that resembles a large and formal acropolis containing multiple temples—as at Pusilha and Lubaantun—or a complex palace structure. Nim li Punit is a rural dynastic manor with some public architecture, but it is not an urbanized site. We placed our 17 test pits in three groups. Test pits 1-6 were located in and just off of the Stela Plaza of the South Group. Test pits 7-9, 9N, 9E, and 10-11 were located in the West Group, an isolated residential group containing the largest structure at the site. Test pits 12-15 were placed in or near the North Group, the smallest of the three residential groups at Nim li Punit (Pitcavage 2010).

Test Pits 1 and 2 in the Stela Plaza reveal that the plaza itself was built in two construction episodes. Two floors are preserved in front of Structures 1 and 2 and among the stelae (Figure 3). These floors are made of small pebble gravel

over larger stone ballast. There is no evidence of the use of plaster or lime mortar in either of these two floors. Test Pit 3 was excavated just off the plaza but between Structures 1 and 2 and revealed the steps of a stair that provided access to the Stela Plaza. Framing this access point, indeed all entrances to the Stela Plaza, are two blank stelae. Test Pits 4-6, positioned south of Structure 2 and outside of the Stela Plaza, revealed no architectural features and contained few artifacts.

Test Pits 7-11 were excavated in the West Group, in front of three range structures that probably supported residences and both in front and behind Structure 48, the tallest pyramidal structure at Nim li Punit. At Structure 48, we found no evidence of prepared pebble or gravel floors. Instead, the leveled earthen surface of the hill was used as the occupational surface. The most interesting discoveries were made in Test Pits 9, 9N and 9E, placed north of Structure 50 (Figure 4). Here, we encountered a laja (flat paving stone) surface in front of the building, reminiscent of the monumental paved surface in the East Group. Beneath this pavement, we encountered retention walls and fill cells built of stacked lajas. Below this and on top of a buried A-horizon surface, we recovered many thousands of pottery sherds and other artifacts, as well as secondary deposits of human remains and a small bowl (Figure 5). Our interpretation is that in this area, a lower occupation surface was filled with these remains and artifacts. This was covered up with fill stones in a second construction episode that led to the raising of this portion of the West Group plaza.

Test Pits 13-15 were excavated in the third and smallest hilltop habitation group, what we call the North Group. Test Pit 12 was placed in front of Structure 37 in a transitional area between the open public space of the East Group and the North Group. Test Pit 12 revealed laja fill of the sort encountered in Test Pits 8, 9, 9N, and 9E of the West Group as well as the base of a stair, but we did not find any paving stones. Excavation of Test Pits 13-15, located within the North Group itself, also failed to expose paving stones, and instead revealed several levels of earth, cobble, and pebble fill. It appears as though there may be two construction stages

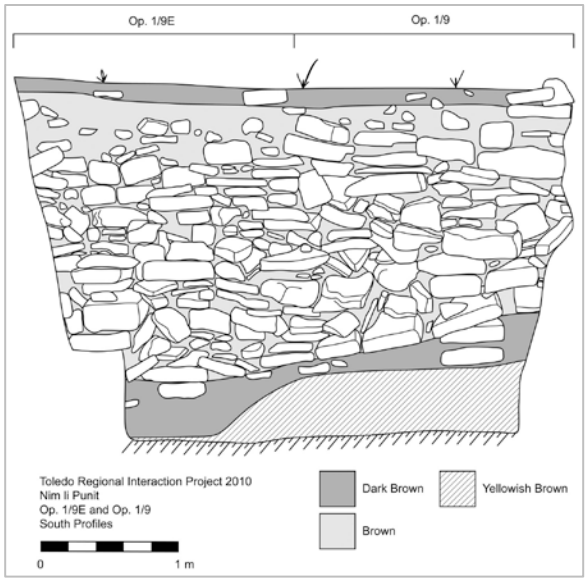

Figure 4. Nim li Punit Test Pits 9 and 9E (Pitcavage Figure 5.14).

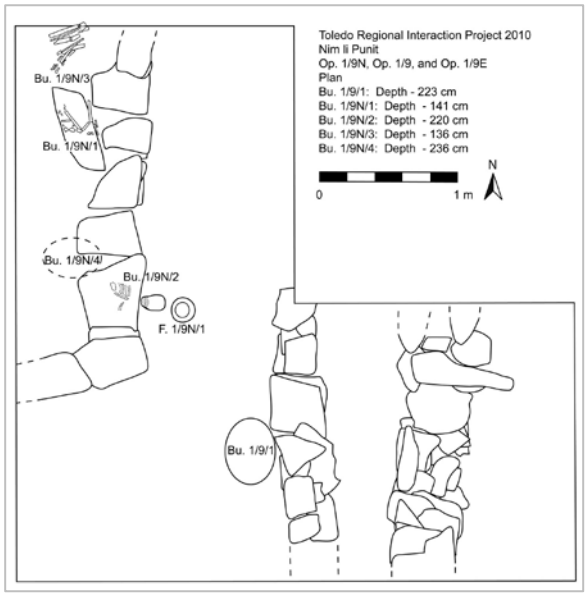

Figure 5. Nim li Punit Test Pits 9, 9N, and 9E (Pitcavage Figure 5.15).

here; perhaps the lower one culminated in a gravel or pebble floor and the upper one in a packed earth floor.

Ceramics

Our preliminary analysis of the ceramic assemblage from Nim li Punit, conducted this field season, had three broad goals. Our first goal was to develop a ceramic typology and chronological sequence for the site. Once this

was complete, an equally important objective was the comparison of the Nim li Punit ceramic assemblage with that from Lubaantun in order to evaluate the level of exchange between and economic integration of these two neighboring centers. A final goal was to determine if imported ceramics at Nim li Punit could shed light on the foreign connections hinted at in several stelae. In all, 32,988 ceramic sherds were collected in 2010, and our 2011 analysis focused on those identified as having diagnostic attributes.

We have tentatively constructed a two-phase ceramic chronology for Nim li Punit, corresponding roughly to the Late and Terminal Classic periods. The Late Classic period is characterized by a preponderance of well-made red slipped bowl and jar forms, as well as a large number of sherds assigned to the Belize and Hondo ceramic groups. A number of red slipped vessels from this phase are stamped with an "X" motif that is absent in both the Terminal Classic collection as well as in the ceramic assemblages of other nearby sites including Lubaantun and Pusilha. During the Terminal Classic period, there is a marked increase in the number of unslipped utilitarian wares, including a number of striated jar forms. In general, jar forms were far more common during the Terminal Classic, possibly indicating a decrease in the importance of food presentation and feasting. The Terminal Classic ceramic phase is also characterized by a small number of sherds belonging to the Fine Orange and Pabellon Model Carved systems, suggesting that the occupation of the site persisted after about A.D. 830. So far, we have found no diagnostic Preclassic or Early Classic sherds at Nim li Punit corroborating hieroglyphic dates that give the center a short history spanning the late 8th and early 9th centuries (cf. Wilk 1977).

Hammond's (1975) typology for Lubaantun contains just eight ceramic groups and a total of 15 types, many of which are defined by only a few sherds (Figure 6). Our initial reaction was that several of his groups and types could probably be subdivided, that is, that Hammond's typology emphasizes lumping rather than splitting. Nonetheless, we have found it to be very accurate at describing the ceramic diversity seen at Lubaantun, especially

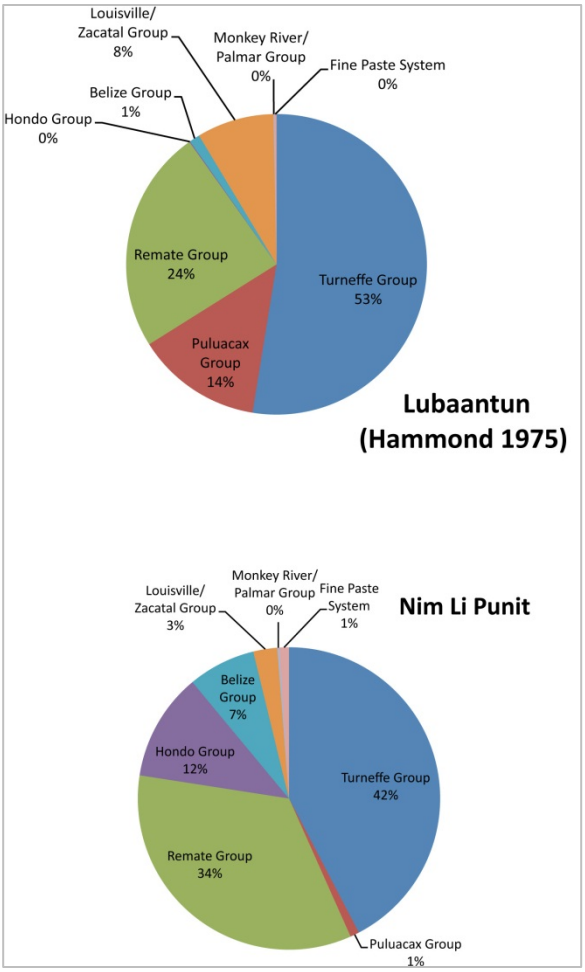

Figure 6. Quantitative comparison of ceramic groups at Lubaantun (left) and Nim li Punit (right)

for Late Classic contexts. Put another way, the ceramic assemblage of Lubaantun is quite limited in diversity, suggesting that the site received its pottery from only a few pottery workshops. In comparison, the ceramic assemblage of Nim li Punit is much more diverse, with at least four distinct types of polychromes and numerous types of both slipped and unslipped monochromes and dichromes. It appears as though the inhabitants of Nim li Punit had access to pottery made by a wider variety of producers.

The ceramics of Nim li Punit are most similar to those of the southern Peten and include red and black slipped Peten Gloss monochromes as well as polychromes of the Zacatal and Palmar groups. Hammond (1975), however, reports only cream-slipped (what he calls Louisville group) polychromes for

Lubaantun. In contrast, both orange and cream slipped polychromes are present at Nim li Punit and Pusilha. Our collections from Nim li Punit and Lubaantun are broadly similar on the group level, with the majority comprised of ceramics falling into the Remate and Turneffe groups established by Hammond (1975). The proportions of these groups at each site, however, are markedly different. Nim li Punit, for example, is characterized by considerably greater numbers of sherds from the Remate, Belize, and Hondo Groups, and by considerably fewer sherds from the Turneffe Group. One substantial difference can be seen in size of the Puluacax Group, which consists of a single type of crude bowl and possibly jar forms. Puluacax Unslipped is very common at Lubaantun and Uxbenka, but less so at Pusilha and quite infrequent at Nim li Punit.

Another substantial difference between the ceramics of Nim li Punit and Lubaantun can be found in the relative proportions of Hondo Group ceramics, a family within Peten Gloss Ware. Hammond (1975) defined the Hondo Group based on a sample of 14 sherds and suggested that it represented an intrusive ceramic group at Lubaantun. At Nim li Punit, Hondo Group ceramics make up 12% of our diagnostics. We suggest the Nim li Punit area as the likely source of this group. We have also expanded the Hondo Group to include two new types based on differences in paste and form. If the Hondo Group was produced at Nim li Punit, the fact that only 14 sherds of this group were found by Hammond at Lubaantun suggests only minor economic ties between these two centers, despite their close geographical proximity.

One of the most striking differences between the ceramic assemblages of Nim li Punit and Lubaantun concerns the use of carbonate-based tempers. At Lubaantun, a considerable majority of sherds in most ceramic groups are visibly tempered with limestone. The opposite is observed at Nim li Punit, where very few sherds have limestone inclusions. Hydrochloric acid tests show that, overall, 60% of Lubaantun ceramics contain carbonate temper compared to only 6% at Nim li Punit. For deeply buried and better preserved contexts, where limestone has not leached out of heavily weathered pottery, the percentage of sherds that react to HCl is nearly 100% at Lubaantun but around 10% for Nim li Punit. These numbers provide strong evidence that consumers at each site were procuring ceramics produced by different groups of potters. Ceramic procurement—and probably production—was organized separately at these two nearby centers. This is a second line of evidence suggesting that pottery at the two sites was not exchanged in the same market system.

The large quantity of Belize Red sherds found at Nim Li Punit is yet another factor that differentiates the ceramic assemblage at the site from those found at other centers in the Southern Belize Region. At Lubaantun, Hammond (1975) identified only 150 sherds of Belize Red. This is similar to the pattern found at Uxbenka and Pusilha, where Belize Red also is relatively uncommon. At Pusilha, in fact, Belize Red appears to be limited to Terminal Classic contexts. At Nim li Punit , however, Belize Red sherds make up 7% of the overall ceramic collection. This suggests that Nim li Punit may have had stronger ties to the Belize Valley than did other centers in southern Belize. Moreover, the greatest proportion of Belize Red at Nim li Punit is found in the deepest Late Classic contexts we have excavated, and the relative quantity of this pottery dropped considerably during the Terminal Classic period. This might suggest the site was subject to a period of fluctuating and uncertain trade relations during the tumultuous Terminal Classic.

Lime Plaster and Jute Shell

As mentioned, virtually all of the well-preserved pottery at Lubaantun tests positive for carbonate temper or inclusions. This is also true for Pusilha but not for Nim li Punit, where about 90% of pottery does not react to HCl. The ancient Maya also used calcium carbonate in plaster and stucco and to make *cal*, used to soften and puff corn before eating. Thus, access to high-quality calcium carbonate was critical for building purposes and even for sustaining life.

The builders of Pusilha and Lubaantun employed substantial quantities of stucco in covering vertical stonewalls, built thick plaster floors, and even used mud mortar that included white lime. In contrast, the use of plaster at Nim

SOURCE	NIM LI PUNIT (N=324)	LUBAANTUN (N=202)	PUSILHA (N=4,079)
El Chayal	85.8%	90.1%	91.4%
Ixtepeque	14.2%	5.9%	7.6%
S.M. Jilotepeque			0.2%
Pachuca		0.5%	0.3%
Zaragoza			0.3%
Ucareo of Zaragoza		3.5%	
Unknown			0.1%

Table 1. Geological sources of obsidian recovered from Nim li Punit, Lubaantun, and Pusilha.

li Punit is—at present—almost undocumented (cf. Wilk 1977). Our excavations did not find any evidence that floors were coated with plaster, and only a single wall—inside an open tomb—today shows any evidence of stucco. Although the silt- and mudstones of the Toledo Formation, the rocks used to build Nim li Punit and to make its monuments—are derived from limestone, there is no source of high-quality material suitable for white lime production near Nim li Punit.. Another material—*Jute* shell—can also be used to produce lime, albeit in much smaller quantities. We note that *Jute* shells are much less common at Nim li Punit than at either Lubaantun or Pusilha, perhaps indicating that most shells were processed in order to make *cal* or even, on rare occasions, stucco. One thing that is clear is that the residents of Nim li Punit did not obtain large quantities of lime in trade with their neighbors at nearby Lubaantun. Again, this implies that exchange between the two polities was limited.

Obsidian

A third source of economic data is the obsidian from Nim li Punit, Lubaantun, and Pusilha. Obsidian is a volcanic glass that was traded to the Maya lowlands from the highlands of Guatemala and—to a much more limited extent—from central and west Mexico. Differences in access to obsidian can be determined by measuring the relative quantities of obsidian to pottery found at distinct sites. Moreover, differences in the relative proportions of materials from distinct sources can provide information regarding distinct interregional exchange connections.

Our excavations at Pusilha, Lubaantun, and Nim li Punit have all been conducted in broadly similar contexts: elite architecture at or just outside of the epicenter of each site. We argue, therefore, that differences in the relative quantities of obsidian at each site are meaningful. At Pusilha, we collected a total of 4,079 obsidian artifacts and 94,858 ceramic sherds. The obsidian-to-sherd-count ratio is 43.0‰. In contrast, we have collected just 202 obsidian artifacts and 27,696 sherds at Lubaantun. At that site, the obsidian-to sherd-count ratio is a mere 7.29‰. With 324 obsidian artifacts and 32,988 sherds, the obsidian-to-sherd-count ratio at Nim li Punit is 9.82‰, much lower than that of Pusilha but somewhat higher than that of Lubaantun. Pusilha clearly had great access to obsidian, while the other sites had much less access.

It is more accurate to compare the total mass of obsidian to the mass of pottery at each site. We did not weigh our pottery from Pusilha, but have done so for both Lubaantun and Nim li Punit. At Nim li Punit, the ratio of the total mass of obsidian to the mass of pottery is 1.187‰. At Lubaantun,it is 0.608‰. In other words, the relative quantity of obsidian is about twice as great at Nim li Punit as at Lubaantun, implying that the elite inhabitants of the center of Lubaantun had much less access to this material than did their counterparts at Nim li Punit.

There are also subtle differences in the procurement patterns of the sites (Table 1). Although all three sites received the vast majority of their obsidian from El Chayal, Nim li Punit received roughly twice as much obsidian from the Ixtepeque, Guatemala source as did both Lubaantun and Pusilha. The Ixtepeque source was particularly important to sites in the southeastern Maya periphery such as Copan, and also is common at Quirigua. It appears as though Nim li Punit may have had stronger trade relations with this region than did the other sites, something that lends credence to interpretations of the hieroglyphic texts of the site. Both Lubaantun and Pusilha received small but significant quantities of obsidian from at least two highland Mexican sources during the Terminal Classic period. The presence of relatively more Ixtepeque obsidian at Nim li Punit and Mexican obsidian at both Lubaantun and Pusilha indicate significant differences in trade relations. Although Nim li Punit and Lubaantun seem to have had somewhat different obsidian procurement strategies, Lubaantun and Pusilha are remarkably similar. Given that obsidian is so abundant at Pusilha and much less so at Lubaantun, it may be that Lubaantun was dependent on Pusilha as its regional supplier.

Conclusions

One important goal of the Toledo Regional Interaction Project is to understand the political relations between the five major sites of the Southern Belize Region, all of which were occupied and carved dynastic monuments during the 8th century A.D. Because the preserved monuments at each of these sites do not overtly mention any of the other sites in the region, we are forced to use economic data as surrogate variables for political relations. We assume, for example, that if Nim li Punit and Lubaantun were part of the same political unit—as Hammond (1976) once argued—then it must also be the case that they participated in the same market system. If, on the other hand, procurement, production, and distribution systems indicate sharp distinctions and a closed economic frontier between the two centers, then they probably were both economically and politically independent.

Data collected at Lubaantun during the past three seasons and at Nim li Punit during the past two years all suggest that the two kingdoms were distinct, despite their relative proximity. At the group level the ceramics of both sites are similar, but there are great differences in the relative quantities of different types and groups. This is seen not only in pottery produced within the Southern Belize Region (such as the Hondo group, common at Nim li Punit but rare at Lubaantun), but also in imported pottery (such as Belize Red, which is common at Nim li Punit but uncommon at Lubaantun). Furthermore, differences in temper indicate distinct production zones for much of the regionally produced pottery. We hope that INAA analyses, currently being conducted by Ron Bishop and Dorie Reents-Budet, will provide further evidence for distinct local production zones. In sum, the pottery suggests that two different production and extra-regional procurement systems were in operation, and that the elite of Nim li Punit had greater access to a wider variety of both locally produced and imported ceramics than did their counterparts at Lubaantun.

Both the relative quantity of obsidian and the sources represented at Nim li Punit and Lubaantun also indicate somewhat different extra-regional procurement patterns. There is twice as much obsidian (when compared to pottery mass) at Nim li Punit as at Lubaantun, and the elites of Nim li Punit received a greater portion of their material from sites in the southeastern Maya periphery. In contrast, there is less obsidian at Lubaantun and trace amounts of it come from central and west Mexico.

Were Lubaantun and Nim li Punit sister centers that shared the same market system? The answer seems to us to be no. They did not engage in the exchange of significant quantities of obsidian, pottery, or even lime for plaster and food processing. Because economic ties between the two sites were weak, we argue that they also were politically independent.

Acknowledgments Field research and laboratory analyses were supported by grants from the University of California, San Diego, and the National Geographic Society (#86-5409) awarded to Braswell. Excavations at Nim li

Punit were conducted in 2010 by Pitcavage and a team of skilled workmen from Indian Creek village, and overseen by Braswell. We thank the people of Indian Creek, as well as the staff of the Institute of Archaeology for the opportunity to work at Nim li Punit. In 2011, pottery from Nim li Punit was analyzed by Fauvelle and lithic collections from both Nim li Punit and Lubaantun were studied by Braswell.

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XX ISOTOPIC EVIDENCE FOR MOBILITY IN THE SOUTHEASTERN MAYA PERIPHERY: PRELIMINARY EVIDENCE FROM UXBENKÁ, TOLEDO DISTRICT, BELIZE

Willa R. Trask, Lori Wright, and Keith M. Prufer

Southern Belize is typically considered geographically and culturally peripheral within Maya prehistory. Researchers have documented the development of a "southern Belize style" in terms of architecture and material culture. Whether the style developed due to isolation, or as a form of identity separate from, but engaged with, powerful polities inland, remains unresolved. From the Early Classic on, the region has been suggested to have functioned as an important trade route between the Caribbean Sea and inland urban centers. Since 2005, excavations at Uxbenká have encountered human remains from a variety of contexts. Although the provenance for some of these individuals is less than ideal, it is believed that they are nonetheless still useful to answer general questions and elucidate patterns in subsistence, location at birth, and ultimately local identity. Strontium, oxygen, and carbon isotopes were obtained from dental enamel from 27 individuals. Locally expected values for strontium and oxygen were used to identify a local Uxbenká signature, as well as to identify outliers in the data. We compare the results to available temporal and geospatial data, and inferred status. Results provide ancillary evidence for the involvement of Uxbenká as part of a regional trade network

Introduction

The Classic Period (AD 300 – 900) of Maya civilization is believed to have been dominated by large urban centers like Tikal, Copan, and Calakmul that played a wide-spread role in political and trade networks (Demarest 2004). Although Maya scholarship has traditionally focused on large political centers, recent research has begun to recognize the importance of the role smaller, less prominent polities played in political and trade relations (Demarest 2004, Braswell et al. 2005, Braswell and Prufer 2009). The last decade has also seen a rise in research that identifies the importance of migration in shaping the growth of urban areas (e.g. Whittington and Read 1997, Price et al. 2008, among others). It is becoming clearer that the nature of contact between polities was highly variable and complex, and may have been the result of numerous factors such as warfare, trade, or political alliances (Demarest 2004).

Isotope studies are important for identifying individuals and their roles in past settlements. To date, in the Maya area, most of these studies have been undertaken on the largest sites, like Tikal (Wright 2005), Copan (Price et al. 2010), Kaminaljuyu (Wright et al. 2010), and Altun Ha (White et al. 2001). Although there is no question that the use of large sites is important, especially for testing movement of epigraphically-documented individuals, the emphasis on these major centers may overshadow the role smaller sites played in inter-regional movements and trade, and may lead to erroneous interpretations of migration due to lack of data for understudied regions.

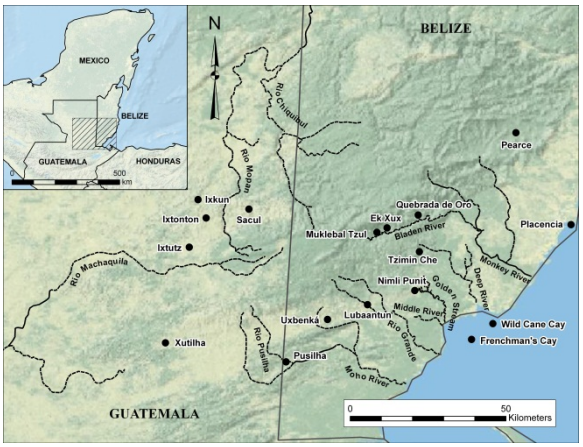

Figure 1. Map of significant sites and rivers in the southern Belize and Eastern Guatemala region. (Map by Claire Ebert and courtesy of the Uxbenká Archaeological Project).

Southern Belize is often considered geographically and culturally peripheral to the action of Maya prehistory (Figure 1). Southern Belize is a region geographically bounded by the Maya Mountains, the Caribbean Sea to the east, and swampy marshlands. Coastal sites have been identified on cays and coastal estuaries. More inland sites are located either within the foothills of the Maya Mountains, or along branches of Bladen Branch, deep within the

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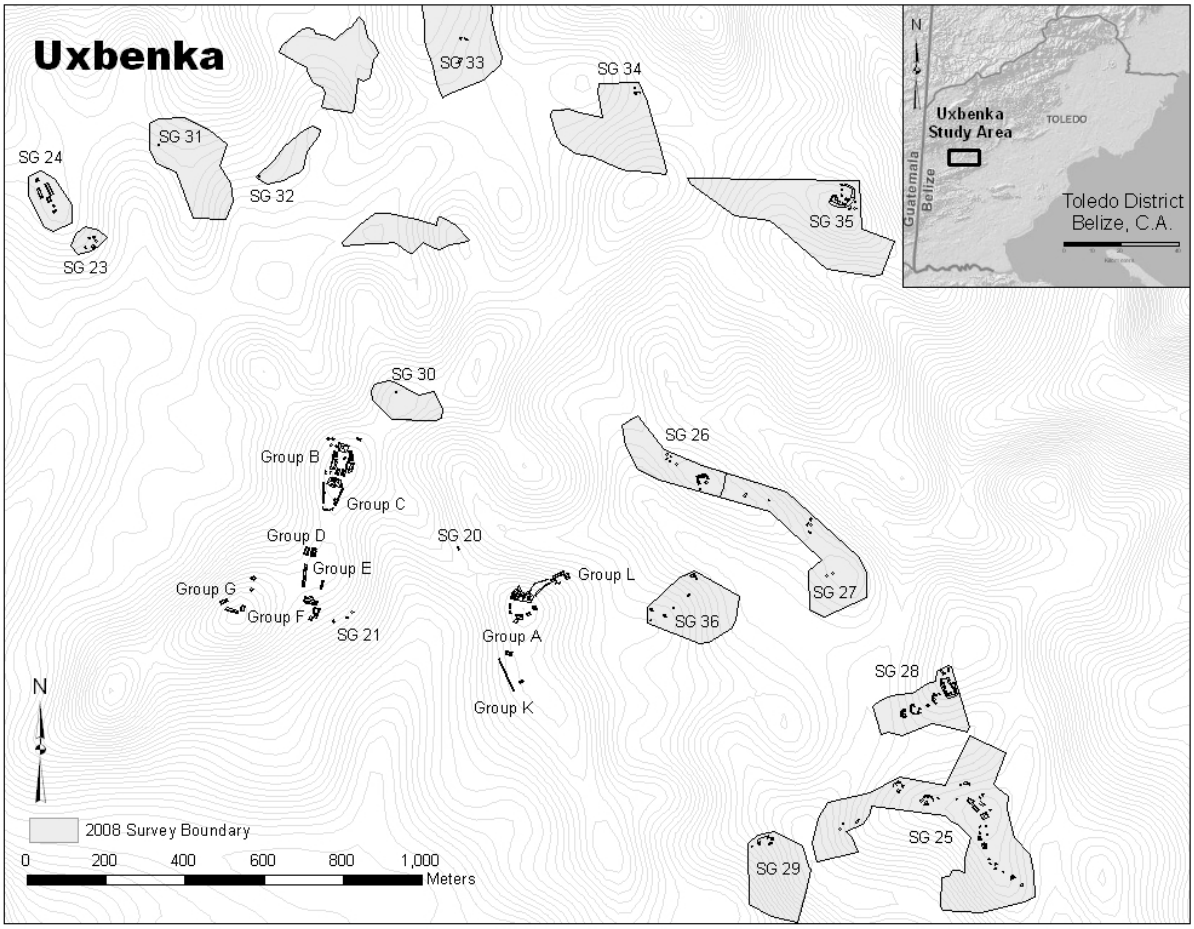

Figure 2. Uxbenká site map detailing locations of site core and settlement groups. (Map by Claire Ebert and courtesy of Uxbenká Archaeological Project).

southern Maya Mountains. A low point in the western Maya Mountains is believed to have formed a geographic economic and communication corridor connecting the eastern coast to large inland political and urban centers (Prufer et al. 2011). Archaeological and iconographic evidence has led researchers to suggest that during the Classic Period this corridor was an important exchange route between the Caribbean Sea and polities located in the Guatemalan Highland and Central Lowland regions (Prufer et al. 2011, Braswell and Prufer 2009, Prufer et al. 2006). Other research has instead suggested that interactions were more focused towards relations between inland southern Belize sites and other sites farther inland in Guatemala and Honduras, thus inferring that coastal sites were more marginal operations, inconsequential to Classic period politics (Braswell et al. 2007, McKillop 2009).

Although the southern Belize region is known to have been occupied since archaic times, political organization was not observed until the establishment of Uxbenká in the Terminal Preclassic Period (100-200AD) (Prufer et al. 2011). During the Early Classic Period (200- 600AD) Uxbenká grew in size and complexity, and the surface and associated cave site of Ex Xux, the only other known early site with public architecture, was established in the Maya Mountains (Prufer et al. 2011, Braswell and Prufer 2009, Prufer 2005). There is evidence of established maritime communities along the coast of southern Belize by the Early Classic, with Wild Cane Caye having been settled as a fishing community by 300AD (McKillop 2002, 2009).

Little evidence exists to support extensive interaction between inhabitants within the region and larger inland sites during the Preclassic and Early Classic Periods. Artifacts traditionally believed to be indicators of the Preclassic and Protoclassic time periods elsewhere, such as Sierra-red pottery, mammiform tetrapod pottery and obsidian flake technology (Awe and Healy 1994, Prufer et al. 2006, and others), also occur in comparably dated contexts at sites in southern Belize, however it should be noted that there is evidence that some of these traditions may have persisted slightly later in southern Belize than expected from sites elsewhere (Prufer et al. 2007). Carved monuments documented at one site in southern Belize, Uxbenká, have been interpreted as making specific references to the Early Classic Tikal dynasty, including Chak Tok Ich'aak I, Tikal's 14th ruler (Wanyerka 2009, Stuart 2000), however these interpretations are not without question (Prufer et al. 2011).

The Late Classic in southern Belize, like elsewhere in the Maya realm, was characterized by a marked regional expansion in population, and the establishment of over 10 political centers with monumental architecture and over 100 smaller communities (Prufer et al. 2011, McKillop 2009, Braswell and Prufer 2009). Dates for the establishment of the major, archaeologically and epigraphically known political centers include: Pusilhá around AD 570 (Braswell et al. 2005), Lubaantun by as early as AD 700 (Hammond 1975), and Nim Li Punit by AD 721 (Wanyerka 2005). Uxbenká also underwent a period of growth and massive construction of monumental architecture at the beginning of the Late Classic. The surface site of Muklebal Tzul appeared on the landscape in the Maya Mountains by AD 600, and within a relatively short amount of time, eclipsed its smaller neighbor Ex Xux. During the Late Classic, maritime communities along the coast also grew in size, functioning as trading ports and salt production sites (McKillop 2009). At this time, the only known Postclassic occupations are maritime sites.

Previous archaeological and epigraphic studies have found evidence in support of interactions between southern Belize sites and elsewhere in Maya area during the Late Classic time period. McKillop (2009) suggested the population density increase in southern Belize was a result of an increase in trade between large inland sites and the coast in response to an increasing demand from inland urban centers for biologically and ritually required items like obsidian, salt, stingray spins, and other marine resources. McKillop (2009) further suggests that these coastal artifact assemblages indicate that these trade relationships predominately were most similar to an "alliance" model however there is some evidence that the nature of inter-regional relationships fluctuated between models defined by "isolation" or "control" by large inland polities. Trade models developed utilizing ceramic and obsidian data have identified Late Classic links between sites in southern Belize and Copan and Quirigua (Braswell et al. 2005; Grube et al. 1999; Marcus 1992), Tikal (Leventhal 1992; Prufer 2005; Wanyerka 2005), the western Petén region (Braswell and Prufer 2009, Bill and Braswell 2005), the southeastern Petén (Prufer 2005), the Pasión region (Bill and Braswell 2005, McKillop 2002), the highlands (Nazaroff et al. 2010, McKillop 2002), and the Belize Valley (Braswell et al. 2005; Prufer 2002). Although southern Belize appears to be culturally and spatially on the periphery of the large cultural and urban centers of the Central Lowlands, having developed its own "southern Belize style" (Leventhal 1992), it is still unclear if this style developed because of isolation, or rather as a form of identity separate from, but connected to, powerful polities located inland (Prufer et al. 2011).

Taking into consideration the complex political history of southern Belize and Uxbenká, this paper seeks to examine the question of migration and subsistence at the site of Uxbenká through the use of stable isotopes. Generally speaking, the isotopes discussed in the present work are incorporated into the body primarily through ingestion of food or water, at which point they are used in the formation of, for archaeological purposes, bones and teeth (Bentley 2006). These isotopes are incorporated into the hydroxyapatite of bone and tooth enamel. Bone is continually remodeled throughout the lifetime of an individual. Teeth are not subject to continual remodeling and so their isotopic ratios remain constant from the time of formation (Bentley 2006).

Strontium and oxygen isotopes have proved to be a very powerful and useful indicator for movements of ancient people, as well as identifying patterns in mortuary treatment for individuals based on birth place. Strontium isotopes measure the ratio of Strontium 87 to Strontium 86, and are tied to local geology (Bentley 2006). They have been shown to be very useful as a geologic tracer to estimate the location of an individual's childhood (Price et al. 2002). Oxygen isotopes measure the ratio of the isotopes of Oxygen 18 to Oxygen 16, and are utilized as a measure of an individual's drinking water location as a function of altitude and temperature driven meteoric rain-out (Lachniet and Patterson 2009). Essentially, the farther inland and the higher the elevation, the lower the oxygen isotope ratio will be. The isotopic strontium and oxygen ratios of teeth represent the ratios of the region in which the individual was born and raised. Thus when used together they are useful for establishing the geographical location of an individual during childhood.

At the most basic level, the stable isotopes of carbon can assist with determining types of plants that follow the C3, CAM, and C4 photosynthetic pathway in an individuals' diet. Maize is the only C4 plant in Mesoamerica, so looking at the ratio of Carbon 13 to Carbon 12 can assist us in knowing how prominent the reliance of maize was in the diet.

Materials and Methods

Strontium, oxygen, and carbon isotope ratios from twenty-seven individuals (25 adults and two children) from various contexts were measured at Uxbenká (see Figure 2 for a map detailing locations of groups discussed in the present work). Six individuals were recovered from well-provenienced internments in the site core and settlement groups. The remaining 21 individuals were recovered from five different looted contexts in settlement groups. Because this study is utilizing individuals from both looted and non-looted contexts, MNI were established based on the most prevalent dental element. Enamel samples were taken for analysis from the maxillary first premolar for adults and the mandibular second deciduous molar for juveniles.

The recent looting of structures is a major issue at Uxbenká. When we find these contexts during settlement survey, a systematic and thorough salvage recovery is undertaken to collect the remains. We recover any *in situ* skeletal material and artifacts and record architectural information that can be confidently related to the structure or burial. The MNI for burials from looted contexts ranged from one to seven individuals based on dental remains. Of the five looted structures, portions of two intact burials were recovered. Future work plans include attempting to directly date the remains to aid in establishing chronology of interrment. In spite of the lack of pristine mortuary contexts and temporal data, these individuals are useful in elucidating overall geochemical patterns in the population.

One individual was recovered from within the Uxbenká site core. This individual was recovered from within the fill of a Late Classic construction phase in an ancillary structure in the Group D complex.

The remaining individuals included in this study come from settlement group excavations or salvage recoveries of looted residential structures. Five adults were recovered from four separate interments during excavation of settlement groups near the site core. One individual was recovered from a tomb in Group I, an elite residential compound. This tomb contained jade and shell beads, jade ear spools, as well as six ceramic vessels, of Early Classic date. Burials recovered from Settlement Group 21 date to both the Preclassic (AD 179 - 334), as well as the Late Classic (AD 680-722). A single interment containing two individuals was recovered from Settlement Group 23 that also yielded a Late Classic date of 660-768. All three of these interments consisted of simple, shallow, stone lined cysts cut into mudstone bedrock, with grave goods primarily consisting of one or two eroded slipped vessels.

Salvage efforts recovered at least twenty-one individuals from five different structures at three settlement groups, Settlement Group 25, Settlement Group 35 and Settlement Group 36. Interments ranged from very simple, shallow cysts cut directly into bedrock, to what appears to have been elaborate, well-constructed tombs built within a structure, and representing

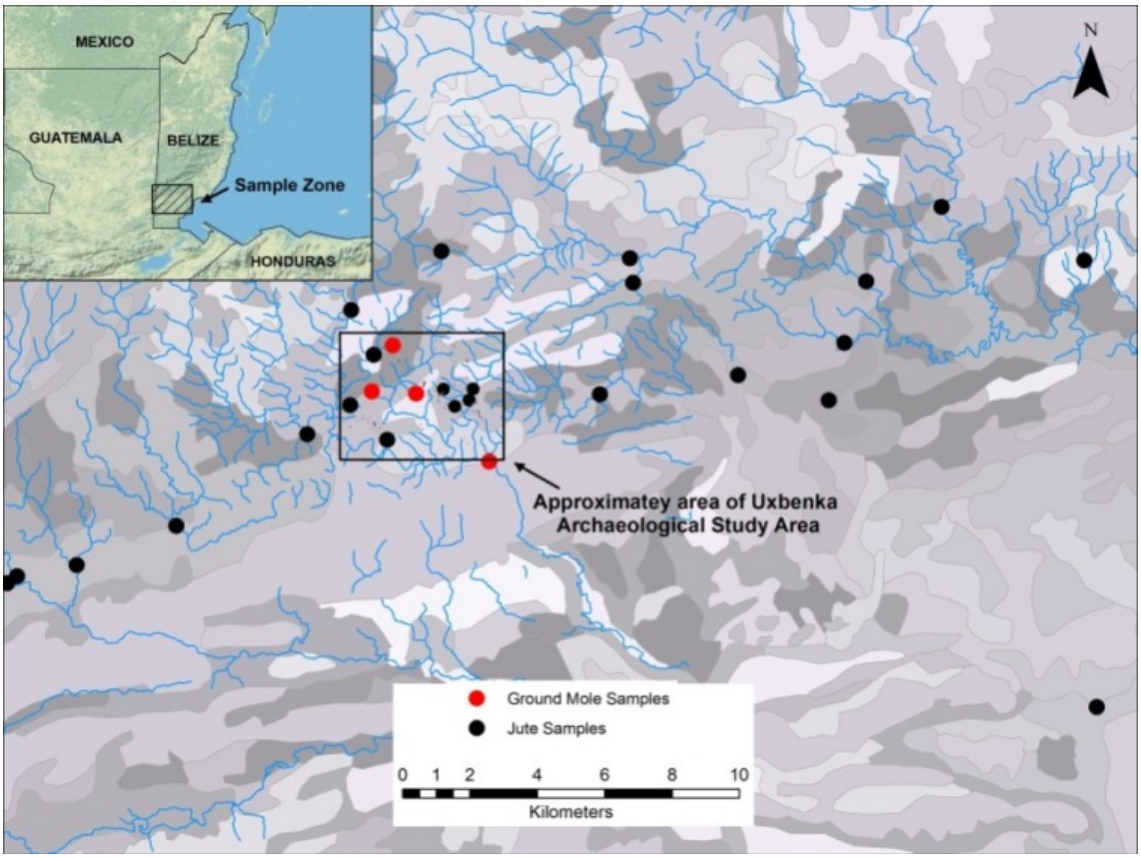

Figure 3. Distribution of faunal samples collected local to the Uxbenká area. (Map by Claire Ebert).

massive construction effort. Undisturbed portions of two burials were encountered. Although it is assumed that any artifact of market "value" was removed, what was left behind by looters can still inform us about past lives and social status. Artifact assemblages recovered are variable, and include various unpainted ceramic sherds, polychrome sherds, fragments of jade, shell pendants, in addition to several intact, undisturbed ceramic vessels. Although dental modification has been noted in many individuals at Uxbenká, at least one individual recovered had inlayed central incisors. Although beyond the scope of the present paper, evidence of variable skeletal and dental pathology was noted.

The primary author collected faunal remains to establish background values in order to determine the locally expected $^{87}Sr/^{86}Sr$ range (Figure 3). I obtained 10 pocket gophers (*Orthogeomys hispidus)* from farmers in and around Uxbenká, in addition to gathering jute snails (*Pachychilus)* from streams throughout the region. I am still in the process of running the faunal samples, and will only report data from fauna local to Uxbenká in the present work.

Samples were prepared for strontium and oxygen isotopes based on standard protocol. Strontium isotopes were processed at the Williams Radiogenic Isotope Geosciences Laboratory at Texas A&M University. The oxygen and carbon isotopes were analyzed at the Texas A&M Stable Isotopes Geosciences Facility.

Results

When undertaking strontium isotope studies, it is important to obtain an understanding of the local variability of biologically available strontium. The results from the faunal and human strontium isotopes are presented in Figure 4. Four faunal samples collected from the Uxbenká area had a mean of

0.70725 with a standard deviation of 0.00028. It should be noted that this mean is in part affected by a somewhat lower value of 0.7068 obtained from one gopher. Hodell et al. (2004) reported a value of 0.7076 from a water sample taken near Uxbenká, Thornton (2008) reports a mean of 0.7075 from zooarchaeological samples from nearby Lubaantun, and Freiwald (2011) obtained a value of 0.7074 from nearby Blue Creek. The variability observed here underscores the importance of obtaining numerous faunal samples to establish a more accurate idea the range of biologically available strontium within a given area.

The human samples from Uxbenká have a mean $^{87}Sr/^{86}Sr$ ratio of 0.70795 and a standard deviation of 0.00046 (Figure 5). Excluding the obvious outlier, the mean rises to 0.70803 with a much tighter standard deviation of 0.00018. The trimmed human mean is higher than any faunal value obtained from the area. Although the possibility does exist that no individual in this study did in fact live at Uxbenká during their childhood, other, more plausible explanations include the presence of marine foods or salt in the diet (Wright 2005, Killgrove 2010). Sea water has an $^{87}Sr/^{86}Sr$ of 0.7092, and thus the intake of marine strontium may have raised the values for humans at the site. Heather McKillop has found numerous salt production sites along the coast directly to the east Uxbenká, and would have provided a likely source for imported marine foods (McKillop 2005). Additionally, Uxbenká sits on the foothills of the Maya Mountains, where the older, granitic bedrock produces a significantly higher strontium value than seen locally. Game meats or other foods from the Maya Mountains included in human diet might have raised the strontium ratio.

The faunal and human strontium samples can be compared to known ranges obtained from bedrock, plants, water, and soil samples from throughout Mesoamerica. The values are consistent with those expected for the area, and fit within Hodell's Southern Lowland cluster of 0.7071- 0.7082 (Hodell et al. 2004). One individual from a settlement group does not fit in this range, which will be addressed later. Using Price's ± 2 standard deviation criterion, the trimmed human mean provides a local strontium

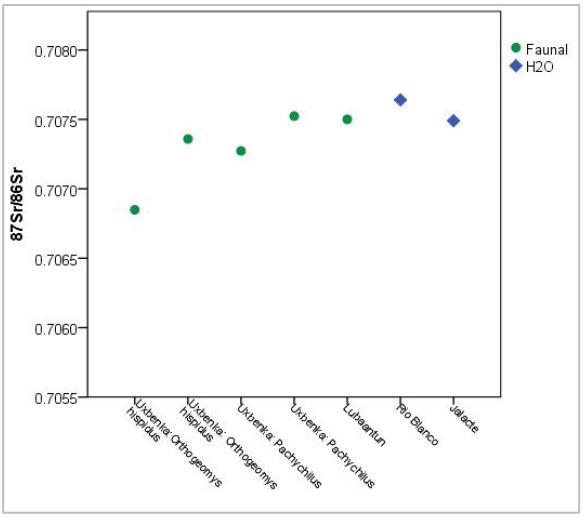

Figure 4. Strontium isotope values obtained from fauna and water sources local to Uxbenká. Data from Thornton 2008, Hodell et al. 2004, and the present work.

range of 0.70803 ± 0.00036 or 0.70767 to 0.70839.

The graph presented in Figure 6 shows the strontium data grouped by recovery location to observe house group patterning. The burials appear to group well by location. Although little variability is seen overall, consistency in strontium values by settlement group would be expected if family units relied on food from the same source locations. Settlement groups at Uxbenká were positioned on hilltops, with farms and gardens located on the immediately surrounding hillsides. Small variations in local geology would thus be reflected through variation in family farmed food stuffs. To date, all burials and tombs observed or investigated by project members have been oriented north-south, with one exception. Settlement Group 36 is a looted Late Classic tomb oriented east-west. Tomb orientation does not appear to influence isotope values.

Strontium ratios are plotted against oxygen isotope values to elucidate any possible status differentiation (Figure 7). Status was determined for each group using Webster's settlement typology (Webster 1999). The data indicate there is a possible distinction between those individuals from elite and non-elite groups. The strontium and oxygen isotopes for non-elite individuals appear to cluster, while those individuals from elite groups appear to be

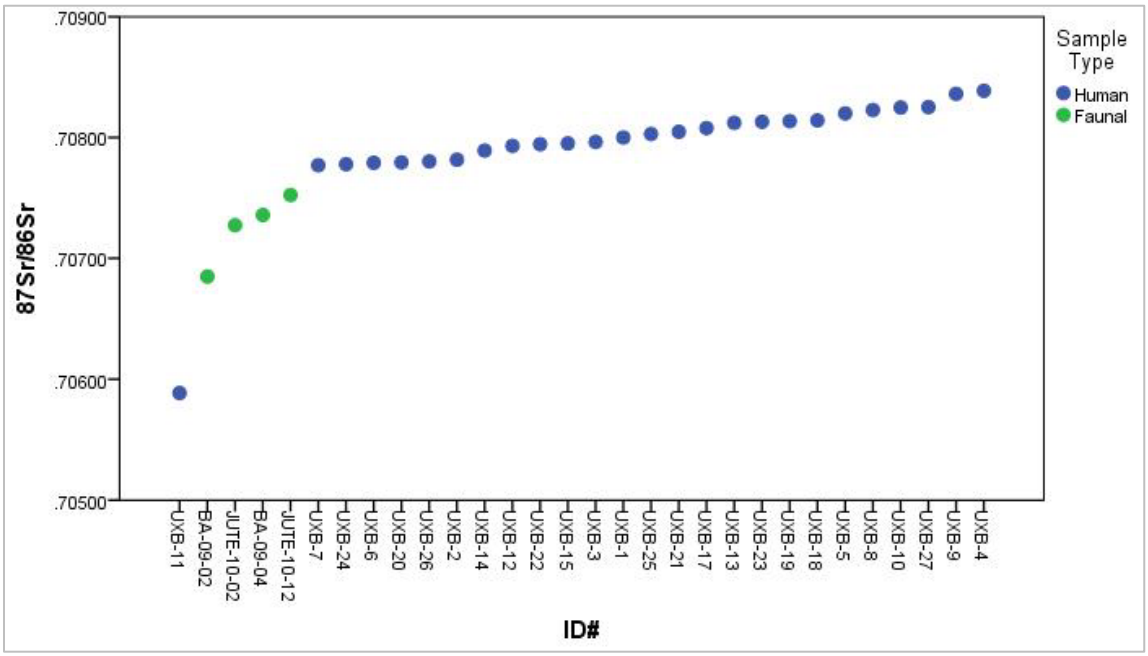

Figure 5. Strontium isotope values for local fauna and human individuals.

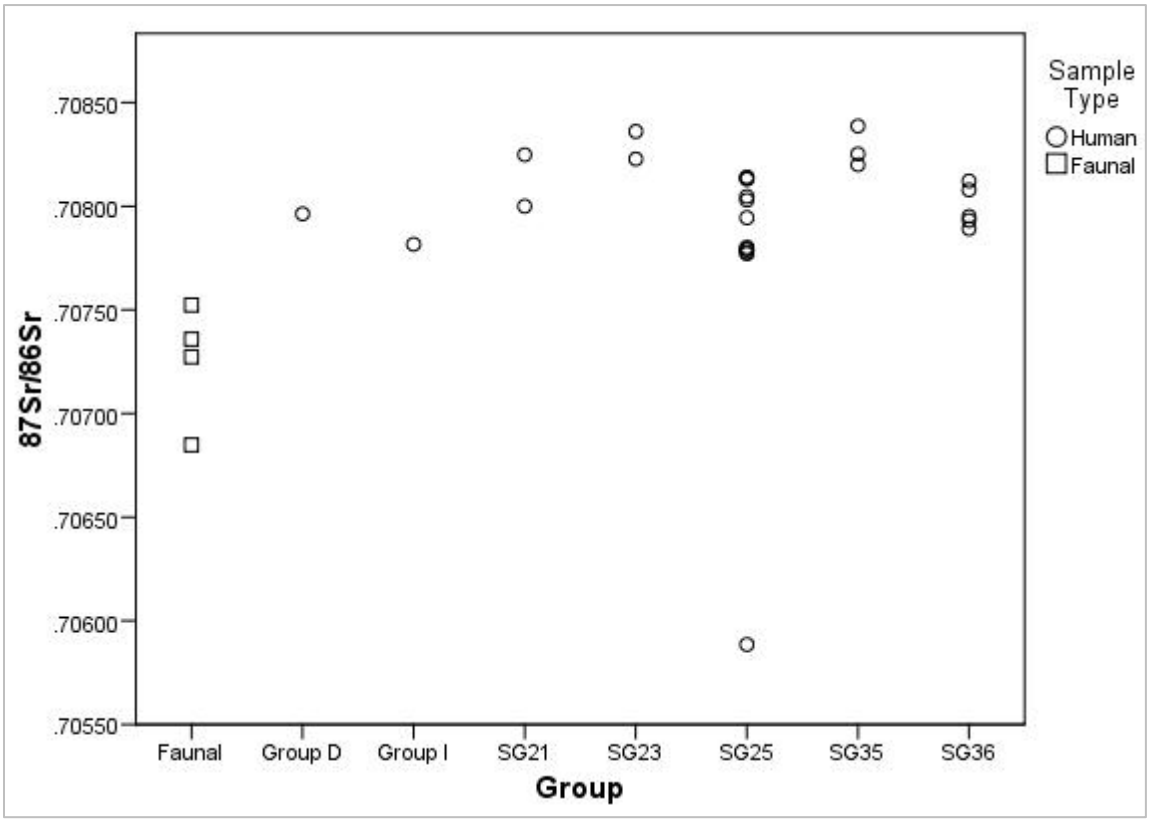

Figure 6. Distribution of strontium values by settlement group.

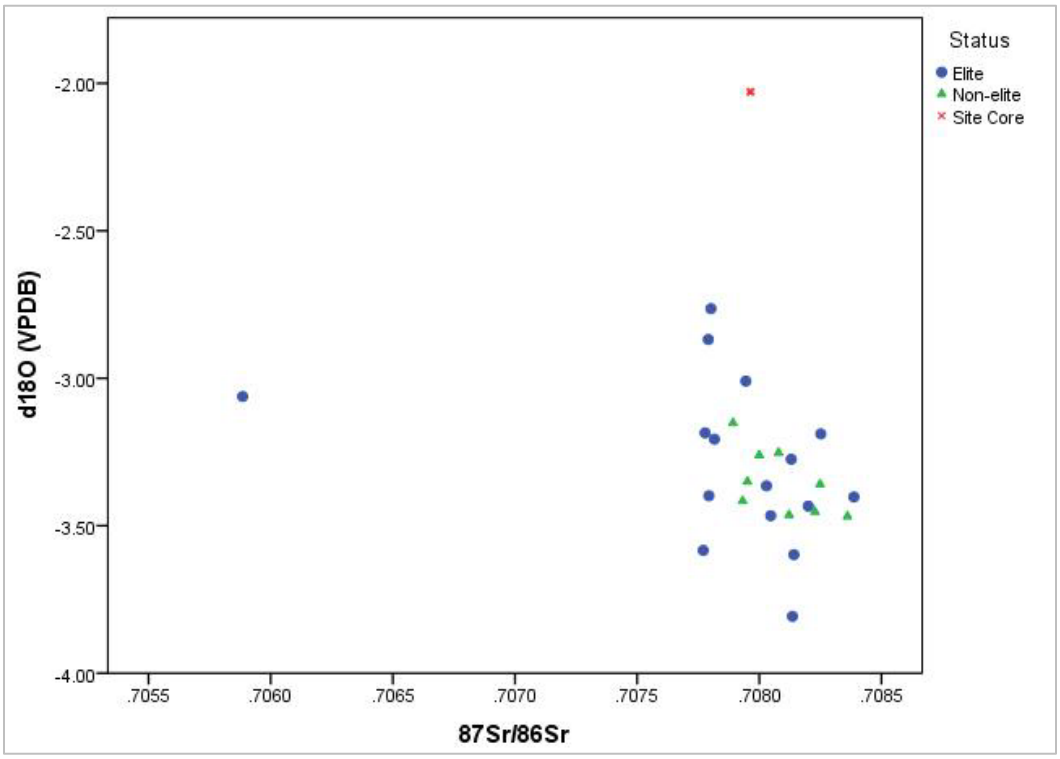

Figure 7. Distribution of strontium and oxygen isotope values separated by inferred social status.

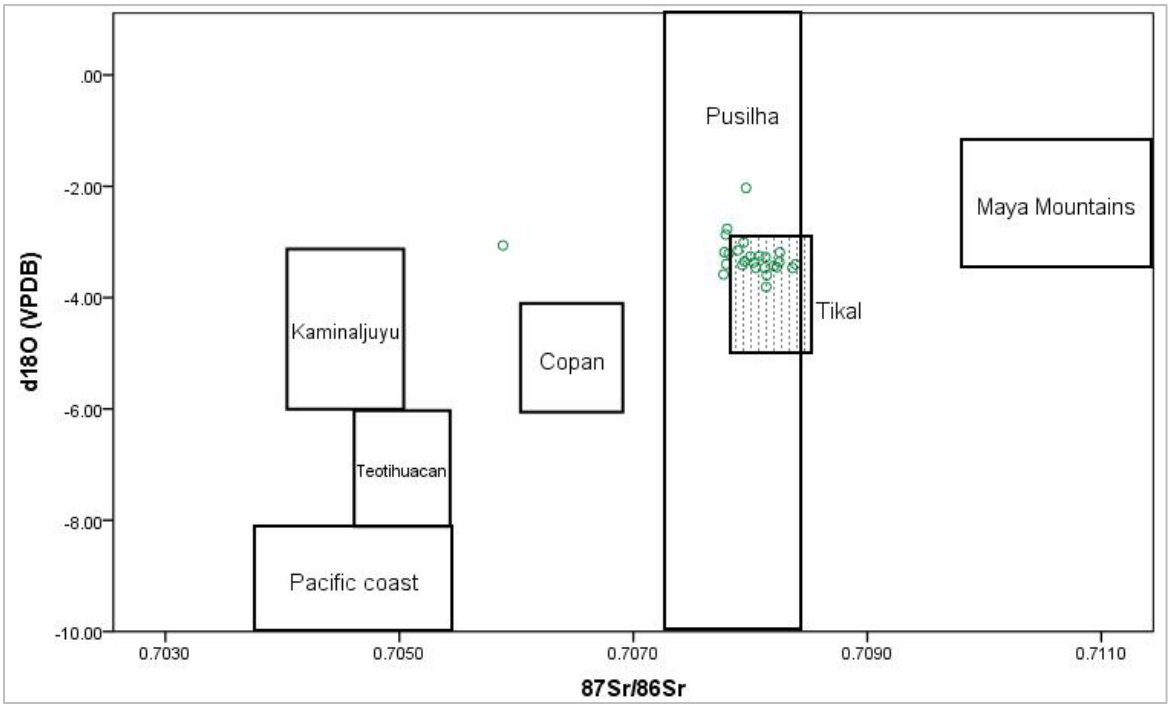

Figure 8. Geographic variation in strontium and oxygen isotope values for the Maya region. Uxbenká individuals are indicated by circles.

distributed over a wider range. This difference is not statistically significant for either value ($^{87}Sr/^{86}Sr$: t=-1.140, df=23, p=0.266, $\delta^{18}O$: t = 0.789, df = 24, p = 0.438). Of note, the individual recovered from the site core has a local strontium value. The elevated oxygen value for this individual may be the result of a different drinking water source than others at the site, possibly one closer to the coast than Uxbenká, or alternately the result of nursing. Freiwald (2011) recently found that a significant number of individuals studied in the Belize Valley relocated at least once in the area during life. However more work needs to be done to understand Southern Belize regional oxygen isotope variability before something similar can be said here.

Geographic origin is best understood by placing isotope data into broader comparative context (Figure 8). The Uxbenká data are extremely close those reported from the Petén. There is considerable overlap between the local strontium and oxygen range for Tikal defined by Wright (2005) and the Uxbenká range. However, an independent sample T-test indicates that although close, Uxbenká and Tikal represent two statistically distinct isotope populations (t= 2.790, p=0.0067). Nonetheless, this highlights that care should be employed when identifying childhood locations of isolated individuals.

The strontium values from Uxbenká are also virtually indistinguishable from the local human values obtained by Somerville (2010) from Pusilhá, which average 0.7079 (Uxbenká averages 0.7080). Somerville did not measure oxygen isotopes or collect any background faunal data so deviations from local geology are unknown. However, it appears that strontium and oxygen isotopes alone are not an effective tool to define intra-regional population movements within southern Belize, and for distinguishing southern Belize from other portions of the southern Lowlands.

In regards to the dietary isotope of carbon, there appears to be some clustering when the samples are separated by general time period (Figure 9). Generally speaking, higher $\delta^{13}C$ values indicate a greater consumption of maize, and lower $\delta^{13}C$ values indicate a lesser maize consumption. The carbon isotopes for individuals from Preclassic and Early Classic contexts show significantly less variation than those individuals from Late Classic contexts.

Recently, a 2000 year rainfall record has been established for the southern Belize area utilizing a speleothem from a cave near Uxbenká. The Early Classic period was characterized by moist conditions. A general decrease in precipitation is seen around 600AD, and culminates in a significant drought by the terminal classic. Changes in rainfall may have affected subsistence practices at Uxbenká in the Late Classic, and resulted in a much more varied amount of maize in the diet. No patterning was noted based on inferred social status, indicating that diet was not strictly defined by social class. Interestingly, oxygen isotopes also appear to be less variable in the Early Classic than the Late Classic, suggesting greater variability in drinking water sources in the Late Classic period.

One individual had a distinctive strontium value that identified it as non-local to the Uxbenká region. Unfortunately, preservation and looting activities obscure the ability to critically access the burial. UXB-11 was recovered from a looted residential structure at Settlement Group 25, the largest settlement group at Uxbenká. The structure itself was mostly unremarkable, and although capstones were removed by the looters, little evidence of a well-constructed tomb could be seen. The cranium, mandible and upper torso were accompanied by three intact red or black slipped vessels, not removed by the looters. We do not know what they did take.

UXB-11 most closely fits within the Motagua Valley subset of Hodell's Metamorphic Province cluster (Hodell et al. 2004). The Motagua Valley has a geologic mean of 0.70598 while UXB-11 has an $^{87}Sr/^{86}Sr$ value of 0.70589. This close numerical association should be taken with caution, due to both the scarcity and diversity of values reported from this geologically diverse region. Although low, the value is a little higher than expected for the Valley of Mexico or pacific coast. Furthermore, the oxygen isotope value of -3.06 is higher than the expected Copan range of -4.5 to -6.5 (Price et al. 2007), and is clearly not a highland value. As the tooth sampled was a maxillary third

premolar, it is possible that nursing may have elevated the oxygen isotope value. However, a post weaning value for this individual would be no lower than -3.7, still higher than the mean at Copan.

The $\delta^{13}C_{apatite}$ value for UXB-11 also sets it considerably apart from the remainder of the Uxbenká population (Figure 10). This low $\delta^{13}C_{apatite}$ value indicates a diet very low in C4 plants during the age of 1.5 to 5.5 years. We are still waiting on a radiocarbon date for this burial, however the ceramics removed from the tomb are consistent with other ceramics from dated Late Classic occupations of the site.

Other sites in the southern lowlands and highlands have also identified non-local burials through the use of strontium and oxygen isotopes (Figure 11). The non-local individuals from two of these sites, Pusilhá and Kaminaljuyu are shown here. It is interesting that several of the individuals from Kaminaljuyu, likely victims of sacrifice, cluster closely to UXB-11 in terms of oxygen and strontium values. Furthermore, a non-local strontium value from a Pusilhá companion burial also clusters closely to the Uxbenká foreigner. It is possible that these individuals are from a similar, unknown location in the southern Maya area.

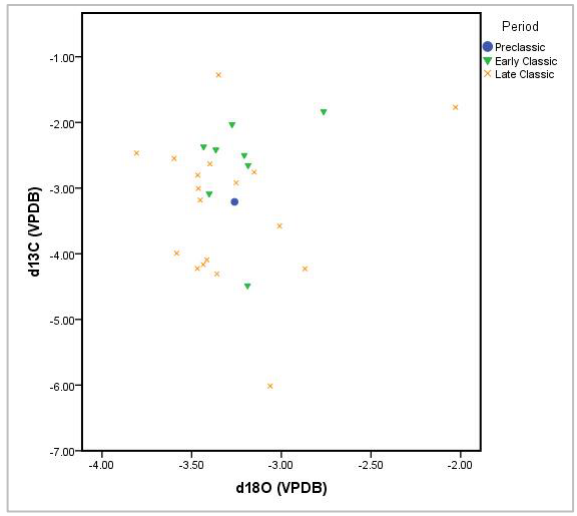

Figure 9. Distribution of stable carbon and oxygen isotopes, separated by time period.

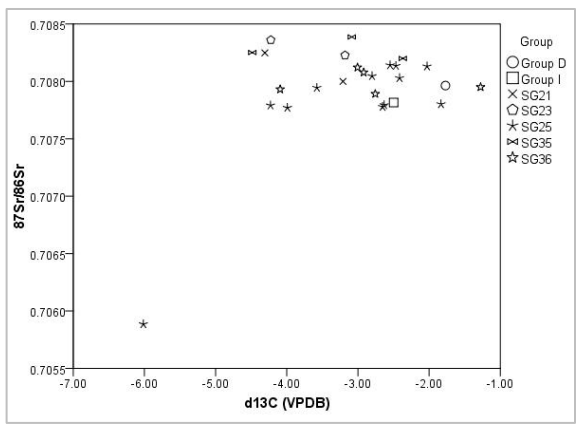

Figure 10. Distribution of stable carbon and strontium isotope values, separated by settlement group. UXB-11 is located in the bottom left corner of the graph.

Discussion

Iconographic evidence at Uxbenká and elsewhere in the region describe possible ties to major urban centers. It has been theorized that these outside forces exerted pressure on Uxbenká as a means to control trade and the fertile agricultural lands, or that population expansion and large reconstruction events were prompted by external factors, rather than endogenous growth.

The isotopic data indicate that most individuals at Uxbenká, including those recovered from the site core, appear to have homogeneous oxygen and strontium isotopic values, indicating that they probably derived from a single homeland (either Uxbenká or a nearby polity). It is however possible that some individuals originated in an isotopically similar geographic region, such as Tikal, or adjacent areas of southern Belize. Although it is possible that the Uxbenká's large scale construction projects were prompted by an intrusive, foreign influence, the isotope data provides little support for massive immigration. The likelihood that elevated strontium values (as compared to local fauna) are due to the intake of marine resources strengthens models linking Uxbenká to maritime trade ports.

Archaeological investigations at Uxbenká have resulted in no material evidence of any authorization by larger, inland political centers. Prufer and others (2011) have argued that the reconstruction activity and changes in elite ritual behavior was a strategy used by the emerging

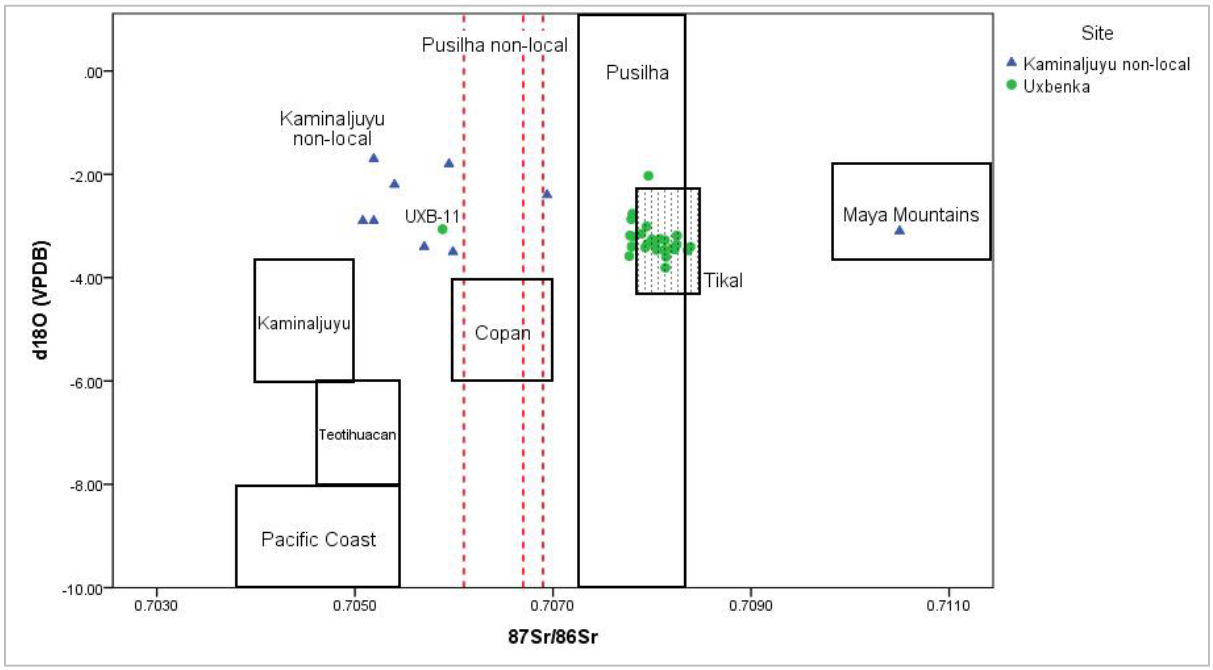

Figure 11. Distribution of stable oxygen and strontium isotope values across the Maya region. Oxygen isotope values are not available for Pusilhá, thus Pusilhá ranges are only representative of published Strontium ratios. Dotted lines indicate the $^{87}Sr/^{86}Sr$ values for Pusilhá non-local individuals.

Uxbenká elites to assert dominance locally, rather than evidence of external political forces. Overall artifact assemblages, continuity of occupation, and recent finds at the foundational shrine Kayuko Naj Tunich by Dr. Holley Moyes (Prufer at el. 2011), suggest that local identity at Uxbenká actually emulated that of larger polities outside the region.

At least one foreign individual has been identified at Uxbenká. Presently, the best fit for the origin of UXB-11 is within the highly variable metamorphic province, possibly somewhere within the Motagua Valley. The presence of other individuals with similar non-local values at other southern lowland and highland sites is very interesting. It is possible that these individuals may have shared a common homeland. If this is the case, it does appear that the Uxbenká individual may have met a better fate than, for instance, those sacrificed at Kaminaljuyu.

In establishing a local isotopic range for Uxbenká we found that Strontium values for human material are slightly higher than both local water values and faunal values. This underscores the importance of obtaining multiple lines of evidence when interpreting strontium isotope data. We plan to describe the range of faunal variability in the region more systematically by analyzing a larger set of local and regional fauna. Most critically, this study showed that local fauna do not always clearly match the human mean, perhaps due to minor local geologic differences, difference in diets, or perhaps imported foods or condiments, such as salt or lime. Preliminary dietary isotopes show possible temporal differences. It is hoped that the forthcoming addition of nitrogen and collagen carbon isotopes will help to better elucidate temporal changes in dietary practices at Uxbenká, including the involvement of marine resources in the diet.

Finally, caution should be used when identifying specific homelands using oxygen and strontium results, as geographically distinct locations may produce extremely similar strontium and oxygen values. Many larger urban centers are often seen as the most likely candidates as homelands for non-local values. The data presented here suggest that other, smaller polities may be potential homelands that

are overlooked, simply because no one has collected data from these areas.

Acknowledgements The present work could not have been completed without the assistance of numerous individuals and groups. First and foremost, authors would like to thank all the members of the Uxbenká Archaeological Project, both past and present. Faunal collection in Belize was undertaken with the assistance of several individuals, most importantly Hilario Canti of Santa Cruz Village and Clayton Meredith of the Uxbenká Archaeological Project. Very special thanks are extended to the men and women of Santa Cruz Village, Toledo District, Belize, and the Uxbenká K'in Ajaw Association.

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XX THE ARCHAEOLOGICAL AND EPIGRAPHIC SIGNIFICANCE OF CUYCHEN, MACAL VALLEY, BELIZE

Christophe Helmke, Jaime J. Awe, Shawn G. Morton and Gyles Iannone

Discovered in the summer of 2010, the small cave of Cuychen, located in the Macal Valley of western Belize, was found to be an unlooted cave that contained a well-preserved ceramic assemblage. Included in this assemblage is an exceptional Zacatel Cream-polychrome vase that was produced in northeastern Peten. Here we present a summary of our archaeological investigations at the site and the epigraphic analyses of the glyphic text that adorn the vase. The cave witnessed multiple phases of usage spanning from the Early to the Late Classic (c. AD 450-830) and we reconstruct and contextualize the utilization of the site. The epigraphic and paleographic analyses have allowed us to determine the origin of the vase and to approximate its date of manufacture (c. AD 791-820). The discovery of this unique vase has several ramifications for understanding the socio-political relationships maintained between Classic Maya polities over a broad expanse of the eastern central Maya Lowlands.

Introduction

The foothills of the Maya Mountains form a landscape rich in caves that were intensively utilized by the ancient Maya. The favorable preservation afforded by the shelter and stable micro-climate of caves – a quality that has increasingly attracted the attention of archaeologists – has unfortunately also marked these sites as profitable targets for looters. Thus, when the opportunity presents itself to investigate a recently discovered cave, archaeologists have to act fast to foil prospective plunderers. Precisely such an opportunity arose in July of 2010 when an unlooted cave was discovered in the Macal River Valley of western Belize.

Remarkably, this small cave had escaped the attention of looters due to its remote location and very difficult access. The cave, perched high in a cliff face overlooking the Macal River Valley, contained a well-preserved assemblage of ceramics and a stunning and otherwise unique polychrome vase. Here we present the results of the work we conducted at this site, which we named Cuychen /*kuy-ch'een*/ 'owl-cave', and a provide summary of the epigraphic analyses of the polychrome vase found within. In so doing we elaborate on the provenience of the Cuychen vase and attempt to reconstruct the ritual events that the ancient Maya celebrated within this site.

Site Setting & Description

Cuychen is located near the middle of the Macal Valley of west-central Belize (Figure 1). The small cave is set within the limestone cliffs that border the western bank of the Macal River and overlooks what is today the Vaca Falls hydroelectric dam. The site is ringed by a series of caves that have already been the subject of intensive archaeological investigations undertaken by Peter Schmidt, David Pendergast, and more recently by members of the Western Belize Regional Cave Project (WBRCP), under the direction of Jaime Awe. Some of these sites include Uchentzub, Actun Chechem Ha, Rio Frio Cave E, Stela Cave, Actun Chapat, and Actun Halal. Nearby surface sites include Minanha, Las Ruinas de Arenal, and the as yet little investigated site of Guacamayo. Although we cannot conclusively demonstrate this at present, we surmise that the ancient users of Cuychen may have stemmed from Minanha, since the cave is located within northeastern territorial limits of this small polity (Iannone 2006a; Helmke & Awe 2008: 78). From a larger vantage, Cuychen can be described as located nearly equidistant from the major centers of Naranjo and Caracol, and as such the cave is located less than a day's walk from either of these sites.

The karstic topography bordering the Macal River is in many parts characterized by a series of prominent cliffs. Formed through the seepage of groundwater, many caves are found in this area, especially along these exposed cliff faces. Cuychen follows the same pattern and it is clear that it was formed by slow-flowing water, seeping through a horizontal cleavage plane between two horizontal strata of limestone conglomerate.

Cuychen is found near the summit of a prominent hill. The eastern face of this peak

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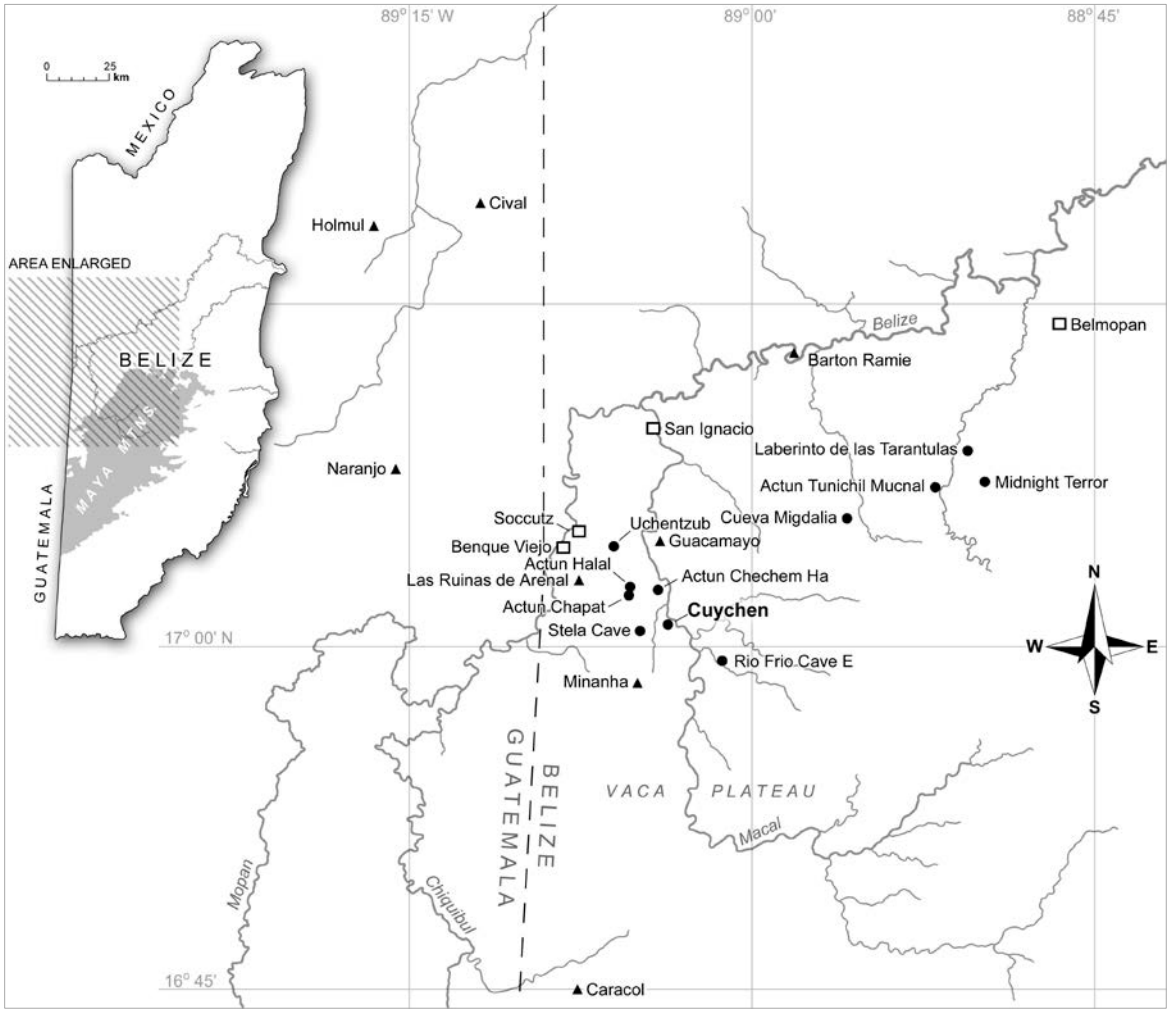

Figure 1. Map showing the location of archaeological sites mentioned in the text. Solid circles indicate the location of caves, whereas triangles mark surface sites. Open squares refer to modern settlements. In this projection each 15' latitude corresponds to c. 27.8 km (unless otherwise specified all drawings and figures are by Christophe Helmke).

exhibits a series of sheer cliffs, each interrupted by horizontal shelves, giving the cliff face a stepped appearance. The uppermost rock face is no more than 5 m high and gives way at its base to a sloping shelf before dropping off some 30 m to an additional shelf. Cuychen perforates the central face of this cliff. The base of the lowest shelf aligns more or less to the top of the sub-tropical canopy. The third and lowest cliff is estimated to be c. 22 m high, based on the average height of canopy in the area. From there the over 120-m high talus slopes evenly downwards to the course of the river. Access to the site is difficult and requires rappelling 15 m down from the edge of the uppermost cliff. We surmise that access in antiquity was gained by means of a broad wooden latter built up from the shelf immediately below the cave entrance.

Cuychen itself has been subdivided into three main areas (Figure 2). The first is Ledge 1 and constitutes the small and sloping entrance landing, encompassing no more than 5.1 m^2. The largest area of the cave is Ledge 2 and constitutes the cave proper, which is raised at least 1.7 m above the other portions of the site. The mostly flat area of Ledge 2 measures 5.75 m north-south and 4.54 m east-west and encompasses 19.2 m^2 in all, with ceiling height measuring on average 1 m (Figure 3). Along the eastern portion of the cave a series of small shelves step down from Ledge 2, which collectively have been designated as Ledge 3 (c.

0.9 m^2). All in all Cuychen encompasses no more than 26.8 m^2 and is thus one of the smallest caves that we have investigated. Nevertheless, the site's size proved advantageous as it allowed us to map and excavate the site in its entirety, rather than limiting us to a minute sample as is otherwise the norm.

Circumstances of Discovery & Summary of Investigations

The site was first brought to the attention of the authorities by Dennis Martínez, a local milpero. He first entered the cave on the 21st of June, 2010 and inside the unlooted site he found a series of ceramic vessels and sherds of an exquisitely painted polychrome vase. Having collected the two largest pieces of the vase he contacted Gyles Iannone, director of the Social Archaeology Research Program. Realizing the importance of the find, Iannone contacted Jaime Awe, director of the Belizean Institute of Archaeology, and made arrangements for the pottery to be delivered to the authorities. In response to this discovery Awe promptly put together a team headed by freelance mountaineering experts Marcos Cucul and Mario Perez, who, in collaboration with David Larson (of the Xibalba Mapping and Exploration Team), returned to the cave on the 4th of July to recover more pieces of the polychrome vase.

Motivated by the fact that the cave remained unlooted and considering the uniqueness of the vase it was decided that we should assemble another team to return to the cave, to map the site, document the archaeological remains found within, search for additional fragments of the vase, and initiate excavations. At the end of July we had assembled the necessary team, this time composed of Abel García and Esperanza Gaitan (caving experts from Caves Branch Lodge), Catharina Santasilia (field supervisor of the Belize Valley Archaeological Reconnaissance Project), Gonzalo Pleitez (senior guide of River Rat Tours), as well as father-and-son team Bruce and Alex Minkin, in addition to two of the authors. We were able to gain access to the cave and began the mapping of the site as well as the documentation of the 16 whole or reconstructible ceramic vessels found on the

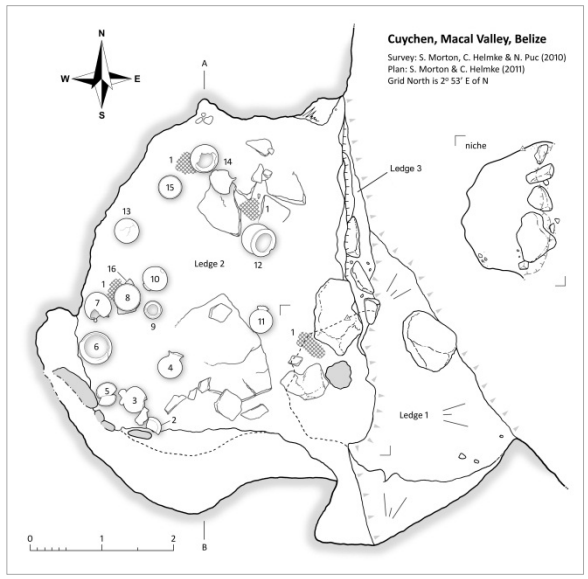

Figure 2. Plan of Cuychen outlining Ledges 1, 2 and 3. Note the niche of Ledge 1 that is shown as an inset. Cross-hatching marks the sherds clusters of the polychrome vase (Vessel 1). All other ceramic vessels (Vessels 2 through 16) are indicated by their numerical designation.

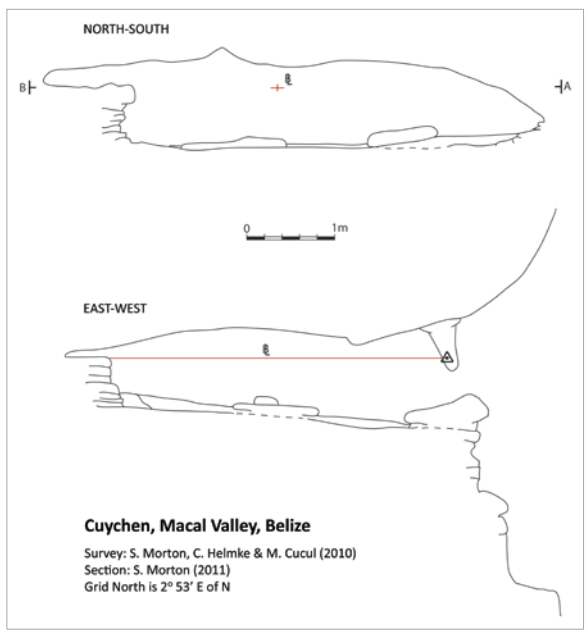

Figure 3. Sections of Cuychen (by Shawn Morton).

surface (Figure 2). We were also able to recover select matrix samples and one additional sherd of the vase.

It was not until the 13th of October – by which time the rainy season had subsided – that we were able to return to the cave with Cucul and Mario Portillo of Belmopan. At this point

we finished the mapping of the site, recorded the cross-sections of the cave and also completed the bulk of the *in situ* documentation and analyses of the ceramic vessels. The following day we returned with Nazario and Marvin Puc, two experienced excavators from Soccutz, to undertake the excavations of the cave. Fourteen excavation units were laid out across Ledge 2, according to a 1 x 1 m grid (Figure 4). All the archaeological materials recovered were brought to San Ignacio for further processing and analyses. By mid-October we had completed the excavations of the cave and the archaeological investigations of the site were deemed completed.

Ceramic Dating

Through stratigraphic data and the dating of ceramic materials, we were able to document that Cuychen witnessed multiple phases of utilization during the Classic period. The ceramics found atop the thin stratum of guano deposited on Ledge 2, can be squarely assigned to the Spanish Lookout ceramic complex (see Gifford 1976: 225-288), which typologically corresponds to the Late Classic. All the artefactual materials recovered as part of the excavations of the underlying matrix predate the deposition of the more complete vessels. This conclusion is confirmed by the analyses of the ceramic sherds recovered from the excavations since these can be identified as belonging to the Hermitage, Tiger Run and Spanish Lookout complexes, corresponding respectively to the Early Classic (Tzakol 3), Middle Classic (or more properly-speaking Tepeu 1) and Late Classic periods (most likely restricted to Tepeu 2). Thus there was an uninterrupted, if periodic, utilization of the cave from the late Early Classic to the latter part of the Late Classic (c. AD 450-830), which fits the most intensive occupation documented for nearby Minanha. Nevertheless, it is possible that the site witnessed some usage during the Terminal Classic although the ceramic evidence remains mute on this point. However, based on archaeological investigations conducted at the sites of Uchentzub, Tipu, and Minanha there is good evidence for continued evidence into the Terminal Classic and later, making later usage of Cuychen a possibility.

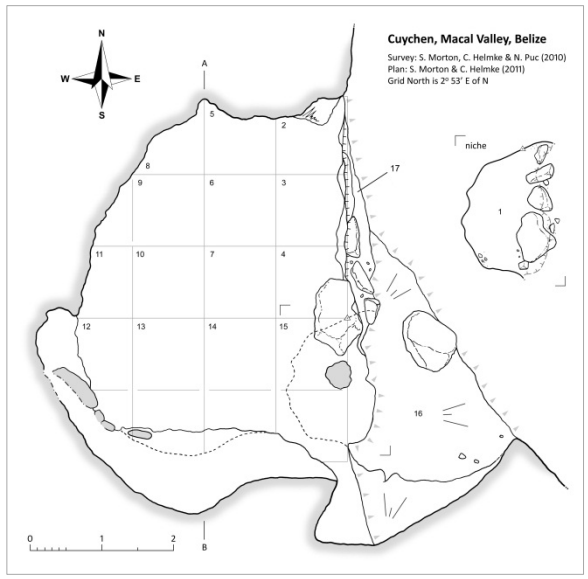

Figure 4. Plan of Cuychen showing layout and distribution of excavation units.

Intensity of Usage

Based on our work at several other caves throughout west-central Belize, we have found that the use of subterranean sites intensifies during the Late to Terminal Classic periods. This conclusion stems from the use of ceramic remains as proxies for human utilization, with increasing incidence of ceramic materials corresponding to proportionate intensity of utilization. Plotting the cumulative relative frequency distribution of ceramic materials according to the phase to which they date, one can obtain a curve that hypothetically mimics the intensity of a sites' utilization. The curve for Cuychen is remarkably similar to that produced for the nearby cave site of Chechem Ha (Figure 5). Furthermore, producing these curves for cave sites in the Roaring Creek and Barton Creek Valleys results in another set of almost identical profiles. Since cave usage was probably motivated in large measure by ritual intentions, the congruous curves for each sub-region provide us with a glimpse as to the relative intensity and history of such utilization in each particular area.

Ceramic Termination

Whereas analyses of activity sets help to explain the functional considerations involved in the votive events themselves (see Helmke 2009), an equally important part of the ceremonial

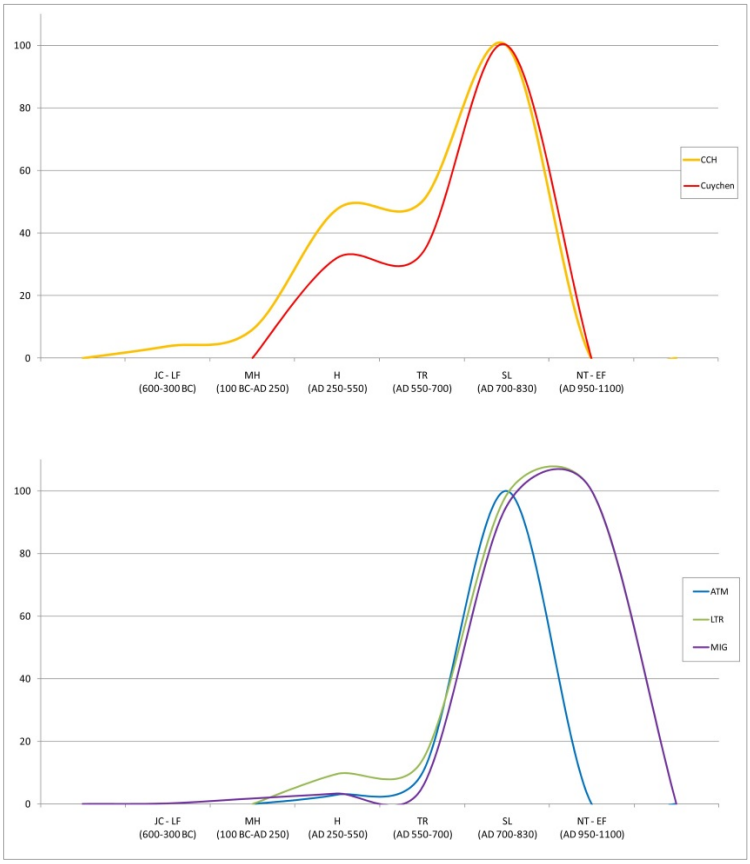

Figure 5. Ceramic assemblages as proxies for the intensity of human utilization of caves. **a)** Temporal curve for ceramic assemblages in the Macal River Valley for Cuychen and Actun Chechem Ha (CCH). **b)** Matching curves for the Upper Barton Creek and Roaring Creek Valleys for Laberinto de las Tarantulas (LTR), Actun Tunichil Mucnal (ATM) and Cueva Migdalia (MIG).

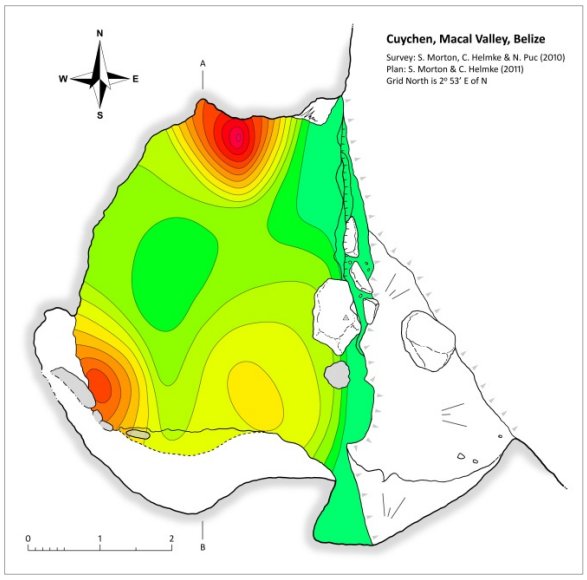

Figure 6. Plan of Cuychen showing the distribution of ceramic specimens by square meter. Each contour line corresponds to an increment of 5 per square meter.

actions that transpired in cave sites involves termination rituals. Although we are aware that the dichotomous model of dedication vs. termination formulated for caches and other offerings is probably an inadequate oversimplification, the concept conveyed by the term "termination" remains viable, with some evident caveats and amendments (e.g. Freidel & Schele 1989). The assemblage at Cuychen, for example, illustrates that the "termination" of objects and "ritual cleansing" of the site takes the form of a suspended ritual event, liking the close of a particular event with the beginning of the subsequent one.

From the onset of our investigations it was clear the vast majority of the ceramic vessels found within Cuychen had been subjected to termination by various means. As is typical of Maya practices most of the vessels exhibit what have been termed "kill holes" a feature also seen in other parts of Mesoamerica and even as far afield as the American Southwest (e.g. Thompson 1959: 125; Reents-Budet 1994: 198). These terminations plainly disassociate the objects from the cultural realm in which they partook as active, although non-sentient members and allow them to rest at their points of deposition as dead and lifeless objects, as Westerners might conceive them.

In the case of Cuychen termination was accomplished by one of several means, entailing either: 1) striking a pointed object to pierce a small hole in the body or base of a vessel, without otherwise affecting the integrity of a vessel; 2) the punching out of the whole base, resulting in a spree of conjoining sherds usually found in the vicinity of a vessels' final point of deposition; or, 3) the wholesale smashing of a vessel, and the eventual scattering of its sherds over larger areas. In the latter case it has also been documented that some sherds were subsequently gathered and re-deposited away from their point of breakage as discrete, grouped clusters, whereas other sherds may have been taken out of the cave, presumably to be deposited in caches at another site away from the cave. Such behavior makes sense in the context of "ritual cleansing", which has already been introduced for similar archaeological materials (MacLeod & Puleston 1978: 72; Brady et al. 2009: 55-56; Wrobel et al. 2010), and is discussed in the contemporary ethnographic context by Evon Vogt (1976: 102) and Linda Brown (2004: 36) at waterholes, caves, and mountain shrines. The same holds true for tomb re-entries as the human remains and associated grave goods of the earlier occupant tend to be removed or pushed to one side to make room for the new interment (see Awe 1985: 40-43; Chase & Chase 1996; Healy et al. 1998).

It is this third type of termination that appears to have affected the polychrome vase (Vessel 1) since its sherds were found as four discrete clusters spread out across Ledge 2. In addition, despite our exhaustive excavations we only recovered 59 % of the vase and we surmise that the remainder was removed from the cave in antiquity, either intentionally or accidentally. Furthermore, within Vessel 8 we found a calcite deposit showing the imprint of a vessel with a diameter of c. 20 cm. Since the polychrome vase is the only vessel found within the cave with a matching diameter, it seems plausible that the large basal sherd initially recovered by Dennis Martinez had been placed within Vessel 8 by the ancient Maya, after its termination. Other types of terminations, documented time and again within caves of central Belize, entail the chipping of olla rims and the forcible removal of supports from tripod dishes (see Mirro 2007: 105; Helmke 2009: 60, 453, 470). In the latter two cases we surmise that the ritual act was designed to affect the vessels, but not their content.

Ceramic spatial distribution

The more complete Late Classic ceramic vessels found on the surface of Ledge 2 had been principally deposited in a broad arc along the base of the cave's rear wall. Three (Vessels 8, 9, 10) stand out from these; their placement forms a neat equilateral triangle near the center of the cave (Figure 2). Evidence suggests that these vessels represent an intentional and deliberate feature. The first noteworthy aspect is that these three vessels are the only ceramics found within Cuychen that had not been ritually terminated or killed. Second, these vessels appear to form a discrete "activity set" being comprised of a bowl, a large narrow-mouth *olla*, and a small wide-mouth (cooking?) *olla* (see Helmke 2009). Third, it was also within the

bowl (Vessel 8) that a sherd of the polychrome vase appears to have been placed after its termination. We suspect that the three vessels may represent the final episode of the cave's utilization thereby accounting for the ceramics showing no signs of termination. If these interpretations are accurate, then it would seem that termination did not conclude a ritual cycle, but rather transpired as the initial element of a subsequent event. Further, the triangular configuration of ceramic vessels is almost perfectly centered on an area that exhibits one of the lowest concentrations of specimens (i.e. less than 10 sherds per square meter; Figure 6). This is again noteworthy in regard to further isolating this feature from all the other ceramic vessels found in the cave. As such, it would appear that the triangular feature served as a central point around which other ritual activities transpired.

The triangular configuration is evocative of the three hearth stones or *tenamaste* that are a ubiquitous feature of traditional Mesoamerican homes and kitchens. Archaeological examples in domestic contexts show that hearths, outlined by three stones, are of great antiquity, whereas groupings of three speleothems set in similar configurations found in caves of west-central Belize appear to be mostly symbolic emulations (see Moyes 2001; Helmke & Ishihara 2002: 126, 127; Morton 2010: 43-44, Fig. 5.3; Wrobel et al. 2010: 77). In other cases four ceramic vessels deposited in offerings at surface sites serve to mark the cardinal points of a cosmogram, such as the Preclassic cache at Cival (Estrada-Belli 2006: 59-63), or the Terminal Classic termination at the nearby Ruinas de Arenal (Taschek & Ball 1999: 229-230). At Cuychen, the three ceramic vessels may echo such a hearth, with each vessel symbolically equating to a hearth stone. From ancient Maya glyphic texts we know that such three-stone hearths played an important role in mythological creation events (Freidel et al. 1993: 64-67). The text of Quirigua Stela C is particularly revealing in this regard since it relates that at the last creation, in 3114 BC, three distinct stones were planted by the Paddler deities "at the edge of the sky" and the text closes by relating that this was "the first hearth". Thus, all of the domestic hearths of the Maya are essentially replications of this cosmological event, serving to center the domestic universe. At Cuychen then the three vessels might also serve to define the center of a ritual area and the spatial distribution of artefacts is certainly in keeping with this interpretation. Whether the four clusters of the polychrome vase around this putative center also served to delineate and frame the ritual space, however, remains open to discussion.

Archaeology: Summary & Conclusion

The investigations of Cuychen reported here contribute to the growing body of data of ancient ritual activities that transpired in caves. The site's isolation and difficult access, as well as the rapid response to the find, meant that we had the unique opportunity to investigate a wholly unlooted cave site. Thanks to its small size, we were able to conduct exhaustive excavations thereby providing us with no small window onto the activities that the site witnessed over the course of its use. As a result we are now in a favorable position to reconstruct the history of the site's utilization as well as to contrast this record against other caves in the region. Our work at the site has shown that the material culture reflects a set of human behavior that favorably compares with datasets from other cave sites. The utilization of Cuychen therefore matches the practices documented for caves in the region. Based on the ceramic analyses we have also been able to determine that the rituals probably entailed the offering of foodstuffs. The termination of ceramic vessels, a trait that is often noted but rarely integrated into the syntheses of ancient symbolic behavior, has upon examination proved to be a fertile area in which to explore the cyclical sequence of ceremonial events. Although many aspects of Cuychen's utilization will have to remain within the purview of future research we hope to have aptly set the stage for a complete analysis of the truly exceptional polychromatic vase that was discovered at the site. With this framework the vase now has not only clear provenience, but also a dynamic ritual setting in which it actively functioned as a key instrument.

Physical Properties of the Cuychen Vase

The Cuychen vase is a relatively large vessel, measuring as much as 27.3 cm high. The vessel's flat base is slightly wider (22.2 cm) than

its mouth (19.8 cm), resulting in gently insloping sides. Based on the typological attributes of the vase and the quality of the surface treatment, the type-variety of the vase can be identified as Zacatel Cream-polychrome: Cabrito Variety (see Smith & Gifford 1966: 164; Gifford 1976: 251; Ball 1993: 249-252, 1994: 364-365) (Figure 7).

Dorie Reents-Budet sampled the vase shortly after its discovery and Ron Bishop of the Smithsonian Institution conducted Instrumental Neutron Activation of the samples. Although the vase was found to have an idiosyncratic chemical profile, the analysts suggest that it fits within the broader Holmul ceramic paste tradition (Dorie Reents-Budet, pers. comm. 2010). As we will see, additional evidence can be brought to bear on the origin of the vase, on the basis of epigraphic data recorded in the glyphs and stylistic elements of the overall execution.

Figure 7. The Cuychen vase.

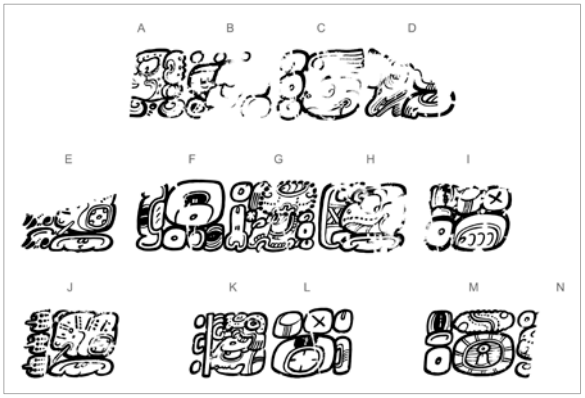

Figure 8. The dedicatory segment of the primary text (A1-D1) and the two impersonation statements recorded on the Cuychen vase (E1-M1). All that remains of the name of the patron of the vase is represented in the final partial glyph (N1).

Dedicatory Segment

We will not provide an analysis and description of the iconography of the vase, and its associated glyphic captions, since it is presented elsewhere (Helmke, in press). Instead we will focus on the primary text of the Cuychen vase, which originally consisted of 29 glyph blocks, and we are fortunate that parts of 21 subsist today. The first half of the text adorns the rim of the vase, leading to the second half that was rendered in a double-column that strikingly separates the iconographic field.

The dedicatory segment of the vase, or Primary Standard Sequence (PSS) is highly abbreviated and was compressed into four glyph blocks (see Coe 1973; MacLeod 1990; MacLeod & Reents-Budet 1994: 109-119, 123-128; Stuart 2005: 118-154; Grube 2006) (Figure 8). The first (A1) provides the so-called Initial Sign serving as the demonstrative pronoun *alay* 'here' (MacLeod & Polyukhovich 2005; Boot 2005). Although quite eroded, the undeciphered dedicatory verb was recorded as the second glyph block (B1). The idiosyncratic verb was used preferentially at workshops in the northeastern Peten, including Río Azul and Xultun (Stuart 2005: 152; Grube 2006: 65), providing us some added evidence as to the origin of the vase. The following glyph (C1) records the typical emic vessel type for cylindrical vases, namely *y-uk'-ib* 'his-drinking-implement' (MacLeod 1990: 313-362; MacLeod & Reents-Budet 1994: 115, 127; Stuart 2005: 126-127; Helmke 2009: 617-618). The final element of the PSS is quite faded, but can be made out as recording the contents and reads *ti tzij* 'for *tzij*'. Although doubts remain as to what type of beverage *tzij* refers to, it may refer to a maize-based drink that was especially popular in

the northeastern Peten, at sites such as Xultun and Río Azul (Stuart 2005: 143-144).

Impersonation Statements

Surprisingly, the next segment of the rim text records not the name of the original patron or owner of the vase, as would otherwise be expected, but two impersonation statements rendered in an intriguing couplet construction, an exceptional feature of the Cuychen vase (Figure 8). Impersonation statements record ritual events in which elite individuals, presumably in a trance state, took on the attributes of a particular god (see Houston & Stuart 1996: 297-300; Stuart et al. 1999: 54-56). At times individuals undergoing this rite also wore the attire of the god they impersonated and some glyphic texts make it clear that intoxication played a key part of these events (Nehammer Knub et al. 2009: 190-193). In its fullest form, the impersonation expression can be read as *ubaahilan ta k'uh*, which can be succinctly translated as 'it is his/her portrayal as a god' (Nehammer Knub et al. 2009: 186).

Both impersonation statements on the Cuychen vase are headed by *ubaahilan*, the usual expression (E1 & J1), each preceding the name of a supernatural entity. The first divinity is the so-called Waterlily Serpent (see Schele & Miller 1986: 46; Stuart 2007), whose name is here rendered as *yax chit juun witz'? nah kaan* (F1-H1). Although some elements of this theonym resist translation it essentially describes the Waterlily Serpent as a personification of bodies of running water (see Stuart 2007). The Waterlily Serpent was the second-most commonly impersonated deity during the Classic period and both males and females took its guise, probably on account of the snake's asexual characteristics (Nehammer Knub et al. 2009: 190). The second deity impersonated is named as a particular martial aspect of the sun god (Boot 1999; Taube 2003: 410), read *uhuk chapaht tz'ikiin k'inich ajaw* (K1-L1). This name can be translated as 'seventh centipede-raptorial bird, radiant lord' and was the most commonly impersonated deity in the Classic period, but on account of marked masculine and martial traits was the exclusive prerogative of male impersonators (Nehammer Knub et al. 2009: 189). As such, it seems clear that the original owner of the vase was male.

The impersonation statements are each closed by prepositional sub-clauses, both initiated by the preposition *ti*. The first instance records *ti ajawlel* (I1), or 'in kingship', whereas the second reads *ti took' ti pakal* (M1), 'with flint, and with shield' (Houston 1983; Schele & Miller 1986: 210, 221; Martin 2001: 178-179). Thus, on the whole the impersonation statements form couplets initiated by impersonation statements and closed by prepositional constructions (see Hull 2003: 390-395; Lacadena 2009: 34-35). Based on this analysis of the text, the human agent is thus said to have impersonated the Waterlily Serpent 'as a king', whereas the agent subsequently took on the guise of the sun god 'as a warrior'. These two ritual events thereby heightened the two idealized and complementary aspects of ancient Maya rulership.

Patron & Parentage Statement

Considering the regular syntactical structure of impersonation statements, what can be expected to follow is the name of the human protagonist, the one who personified the supernatural entities just cited, who in this case is also the owner of the vase. As luck would have it, the following eight glyph blocks (O1-P4) that would have recorded the names and titles of the patron have escaped recovery. Only one small part that seems to initiate the name of the owner subsists (N1) (see Figure 8) and despite best efforts no clear reading can be provided for this segment.

The final portion of the text is notably better preserved and records a parentage statement or pedigree, by citing the names and titles of the owner's mother and father, in that sequence (Figure 9). The last part of the mother's name (Q4), is only partly preserved but seems to include the logogram *ch'een* and forms part of an otherwise well-attested female name Ix Yohl Ch'een 'lady of the heart of the cave'. Paleographic analyses of the **CH'EN** logogram (Helmke 2009: 536-576) indicate that the allograph that has the sun sign as its diagnostic element was utilized between AD 684 and 820, indicating that the Cuychen vase was likely produced during this interval. Whereas *ch'een* is

used in several anthroponyms throughout the Classic period, upon closer scrutiny, the mother's site of origin can be narrowed down even further by noting that *yohl ch'een* only names women from Xultun and Holmul (Helmke 2009: 586-599).

The following glyph block (P5) provides the mother's only title, which is formed by the numeral **7** prefixing an as yet undeciphered grouping of signs. Analogous numbered titles are known for the remainder of the Maya Lowlands and, although these are not as frequent as one might wish, there is enough evidence to suggest that these may conform to some regional distribution. Most importantly to the case at hand, an example that is also prefixed by 'seven' is found in the texts of Najtunich (Drawing 82) where it might title a person from Xultun. Cumulatively, on the basis of the spatial patterning governing the mother's anthroponym and title, Xultun emerges as the best match as her site of origin.

The father of the vessel's owner is introduced by the kinship term *u-mijiin* 'child of (father)' (Q5). The name of the father follows suit (P6-Q6) rendered in a confident an elegant hand as *k'ahk' uti' kuy* or 'fire is the mouth of the owl'. Unlike the name of the mother, anthroponyms that make use of *ti' kuy* are rarer and less spatially restricted. As a result it is not possible, on the basis of onomastic patterns, to make a proposal as to the father's site of origin.

Nevertheless, some clues are afforded in the following glyph blocks that record the father's titles. The penultimate glyph block (P7) provides an Emblem Glyph, marking the bearer as an *ajaw*, or 'king'. Technically-speaking this is actually a partial or so-called problematic Emblem Glyph since it is not prefixed by the logogram **K'UH** that provides the qualifier *k'uhul* 'godly' to the title (see Houston 1986; Grube 2005). The main sign represents the head of a snake, which initially suggested that this might record the Emblem Glyph of Calakmul (see Martin 2005). Nevertheless, there are several key features that argue against this interpretation (Simon Martin, pers. comm. 2010). For one, considering the exalted status of Calakmul kings in the Late Classic the Emblem Glyph always carries the prefix *k'uhul*, which, as said, is notably absent in this case. For another,

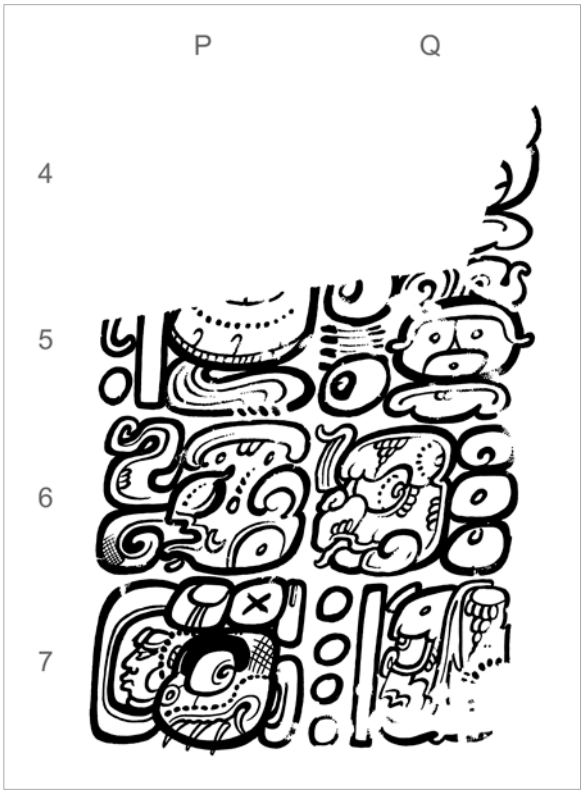

Figure 9. The parentage statement that closes the primary text on the Cuychen vase (Q4-Q7).

since the snake head involved in the Calakmul emblem records an archaic form of the term 'snake', *kaan*, it is systematically prefixed by the syllabogram **ka** to cue this reading. Again this prefix is absent in the Cuychen case. Finally, the emblem on the Cuychen vase is prefixed by an undeciphered sign representing a human head within a circular cartouche. This undeciphered sign is never actually found in the emblem of Calakmul, although it seen as the main sign of other distinct emblems such as that of Altar de Sacrificios (Houston 1986: 2-4; Stuart & Houston 1994: 19-20, Fig. 20) and also serves as part of the name of GIII, one of Palenque's triadic patron gods (Berlin 1963; Stuart 2006). As a result we are left to conclude that the Emblem Glyph painted on the Cuychen vase records a heretofore unknown regal title. Since at present no additional examples of this emblem are known in the written corpus, we cannot suggest to which particular archaeological site this title was tied.

The final glyph block records the second title carried by the father, probably read *baluun*

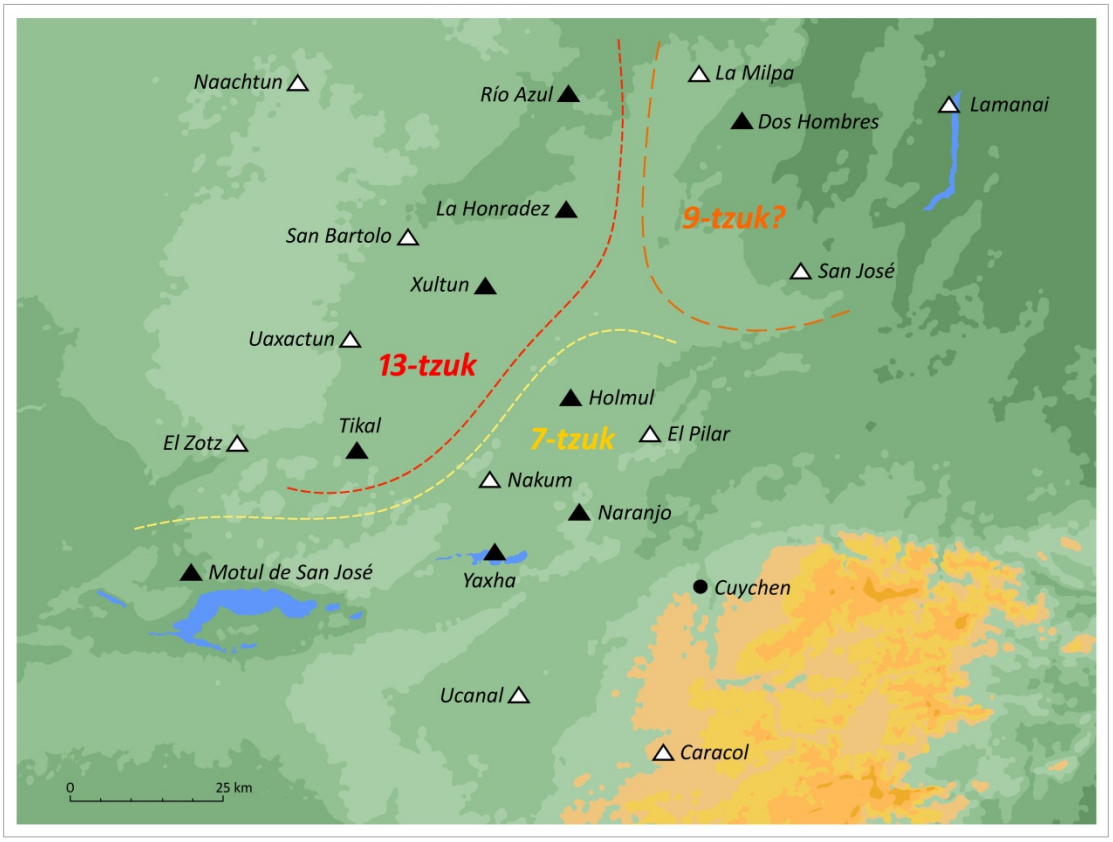

Figure 10. Map of the eastern central Maya Lowlands showing the distribution of sites associated with different numbered tzuk titles (solid triangles) and approximate borders between the different 'provinces'.

tzuk (Q7). Numbered *tzuk* titles (first identified by Grube & Schele 1991: 2-3) are otherwise most commonly prefixed either by the numeral 7 or 13, again making the Cuychen vase exceptional. Here *tzuk* can be translated as 'partition', but probably serves as the term for 'province' as is supported by entries found in western Ch'olan and Yukatek languages. As has been demonstrated by Dmitri Beliaev (2000), these numbered *tzuk* titles tend to be shared by sites within spatially contiguous areas, with *huk tzuk* 'seven province' connected to the archaeological sites of Motul de San José, Yaxha, Naranjo, and Holmul, whereas *uxlahjuun tzuk* 'thirteen province' was borne by lords of Tikal, La Honradez, Xultun and Río Azul (Figure 10). Thus, despite their disparities and nominal independence, many sites appear to have been subsumed under the same larger province, or *tzuk* to use the emic term. While the origin and extent of this system of territorial division of the Maya Lowlands remains unknown, the provinces designated by the numerals 7 and 13 are sufficiently well-documented to allow us to reconstruct the border that separates the two.

One additional example of the title *baluun tzuk* is known from a fragmentary polychrome dish recovered at the site of Dos Hombres in Belize (Robichaux & Houk 2005). On this example it serves as the first title of an individual, who is tied to the toponym *witzil mulnib*, or 'where there are mountainous hills'. While it cannot be proposed with any degree of certainty that the toponym *Witzil Mulnib* refers to Dos Hombres it remains a possibility to be investigated further. Returning to the *tzuk* title, if one assumes that the plate indeed mentions a local lord, it has several important implications, not the least of which is that 9-*tzuk* may have encompassed the region to the west of 13-*tzuk* and to the north of the eastern part of 7-*tzuk*, essentially most of northwestern Belize (Figure 10). On the basis of the present data this

suggestion has to remain tentative, but it is hoped that more data can be brought to bear to corroborate, or refute, this hypothesis. However, assuming that 9-*tzuk* has been placed in roughly the right region, this would imply that the father of the patron of the Cuychen vase was a lord of a site in northern Belize.

Epigraphy: Summary & Conclusion

In this analysis of the Cuychen vase we have attempted to narrow down both the time period during which it was created and to identify the most plausible workshop of manufacture. On the basis of paleographic data and diachronic spelling patterns it seems likely that the vase was produced sometime between AD 791 and 820. This dating accords perfectly with the stratigraphic evidence and the associated ceramics found within the cave, since the deposit which yielded the vase has been dated to c. AD 700-830. On the basis of spatial patterning governing the name and title of the patron's mother it was determined that she likely hailed from the site of Xultun, whereas we could only tentatively suggest that the patron's father governed a site in northern Belize. But who is the original owner? Vexingly, the relevant section of text is missing and as a result we are left with precious little information concerning the patron. However, based on the names and gender categories of the deities impersonated, it seems likely that the vase was originally owned by a male individual. As to the workshop where the vessel was originally produced, at the intersection of complementary lines of evidence it seems most probable that the vase was produced in a workshop associated to the greater Xultun area.

Considering the vessel's final resting place, a cave in western Belize, in a foreign *tzuk* or 'province', several possible scenarios emerge. Nevertheless, the dating of the vase and the ceramics found within Cuychen suggest, whatever the historical circumstances, that the vase was not utilized for more than a few decades before it was deposited within the cave. Archaeological investigations at the nearby site of Minanha have revealed that the royal residence was burnt around AD 775, its main temple was razed, the entry to funerary chambers sealed, whereas special deposits were exhumed and their contents removed. All of these events indicate that this was a dynamic period in the northern Vaca Plateau, possibly connected with a change in governance and the flight of royals from their court. Continued activity within the royal precinct is indicated by the construction of a new shrine adorned with a frieze and uncarved stelae were erected at the foot of a refurbished E-Group. Around A.D. 800 or so, the frieze and stelae are destroyed, and the royal residential courtyard is filled in with architectural core, suggesting that this may mark the demise of the local royal line (Iannone 2005, 2006b; Schwake & Iannone 2011). To what extent external influences played a role in these dramatic events remains unclear, but the appearance of the Cuychen vase, precisely during this period of upheaval is highly significant, not the least considering its ties to polities in northeastern Peten and northwestern Belize. Whereas several key questions still shroud a complete understanding of the Cuychen vase, the present analysis forms the foundation for further studies of this exceptional vase.

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XX MAYA MONUMENTS AND SPATIAL STATISTICS: A GIS-BASED EXAMINATION OF THE TERMINAL CLASSIC PERIOD MAYA COLLAPSE

Claire E. Ebert, Keith M. Prufer, and Douglas J. Kennett

Many studies of the Classic Maya "collapse" have relied upon terminal monument dates to investigate the dynamics of Terminal Classic (~AD 730-910) sociopolitical disintegration. These efforts employed statistical analyses of epigraphic sources to characterize the timing of the collapse, and point to a directional abandonment of Classic Period polities from southwest to northeast. We retest this hypothesis by analyzing 90 terminal dates from the Maya Hieroglyphic Database. Spatial patterning is not consistent with previous hypotheses, but rather suggests a spatial contraction of polities in multiple core regions throughout the Terminal Classic. Of seven core regions identified, the Usumacinta-Pasión region, the Southern Belize region, and the Petén region including sites in central Belize such as Caracol and Xunantunich, demonstrate distinct sub-regional abandonments of monument carving. This suggests that these areas were affected by similar processes (e.g. warfare, ecological disasters, depopulation, and climate change) that led to the cessation of monument dedication due to their geophysical proximity.

Introduction

Glyphic texts recorded on carved stone monuments have played an essential role in the study of the ancient Maya. Monuments incised with glyphic writing, including stela, altar stones, and other types of dedicatory objects, have been interpreted as evidence for social and political complexity (Hamblin and Pitcher 1980; Bove 1981; Whitley and Clark 1985). The stela cult of the Classic Period Maya (ca. AD 250-900) continued traditions of dedicating stone monuments other inscribed media associated with elite peoples. This trend of monument dedication, coupled with the number of sites engaged in erecting monuments increased over time during the Classic Period (Lowe 1985), suggests that a growing number of high-status individual were able to commission the elaborately carved works. Towards the end of the Classic Period, this trend significantly decreased, until the practice of creating large stone monuments was largely abandoned.

Due to major advances in the decipherment of Maya hieroglyphs over the last 50 years we now know that texts recorded on carved monuments relate important historical information focused on political history and the lives of Maya leaders who controlled a series of interconnected polities during the Classic Period. Intricate histories have been worked out at many of the largest of these sites in the Maya Lowlands, and include records of births, deaths, marriages, succession, political alliances, and warfare (Martin and Grube 2000). These histories are temporally grounded in long count calendrical dates, considered to be contemporaneous with the carving and erection of the monument, thus ascribing a date to the object that can be correlated with the Gregorian calendar. Taken together, historical records and precise dates recorded on monuments provide a

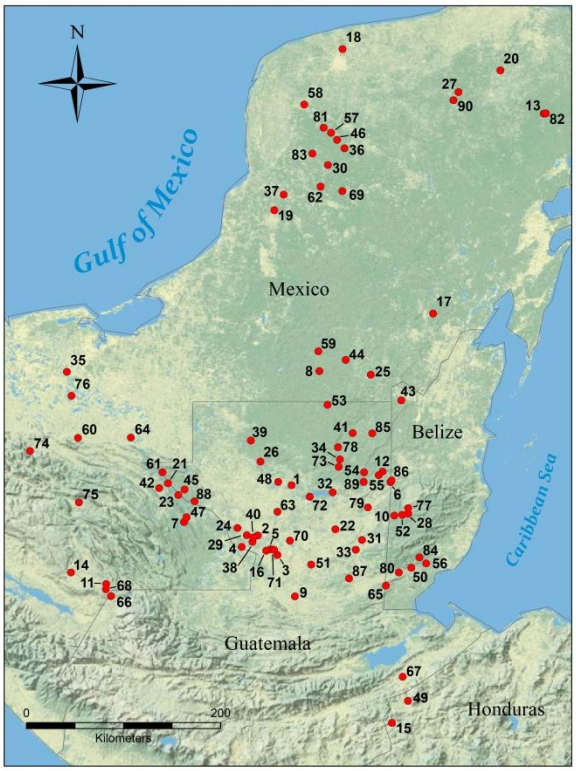

Figure 1. Map of Maya Lowlands, with 91 sites used in this study shown. Numbered sites correspond to Table 1.

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foundation upon which to examine patterns spatial patterning of Classic Period Maya political systems (Mathews 1991, Munson and Macri 2009).

Attention has recently focused on the collapse of sociopolitical networks during the collapse that occurred during the Terminal Classic Period (ca. AD 750-900) in the southern Maya Lowlands (Figure 1). We define "collapse" as the disintegration of a distinct set of political institutions and economic relationships closely associated with elite royal families described in hieroglyphic texts as *ajaw*. This form of political leadership, practiced at multiple polities across the southern Maya Lowlands beginning in the Late Preclassic (400 BC – AD 250) and Early Classic periods (AD 250-500; Freidel and Schele 1998), was characterized by highly networked lineages of paramount elites who ruled individual polities by self-proclaimed divine authority (Houston and Stuart 1996; Martin and Grube 2000). Archaeologists define this type of rulership by the presence of monumental art and architecture, writing, advanced mathematics, and calendrics. The collapse represents the end of those traditions associated with the *ajaw* rulership evidenced by the cessation of monument erections, the abandonment of public political and ceremonial spaces, and disruptions in the trade and consumption of prestige goods during the eighth and ninth centuries AD. Accompanying political disintegration was a decentralization of economic systems, depopulation of many large urban centers, and the cessation writing systems and other media that recorded elite dynastic histories.

Causes of the collapse have been variously attributed to climatic perturbations, warfare, resource exhaustion, disease, and failure of elite governance. Instead of focusing upon the cause(s) of collapse, we examine at the abandonment of the writing tradition using carved monuments as an indicator of the spatial patterning of the collapse across lowlands. Understanding the timing, directionality, and overall duration of collapse at over 100 polities may lead to better models of the collapse and hypotheses regarding causality.

To build a chronology of the collapse, we consider the terminal dedicatory dates on carved monuments an appropriate proxy for this cultural phenomenon. Terminal long count dates refer to the final known date associated carved on a stone monument or other dedicatory object at a site that can be correlated with the Gregorian calendar. The cessation of dated monuments is taken to represent an irreversible decline in political and economic networks and a general disintegration of the polity. Previous efforts to use Maya calendar dates to characterize the timing of these changes concentrated on statistical analyses of epigraphic sources that searched for broad spatial trends (Bove 1981; Whitley and Clark 1985; Kvamme 1990; Neiman 1997; Premo 2004), and suggest that the disintegration of Maya polities occurred during the Terminal Classic Period either in a southwest-to-northeast trajectory in a relatively abrupt manner (Bove 1981; Kvamme 1990) or outward from core areas in the central Petén Region of Guatemala (Neiman 1997).

In this paper we reexamine the results of previous studies with a larger updated dataset of 90 terminal monument dates integrated into a Geographic Information Systems (GIS). First assess whether terminal long count dates found on inscribed monuments exhibit broad-scale spatio-temporal patterning. Earlier studies have suggested some spatial patterning, but others indicate that no meaningful spatial trends can be derived from terminal long count dates (Whitley and Clark 1985; Premo 2004). We also investigate whether regional and sub-regional spatio-temporal patterns of sociopolitical disintegration can be identified by the termination of monument dedication. We compare results of analyses to well published archaeological data from the Central Petén and Central Belize region and from Southern Belize. The aim is to demonstrate how regionally specific analyses may help clarify the relationships between archaeological and epigraphic observations.

Spatial Analysis of Dated Monuments

Multiple studies have examined the spatial distribution of terminal long count dates and geographic trends in the decline of monument dedication at Classic Period polities. Studies by Bove (1981) and Whitely and Clark (1985) both considered terminal dates from 47 sites restricted

Site		Terminal Date AD	Long Count	Monument	Number of Dedicatory Dates at Site	Latitude	Longitude
1	Aguacatal[b]	762	09.16.00.00.00	Stela 1	2	17.04612	-90.06948
2	Aguas Calientes[a, b]	790	09.18.00.00.00	Stela 1	2	16.57915	-90.38083
3	Aguateca[a, b]	790	09.18.00.00.00	Stela 7	6	16.39889	-90.19995
4	Altar de Sacrificios[a, b]	849	10.01.00.00.00	Stela 2	15	16.47268	-90.53070
5	Arroyo de Piedra	711	09.14.00.00.00	Stela 7	2	16.45155	-90.26459
6	Benque Viejo[a]	849	10.01.00.00.00	Stela 1	2	17.07502	-89.15277
7	Bonampak[a, b]	792	09.18.01.02.00	Room 02 Mural Caption 41	8	16.70360	-91.06500
8	Calakmul[a, b]	810	09.19.00.00.00	Stela 15, Stela 16, Stela 64	25	18.10450	-89.81033
9	Cancuen[a, b]	800	09.18.10.00.00	Stela 1	3	16.01470	-90.03841
10	Caracol[a, b]	859	10.01.10.00.00	Stela 10	28	16.76395	-89.11760
11	Chinkultic[a, b]	830	10.00.00.00.00	Stela 7	4	16.12893	-91.78492
12	Chunhuitz	790	09.18.00.00.00	Stela 1	2	17.17216	-89.22487
13	Coba	781	09.17.10.00.00	Stela 20	7	20.49104	-87.73307
14	Comitan[a, b]	874	10.02.05.00.00	Stela 1	2	16.23606	-92.11024
15	Copan[a, b]	821	09.19.11.14.05	Altar L	70	14.84107	-89.13885
16	Dos Pilas[b]	790	09.18.00.00.00	Panel 11	12	16.43713	-90.30333
17	Dzibanche	733	09.15.00.00.00	Wood Lintel	2	18.63841	-88.75866
18	Dzibilchaltun	716	09.14.05.00.00	Stela 9	2	21.09091	-89.59723
19	Edzna	810	09.19.00.00.00	Stela 9	10	19.59667	-90.22908
20	Ek Balam	842	10.00.11.11.10	Vault Cover 1	3	20.89200	-88.13583
21	El Cayo[a, b]	780	09.17.10.00.00	Stela 2	4	17.06436	-91.21246
22	El Chal[b]	761	09.16.10.00.00	Stela 4	2	16.63806	-89.66350
23	El Chicozapote	824	09.19.14.01.11	Lintel 02	2	16.95522	-91.11824
24	El Chorro[b]	771	09.17.00.00.00	Altar 4	2	16.64949	-90.56957
25	El Palmar[a, b]	884	10.02.15.00.00	Stela 41	5	18.06991	-89.33344
26	El Peru[b]	790	09.15.00.00.00	Altar 1	3	17.26605	-90.35578
27	Halakal	870	10.02.01.00.00	Halakal Lintel	2	20.69124	-88.52362
28	Hatzcap Ceel	835	10.00.15.00.00	Altar 1		16.78239	-88.98929
29	Itzan	780	09.17.10.06.08	Stela 17	5	16.58237	-90.48285
30	Itzimte[b]	910	10.04.01.00.00	Stela 6	3	20.01552	-89.73161
31	Ixkun[a, b]	800	09.18.10.00.00	Stela 5	4	16.53799	-89.41604
32	Ixlu[a, b]	879	10.02.10.00.00	Altar 1	3	16.97843	-89.68702
33	Ixtutz[b]	780	09.17.10.00.00	Stela 4	2	16.44692	-89.47524
34	Jimbal[b]	889	10.03.00.00.00	Stela 2	2	17.28488	-89.61956
35	Jonuta[b]	790	09.18.00.00.00	-----	2	18.09649	-92.14775
36	Kabah	860	10.01.10.00.11	Doorjamb	2	20.24802	-89.64770
37	Kayal	744	09.15.13.00.00	Glyphic Stone 1	2	19.74009	-90.14098
38	La Amelia[a, b]	807	09.18.17.01.13	Panel 1	2	16.52024	-90.42965
39	La Corona	771	09.17.00.00.00	La Corona Panel A & Stela A	8	17.46034	-90.44616
40	La Florida[a, b]	766	09.16.15.00.00	Stela 7	2	16.56166	-90.42209

41	La Honradez[a, b]	771	09.17.00.00.00	Stela 7	2	17.52812	-89.50226
42	La Mar[a, b]	805	09.18.15.00.00	Stela 2	3	17.01900	-91.29396
43	La Milpa[a, b]	780	09.17.10.00.00	Stela 7	2	17.83297	-89.05321
44	La Muneca[a, b]	889	10.03.00.00.00	Stela 1	6	18.20787	-89.56734
45	La Pasadita	766	09.16.15.00.00	Lintel 2	2	17.00501	-91.05982
46	Labna	862	10.01.13.00.00	Mask over Doorway	2	20.17118	-89.57872
47	Lacanha[b]	746	09.15.15.00.00	Lintel 1	2	16.74831	-91.03981
48	Laguna Perdita[b]	742	09.15.11.02.17	Altar 1	2	17.07722	-90.19373
49	Los Hijos (Los Higos)[b]	781	09.17.10.00.00	Stela 1	2	15.04492	-88.99020
50	Lubaantun[a, b]	754	09.16.03.05.08	Figural Plaque #6	2	16.28044	-88.95915
51	Machaquila[a, b]	841	10.00.10.17.05	Altar B	11	16.30947	-89.88701
52	Mountain Cow[b]	835	10.00.05.00.00	Altar 1	2	16.77116	-89.04437
53	Naachtun[a, b]	761	09.16.10.00.00	Stela 10	11	17.79005	-89.73556
54	Nakum[a, b]	849	10.01.00.00.00	Stela D	2	17.16568	-89.39683
55	Naranjo[a, b]	820	09.19.10.00.00	Stela 32	23	17.13839	-89.26065
56	Nim Li Punit[b]	810	09.19.00.00.00	Stela 7	6	16.32042	-88.82272
57	Nohpat	858	10.01.09.00.00	Altar 1	2	20.31509	-89.70344
58	Oxkintok	859	10.01.10.00.00	Stela 9	8	20.57533	-89.95042
59	Oxpemul[a, b]	830	10.00.00.00.00	Stela 7	6	18.28834	-89.81970
60	Palenque[a, b]	799	09.18.09.04.04	Initial Series Vase	35	17.48400	-92.04583
61	Piedras Negras[a, b]	795	09.18.05.00.00	Stela 12	46	17.16641	-91.26298
62	Pixoy	711	09.14.00.00.00	Stela 5	2	19.81505	-89.80102
63	Polol[a, b]	790	09.18.00.00.00	Stela 1	2	16.79924	-90.19866
64	Pomona[b]	790	09.17.00.00.00	Panel	2	17.48664	-91.55691
65	Pusilha[a, b]	751	09.16.00.00.00	Stela F	8	16.11450	-89.19443
66	Quen Santo[a, b]	879	10.02.10.00.00	Stela 2	4	16.01720	-91.73944
67	Quirigua[a, b]	810	09.19.00.00.00	Structure 1B-1 Step	19	15.27023	-89.04007
68	Sacchana	879	10.02.10.00.00	Stela 2	2	16.08030	-91.78753
69	Santa Rosa Xtampak	750	09.15.19.17.14	Stela 5	2	19.77257	-89.59877
70	Seibal[a, b]	889	10.03.00.00.00	Stela 18 & 20	7	16.53175	-90.08511
71	Tamarindito[b]	762	09.16.11.07.13	Hieroglyphic Stairway 2, Step 1	3	16.44769	-90.23125
72	Tayasal-Flores[a, b]	869	10.02.00.00.00	Stela 1	2	16.93987	-89.90035
73	Tikal[a, b]	869	10.02.00.00.00	Stela 11	52	17.21732	-89.63163
74	Tila[a, b]	830	10.00.00.00.00	Stela A	2	17.36193	-92.49054
75	Tonina[a, b]	909	10.04.00.00.00	Monument 101	25	16.88618	-92.03831
76	Tortuguero[b]	711	09.14.00.00.00	Monument 2	4	17.87492	-92.10640
77	Tzimin Kax[a]	835	10.00.05.00.00	Altar 21	2	16.83338	-88.98859
78	Uaxactun[a, b]	889	10.03.00.00.00	Stela 12	14	17.39795	-89.63775
79	Ucanal[a, b]	849	10.01.00.00.00	Steal 4	2	16.83933	-89.36180
80	Uxbenka[b]	780	09.17.10.00.00	Stela 15	5	16.23677	-89.07467
81	Uxmal	907	10.03.18.09.12	Capstone 2	5	20.36031	-89.77066
82	Uxul[a, b]	751	09.16.00.00.00	-----	3	20.49359	-87.71295
83	Xcalumkin	765	09.16.14.00.00	Capital 5	4	20.12244	-89.87664

84	Xnaheb	780	09.17.10.00.00	Stela 2	2	16.37527	-88.88435
85	Xultun[a, b]	889	10.03.00.00.00	Stela 10	13	17.52729	-89.32183
86	Xunantunich[b]	830	10.00.00.00.00	Stela 9	3	17.08926	-89.14145
87	Xutilha	840	10.00.10.00.00	Stone 1	2	16.18167	-89.53725
88	Yaxchilan[a, b]	808	09.18.17.13.14	Lintel 1	41	16.89617	-90.96750
89	Yaxha[a, b]	796	09.18.05.16.04	Stela 21	2	17.07584	-89.40210
90	Yula	874	10.02.04.08.12	Lintel 1	2	20.61686	-88.57001

Table 1. Terminal monument dates from 91 Lowland Maya sites used in these analyses, including data in Gregorian and Maya long count (calculated using GMT).

to the Central Petén region. Bove, using Moran's *I* to examine spatial patterns, argued that the spatial distribution of terminal dates showed a southwest-to-northeast trend. Whitley and Clark (1985) using similar methodology, however, found no recognizable spatial pattern in the data. Kvamme (1990) analyses, however, supported the interpretation that terminal dates have a strong spatial correlation, or that that similar dates that are located nearby each other are not randomly clustered. However, he pointed out the need for analyses that also focused upon regionally specific trends in addition to broad-scale patterning (Kvamme 1990).

In another study Neiman (1997) examined the spatial nature of the collapse positing that inscribed monuments represented a form of costly signaling between Maya polities. Neiman's analysis considered 69 terminal long count dates derived from previous studies in addition to some data from the Petén region. His analyses suggested that the latest terminal dates were located in the periphery of the Maya region and the earliest terminal dates in the central Petén. In other words, polities did not collapse from southwest to northeast, but crumbled outwards from the core to the periphery (Neiman 1997).

Premo (2004) was the last researcher to consider terminal monument dates and the disintegration of Maya polities during the Terminal Classic. He noted that while broad-scale examinations had previously been used to characterize the spatio-temporal nature of the collapse, analyses that identified regional trends are better suited to investigate the collapse since individual Maya sites existed in specific biophysical spheres and interacted in regional and sub-regional sociopolitical spheres. To address this problem, Premo introduced the Getis-Ord *G* statistic in addition to Moran's *I* to examine spatial trends at a regional scale (Premo 2004:857). In his re-evaluation of the same dataset used in Bove's (1981) initial study, Premo noted two localized clusters of terminal dates in the Central Petén and the Usumacinta-Pasión regions.

Methods

In order to examine the spatial patterning of the collapse, we adopt Premo's statistical approach, using both Moran's *I* and the localized Getis-Ord *G* statistic, and combine this with Nearest Neighbor analyses, to reevaluate spatial trends in terminal monument dates using a GIS approach since it offers a forum to reevaluate previous research on the spatial trends in terminal long count dedicatory dates across the Maya region.

A dataset consisting of Maya sites with terminal long count dates was compiled from the Maya Hieroglyphic Database (MHD) Project (Macri and Looper 1991–2011). The MHD includes epigraphic data inscribed on known Maya architecture, artwork, portable objects, and carved stone monuments. The database itself is organized by individual glyph blocks (currently over 40,000) located on inscribed monuments at 186 archaeological sites, as well as data from three Pre-Columbian Maya codices.

The dataset used in this study consists of 90 sites with Terminal Classic dates from the Maya Lowlands ranging from AD 711 to AD 910 (Table 1). Initial Series long count dates and calendar round dates that could be confidently correlated with the long count were considered since they are believed to be concurrent with the original time of dedication were chosen for the study. Distance numbers

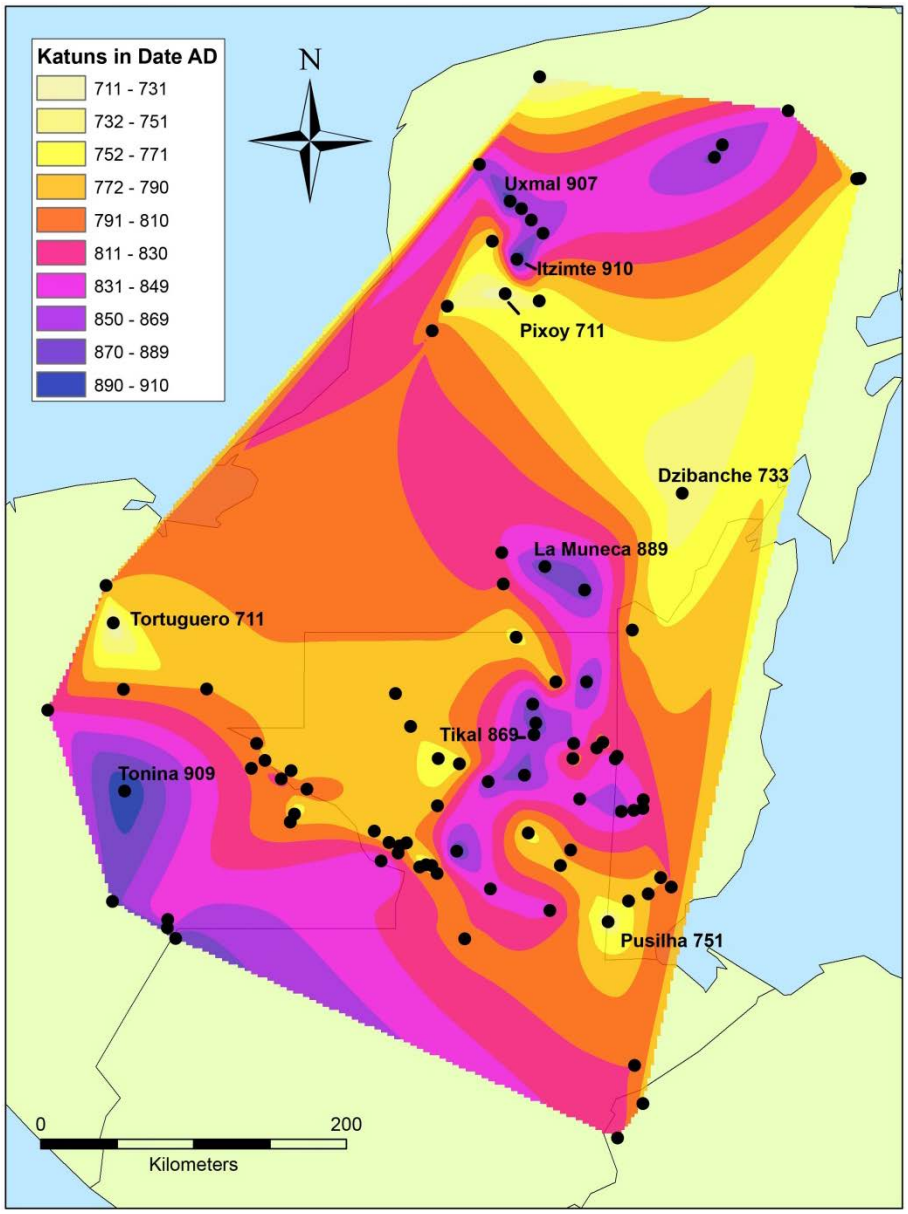

Figure 2. Trend raster image of calculated NN statistics showing broad-scale trends in terminal long count dates across the Maya Lowlands.

were not considered terminal dates. Sites with only one recorded date were excluded from the dataset as a terminal date cannot be determined. Sites possessing only two recorded dates were also included, as a linear regression suggested that the terminal date is not significantly biased due to the number of dates recorded at the site.

Sixty-six sites from previous studies correspond to those used in this study. Both Mountain Cow and Tzimin Kax, considered by some to be the same site, were included in the analyses as two sites with two different UTM coordinates in order to remain consistent with previous studies. Sites from previous studies were excluded if they could not be located geographically. Chichen Itza was not included in this study since its final interpreted long count dedicatory date of AD 997 falls well into the Postclassic Period.

A small number of earlier terminal long count dates exist in the Maya Lowlands, but AD 711 was used as the starting point based on

Lowe's (1985) proposal that the number of dated monuments peaked in AD 721 and represents the apex of the Classic Period monument dedication. He argued that the steady decline in monument dedication after this time represented the breakdown of the authority of Maya kings. In this study we partition the sites into twenty years increments known by the Maya as *katuns*. The date AD 721 falls within the *katun* beginning in AD 711.

Data from the MHD was integrated into a GIS database. Lat/Long coordinates for large sites that could be visually identified from aerial photos were obtained from Google Earth where possible (Table 1). These coordinates come from the central plazas at these sites. For other sites not visible on satellite imagery we adopt coordinates provided by the Maya GIS project (Witschey and Brown 2010), based on a variety of published text and cartographic sources.

Nearest neighbor and spatial autocorrelation using Moran's *I* and the Getis-Ord *G* static were applied to the dataset to examine broad-scale trends in terminal long count dates. NN statistics were calculated using the Spatial Statistics Average Nearest Neighbor tool. NN statistics generated a raster that visually identified trends in the distribution of terminal long count dates. The raster was categorized into twelve discrete periods of 20 years each, (*katuns)* in the Maya long count, beginning with the period AD 711 to AD 731 and ending with AD 891 to AD 911 (Figure 2).

Moran's *I* and Getis-Ord *G* statistics were applied to determine if regional patterns existed in the data. When the two analyses are combined, the *G* statistic identifies discrete regions, referred to called neighborhoods in this study, of points and the Moran's *I* detects outliers within those neighborhoods. Moran's *I* values and Z-scores were calculated using the Spatial Autocorrelation tool in ArcGIS 10. Moran's *I* tests measure a set of point features and associated attributes in order to evaluate whether a spatial pattern is clustered, dispersed or random (Moran 1950). Getis-Ord values and Z-scores were calculated using the Hot Spot Analysis tool in ArcGIS10. *G* identifies features with higher or lower values that tend to cluster in a given neighborhood, but also tests specifically for whether above-average or below-average values cluster more strongly (Getis and Ord 1992). The same spatial analyses were applied to neighborhoods of sites identified in the broad-scale *G* statistic analyses to further investigate the existence of sub-regional patterning.

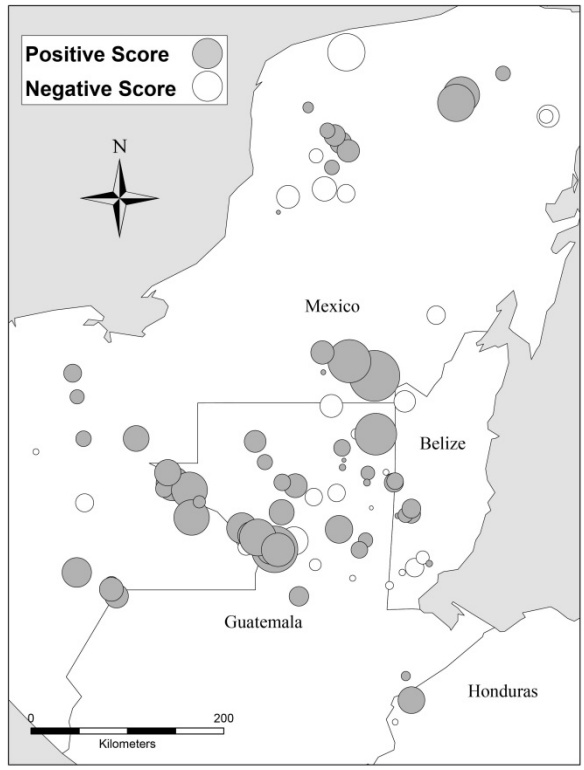

Figure 3. Bubble graph of Moran's *I* scores. Shaded bubbles represent positive scores, white bubbles represent negative scores, and bubble area is proportional to the absolute value of the score. Contemporary political boundaries appear in the background.

Results

A trend raster of calculated NN statistics (Figure 2) shows broad-scale trends in terminal long count dates on monuments across the Maya region. These data demonstrate no strong directional trends (e.g., southwest-to-northeast). Rather, early terminal long count dates are located in isolated pockets in the Puuc region of Yucatan, as well as southern Yucatan, the Campeche district of Mexico, southern Belize extending northwest into the Petén, and the Lower Pasión area. Clusters of sites that have the latest terminal long count dates include zones in the Puuc and Chichen areas around the

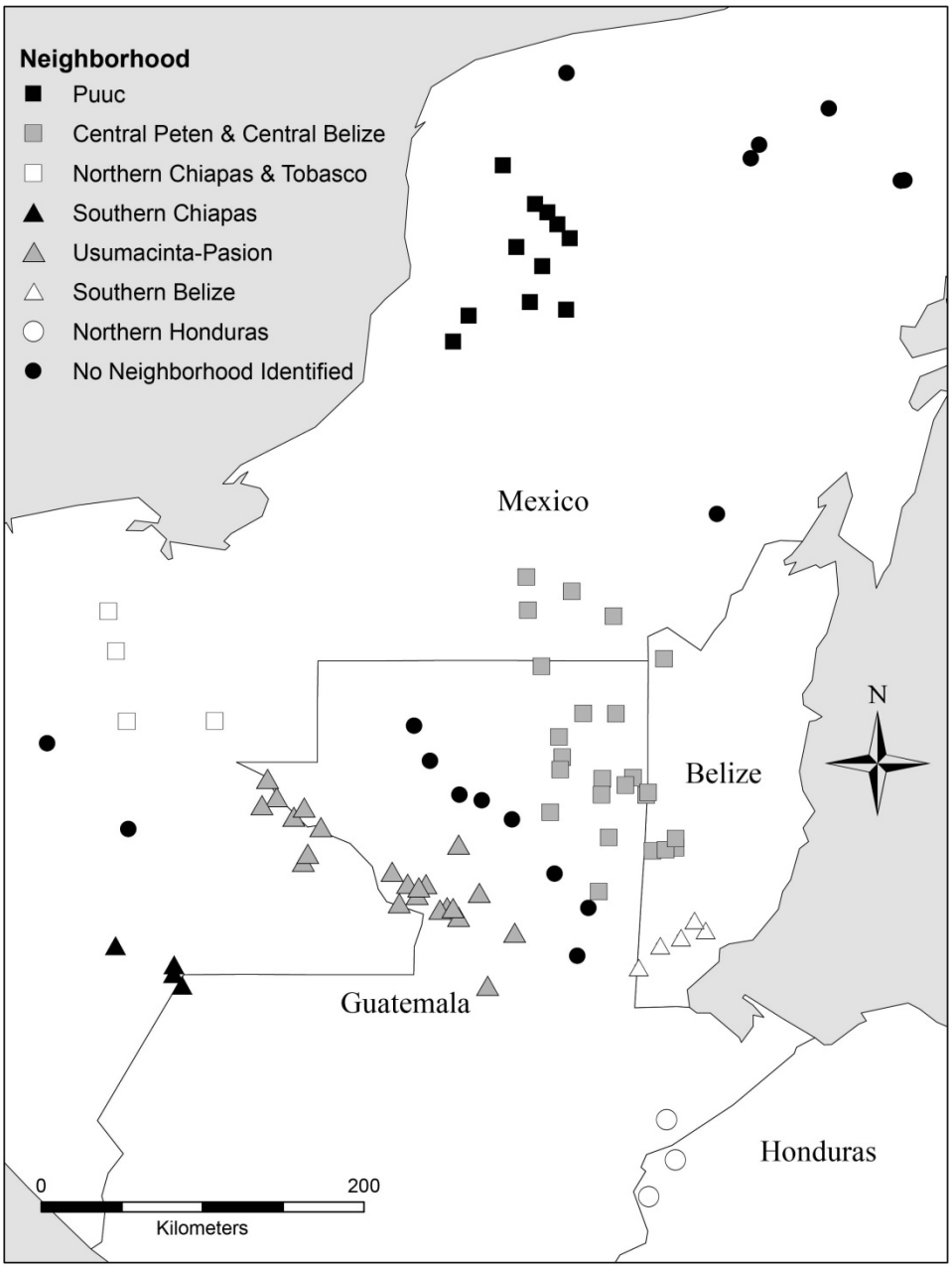

Figure 4. Neighborhoods defined by Getis-Ord *G* statistic, represented as spatially defined clusters of sites with similar terminal long count dates.

sites of Uxmal and Itzimte, southern Chiapas district of Mexico at Tonina and Chincultik, the Northern Petén around La Muneca, and the Central Petén in the area around Tikal, Naranjo, and into Central Belize along the Belize River Valley and the Vaca Plateau.

Moran's *I* scores distinguish spatially defined concentrations of comparable terminal long count dates. Large and positive scores represent sites that have similar terminal dates to those around them (Figure 3). Sites with negative scores have terminal dates that are dissimilar to their neighbors. Concentrations of similar dates are located in the Usumacinta-Pasión region, in the Central Petén and in central and southern Belize. Several explanations have been put forward to explain these site clusters. Premo (2004:862) suggested that clusters

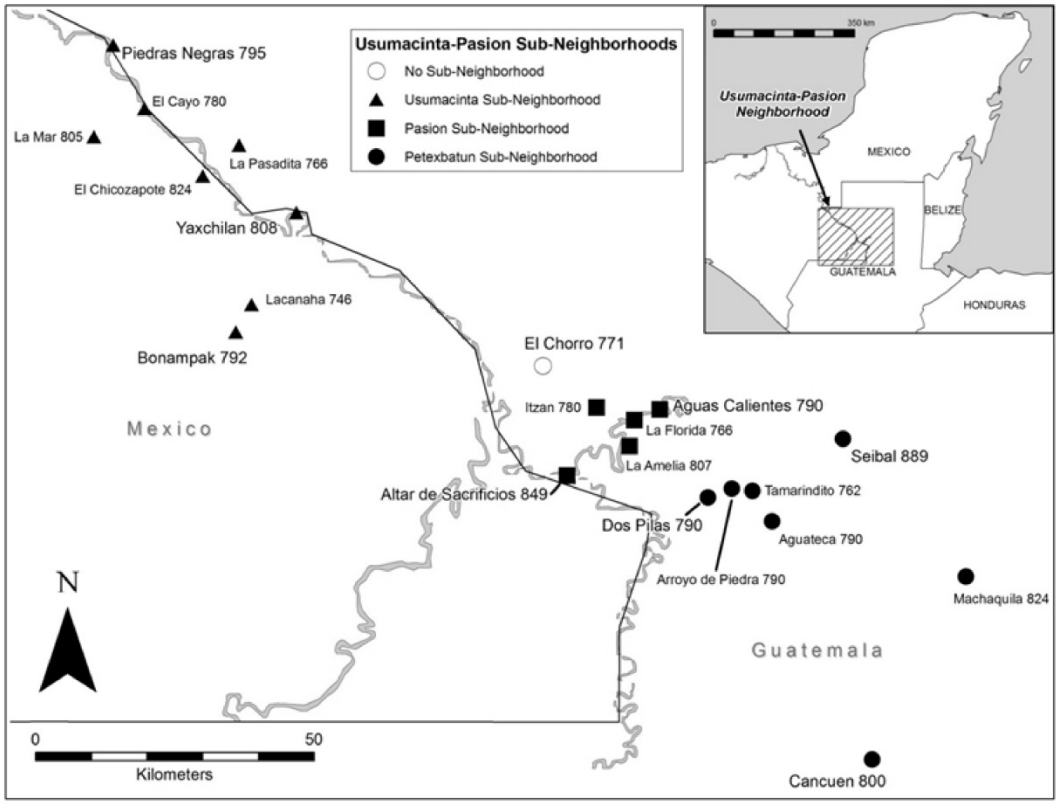

Figure 5. Map of the 22 sites which comprise the Usumacinta-Pasión neighborhood, with three sub-neighborhoods shown.

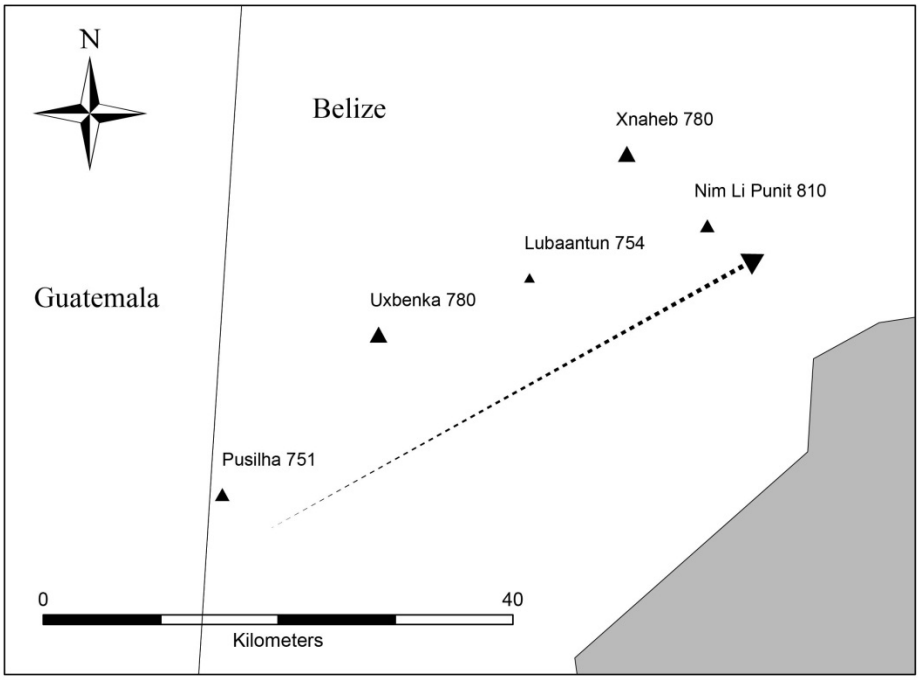

Figure 6. The Southern Belize neighborhood, with early to late terminal monument dates extending from Pusilhá northeast towards Nim Li Punit. Symbology (i.e. size of symbol) reflects this trend.

represent locations where either decentralized elite groups continued erecting monuments, while their neighbors discontinued this cultural practice, or that these clusters represent sites trying to re-establish authority over an area using monuments. Another interpretation may be that these sites were central locations that maintained the ability to carve monuments after others around them had lost their influence, in other words they were, at least for a time, impervious to factors that destabilized their neighbors.

The Getis-Ord *G* statistic grouped sites into neighborhoods, with more negative Z-scores corresponding to sites with early terminal dates, and more positive values identifying sites with later terminal dates. The *G* statistics defined seven neighborhoods that represent clusters of sites with similar terminal long count dedicatory dates (Figure 4). These roughly correlate with major geographical regions in the Maya Lowlands and from which neighborhood names are derived. Clusters of sites compose discrete neighborhoods in the Usumacinta-Pasión region, consisting of sites along the Rio Usumacinta from Piedras Negras in the north down to Altar de Sacrificios, Dos Pilas, and Aguateca in the south; the Southern Zone of Northern Honduras; Southern Belize; the Puuc Hills region; the Petén region around Tikal, Uaxactun, and Calakmul, including parts of Central Belize centered around Caracol; four sites are located in Southern Chiapas; and four sites located in northern Chiapas and extending into Tabasco, the largest of which is Palenque. The regions defined along the Usumacinta, the Central Petén, and Southern Belize are also identified by Moran's *I* as groups of sites that had more similar terminal dates than other regions.

All sites do not necessarily fall within a statistically defined neighborhood. For example, a line of sites without a defined neighborhood extends from southwest to northeast between the Usumacinta-Pasión and Central Petén neighborhood. This is likely the result of their proximity, being relatively closer to the Central Petén neighborhood, and their earlier than average dates as compared to the Central Petén neighborhood.

A total of 22 sites comprised the Usumacinta-Pasión neighborhood (Figure 5). NN analyses performed within the neighborhood suggest a possible temporal gradient, from early to late, down the Usumacinta River from north to south, possibly corresponding to trade networks (Foias 2002). The sites of Seibal (A.D. 889) and Altar de Sacrificios (A.D. 849) have the latest dates in the area. Local *G* statistics performed in this region identified sub-neighborhoods that include the Usumacinta sub-neighborhood (AD 746 – 824), Pasión sub-neighborhood (AD 766 – 849), and Petexbatun sub-neighborhood (AD 762 – 889).

The Southern Belize neighborhood consisted of five sites (Figure 6). NN statistics indicate a dispersed pattern in which early to late dates extend steadily from Pusilhá in the south northeast towards Nim Li Punit. Moran's *I* and G statistic analyses for the neighborhood did not identify sub-neighborhoods but rather suggests that the pattern does not appear to be significantly different than random.

The neighborhood identified for the Petén region and extending into Central Belize consists of 24 sites. While patchwork of later terminal dates can be found throughout the Petén neighborhood, Moran's *I* analyses suggest that most of the dates are similar to each other overall. The *G* statistic did however identify three sub-neighborhoods that are restricted in the Central Petén (Figure 7). These sub-neighborhoods are associated with the largest centers and include:

1. Tikal, Uaxactun, Ixlu, Jimbal, Nakum (AD 849 – 889)
2. Naranjo, Xunantunich, Chunhuitz, Benque Viejo, Ucanal (AD 790 – 849)
3. Caracol, Tzimin Kax, Hatzcap Ceel, Mountain Cow (AD 835 – 859)

The neighborhoods in northern Honduras (n=3), Northern Yucatan (Puuc, n=9), Southern Chiapas (n=4), and Northern Chiapas and Tabasco (n=4) show no internal spatial trends in NN analyses and no statistically significant regional patterns were exhibited in our spatial autocorrelation analyses.

Discussion

Prior work has emphasized the examination of spatial trends in terminal long

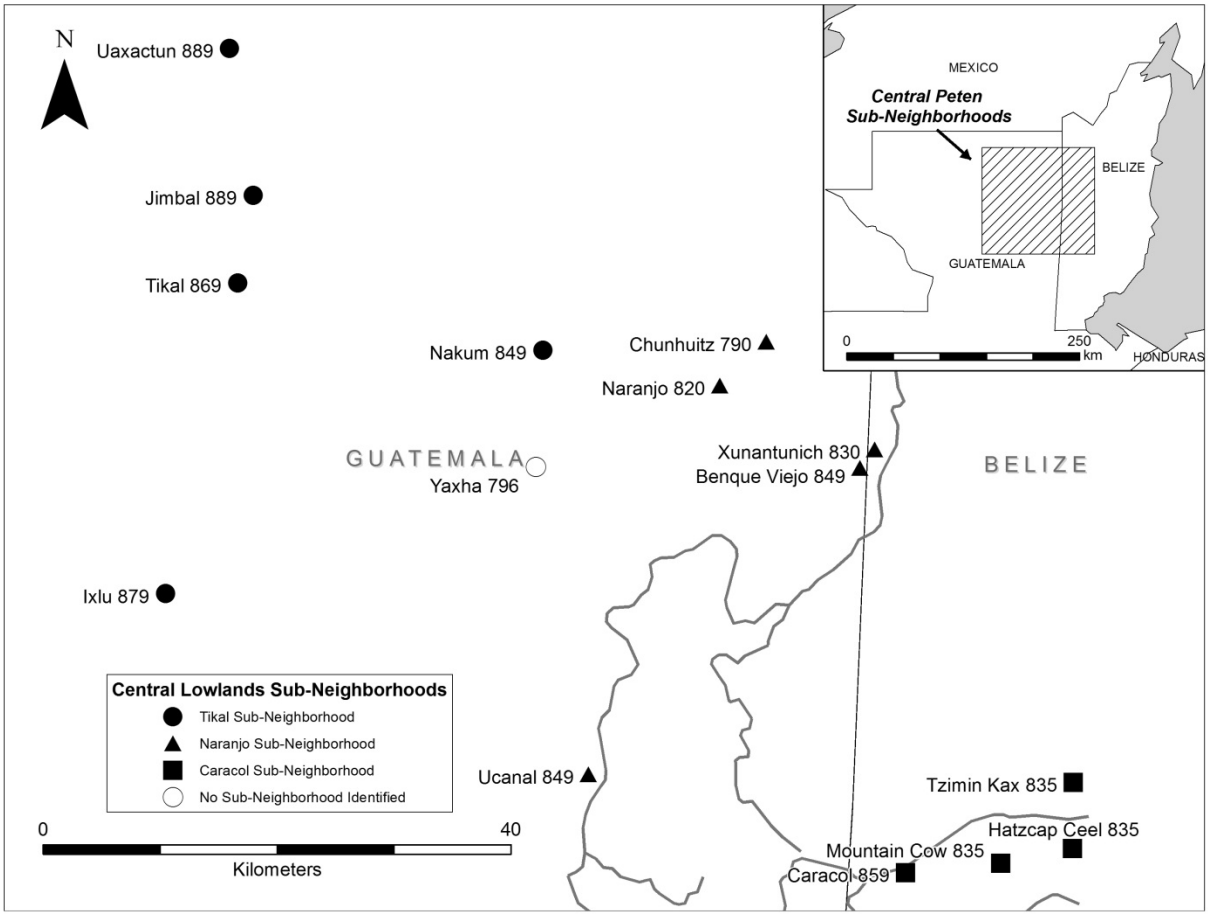

Figure 7. Three sub-neighborhoods in the Petén neighborhood restricted in the Central Petén. These sub-neighborhoods are associated with the largest centers in the area, Tikal, Naranjo, and Caracol.

count dates over broad areas. We expand the data-set to encompass data from throughout the known Classic Period Maya interaction sphere and include regionally specific analyses. More regionally specific studies afford added clarity in spatial patterning in that they identify neighborhoods and highlight sub-neighborhoods within those regions. That monument dedication was relatively coterminous in defined regions demonstrates that local spatial statistics are able to identify spatial indicators of what may be processes or behaviors that undermined kingship and elite rule, which ultimately led to the reduction in the number of complex polities in the Maya region. The identification of geographically specific neighborhoods and of sub-neighborhoods suggests that sites within neighborhoods were affected by similar processes (e.g. conflict, disruption of economic networks, natural or anthropogenic environmental change) that led to the cessation of monument dedication due to their geophysical proximity. This also implies that sites within neighborhoods and sub-neighborhoods were socially and economically interconnected at least in part through their elite populations. The terminality of monument dating in this study exists along a continuum from 24 to 127 years in sub-neighborhoods, suggesting that not all relationships were necessarily equal. Nevertheless, while we do not know exactly what processes facilitated the ability of elites to commission and erect new stone monuments at any particular site, these data suggest that events at one site may have directly or indirectly affected the capability of elites to maintain the authorization of new monuments.

The proposed neighborhoods are not solely defined by shared monument dates. All of the sites examined in this study fall within 27 physiographic adaptive regions in the Maya Lowlands proposed by Dunning et al. (1998). They found these physiographic regions to associate not only with regional geological and geographic variability but also with specific agricultural potentials and practices. This is especially true of neighborhoods with sub-regional patterning. Our Usumacinta-Pasión neighborhood lies within Lacandon Fold (Zone 17) and the Rio de la Pasión regions (Zone 20), the Petén neighborhood sits mostly on the Petén Karst Plateau (14), sites in Belize extending into the Belize River Valley (Zone 22) and Vaca Plateau (Zone 23) and the Southern Belize neighborhood, in an area known as the Karstic Piedmont (Zone 26) (Dunning et al. 1998). Other identified neighborhoods also lie within geophysically bounded areas. A twenty-eighth zone was added to Dunning and colleagues original 27 in order to encompass sites in southern Chiapas. Clustering of specific neighborhood within defined physiographic regions supports a more regionalized view of social and environmental processes, as opposed to broad-scale, which may have influenced local changes during the Terminal Classic.

The spatial pattern of terminal monument dates from the Central Petén and Central Belize neighborhood corresponds well with what has been archaeologically documented during the Terminal Classic in the region. The area was marked, like the Usumacinta-Pasión region, with warfare between the rival sites of Tikal, Naranjo, and Caracol (Schele and Friedel 1990; Martin 2001; Chase 2003), which define sub-neighborhoods for the region. Further status rivalry has been documented in the Central Petén sub-neighborhood during the eight century that stimulated competitive architectural programs. The secondary sites of Uaxactun, Ixlu, Jimbal, and Xultun declared their independence from Tikal. This pattern has been interpreted as representing shifting seats of ceremonial performances and that Tikal may have used this mechanism as a power-sharing device (Rice 2006). However, by AD 830 populations at Tikal began to decline and secondary sites gained power over their former overlord. Like the events that played out in the Usumacinta-Pasión neighborhood, military campaigns likely contributed to the decline and cessation of monument dedication in this region with the final date recorded at Uaxactun (AD 830) referring to warfare with its neighbors. Caracol also experienced a similar fate to Tikal and Uaxactun. Chase and Chase (2004) note a dramatic reduction in architectural construction and evidence of burning and warfare in the Caracol site core. At all these sites, archaeological data suggests that squatter populations still occupied the site following these events (see Stanton and Magnoni eds. 2008).

The description of the collapse in the Southern Belize neighborhood is more varied. While some centers experienced a decline in terms of population and monumental constructions, other sites - such as Ixtonton, Ucanal, Sacul – expanded. Laporte (2004) has suggested that these sites were influenced by the Puuc region in the Northern Lowlands, which fluoresced into the Post Classic Period. In comparison to the rest of the Maya world, little research has been carried out in Southern Belize on the Belizean side of the border. Terminal long count dates in the area suggest a relatively quick sociopolitical disintegration of major open-air sites extending first from the south at Pusilhá (AD 731) to the northeast towards Nim Li Punit (AD 810), a distance of only 30km. Hieroglyphic texts and excavations at Pusilhá, the largest and most politically dominant site in the area, suggest that the polity persisted at least through AD 790 (Braswell 2001; Braswell and Prufer 2009:48), an event that likely played a role in dynamics of collapse in the rest of the area. At Lubaantun the ceramic assemblage, dominated by Tepeu 2/3 Petén styles of the Late Classic suggests that the site was founded in AD 731 ± 20 years (Hammond 1975). The last text from the site dates to 790 and is taken to be the general time of site abandonment. At Nim Li Punit most of the published chronological material comes from 26 carved monuments located in the elite core of the site. Stelae at the site were erected between AD 711 and AD 830 indicating a short dynastic history for the polity and likely a short occupational span at the site (Grube et al. 1999; Hammond et al. 1999). The

overall picture painted through GIS analyses and archaeological exploration for Southern Belize supports the disuse of writing by elites followed quickly by the abandonment of large centers in the region between AD 730 and AD 850. Large and small polities, including those in the nearby Maya Mountains appear to have been depopulated during this span of the Terminal Classic as well. However, it should be noted that this characterization applies only to the inland sites but the coastal sites investigated by McKillop (1996, 2005) have Postclassic elements, which likely are linked to an increase in coastal trade after the end of the Classic Period.

Conclusion

The idea of regionally specific investigations is not new and archaeological work in the Maya Lowlands during in the last decade has increasingly focused on the regional scale (Ball and Taschek 2003; Scarborough et al. 2003; Demarest et al. 2004; Rice and Rice 2007; Prufer et al. 2011), underscoring the importance of social and economic integration between polities. In this paper we have presented a geospatial and temporal model of polities grouped into neighborhoods at the time of the collapse, providing the foundation for a new way of identifying regional similarities and differences. Bove (1981) and others hypothesized that sites with similar terminal long count dates should cluster and correlate with geographic regions, but the information available at the time was limited and isolated to the Petén. An expanded dataset, including the Northern and Southern Maya Lowlands, facilitates spatial studies that can help to define groups of sites geographically that may have experienced similar changes and potentially clarify relationships between sites during the political turmoil of the Terminal Classic.

The spatial neighborhoods identified in these analyses correlate with previous regional archaeological interpretations and assessments of socially important ecological zones (Dunning 1998) suggesting that polities within neighborhoods were economically linked. Economic interdependency has been repeatedly suggested to have been a factor in the disintegration of Classic Period institutions, though there is little agreement structure or form of what were clearly complex systems of production, exchange and consumption (e.g. Dahlin et al. 2011; Rice 2009; Scarborough and Valdez 2009). Establishing spatial and chronological links between sites during critical end days preceding their political collapse provides another avenue to explore social and ecological bases of cultural change over time.

The disintegration of Maya polities during the Terminal Classic was a complex sociopolitical process and recorded dates on stone monuments provide only one way of examining these processes. Spatial analyses of the Terminal Classic collapse through terminal long count dates provide information about the role of interaction networks in processes of decentralization and disintegration. Identifying and understanding patterning may lead to better discussion, hypotheses, and testing of causality. Yet, researchers should remain wary of the possible problems that such analyses present. This study is constrained by some of the same problems as previous research. Sample sizes are relatively small and written texts only provide part of the story with clear biases. Furthermore, though epigraphic texts are invaluable indicators of elite activities, chronological and spatial dimensions of the collapse must also be examined through the recovery and analysis of archaeological data at the regional level. Though spatial representations of the collapse are not able to tell the exact cause, they can help researchers define some of the parameters contributing to the reduction in the number of Maya polities at the end of the Classic Period.

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XX IDENTIFYING HINTERLAND BORDERS?: AN INITIAL REPORT ON THE 2011 ARCHAEOLOGICAL INVESTIGATIONS AT SAK POL PAK, CAYO DISTRICT, BELIZE

Jon Spenard, Bryan Reece and Terry G. Powis

This paper presents the initial results of the Pacbitun Regional Archaeological Project's (PRAP) 2011 investigations in Pacbitun's periphery. Our investigations throughout the region have documented a complex settlement pattern that spans a range from isolated residential clusters to medium-sized centers. The presence of these centers challenge the traditional understandings of Pacbitun as an isolated center on the south rim of the Belize valley to one with a highly populated, multifaceted local interaction network. PRAP's research this season focused on the hilltop site of Sac Pol Pac, the largest of Pacbitun's hinterland centers. Our study of this site was designed to obtain a better understanding of the relationship between it and Pacbitun. We situate our understandings of both of these places into their broader geographical contexts to inform our understandings of them. Specifically, the location of Sac Pol Pac on top of a geographically unique hill that contains several caves and rock shelters and a stream flowing into its base rather than on the flat plateau below suggests that ideological factors may have played a significant role in its establishment. We offer several initial observations about this site, discuss the sociopolitical relations between it and Pacbitun, summarize the research done at the site to date, and offer avenues for future research.

Introduction

This report discusses the Pacbitun Regional Archaeological Project's (PRAP) 2011 archaeological investigations at the site of Sak Pol Pak, offers an initial interpretation of it, and suggests several avenues for future research there. The site is located on a hilltop at the foot of the Maya Mountains approximately three kms to the southwest of Pacbitun in the Cayo District, Belize (Figure 1). Our research there is part of a larger settlement survey in Pacbitun's hinterlands. Two main goals guide this larger survey. The first is to begin to understand the various local and regional communities that comprised and interacted with Pacbitun. The second is to begin to calculate settlement density throughout the region. Finally, we wanted to address questions related to the settling of Sak Pol Pak. In particular, when was it settled, and why?

We chose to investigate Sak Pol Pak for several reasons. The site is dominated by a pyramid that rivals in size to those found at Pacbitun, though its epicenter is much smaller (Figure 2). Secondly, it is secluded from everything around it by its positioning atop a steep-sided, isolated hill. This architectural complex and isolation suggest that this was a significant settlement within Pacbitun's political sphere of influence. Nonetheless, what made it stand out also made it problematic because models for habitation that consider proximity to vital resources, particularly water (e.g. Vogt 1969) and farmable land (e.g. Fedick 1994, 1995; Fedick and Ford 1990), are unable to account for why the Maya would have chosen to settle there. We developed a landscape archaeology model that treats the world as an active agent in decision-making processes to address these issues with Sak Pol Pak. Our model draws heavily on cave archaeological research done throughout Mesoamerica (Brady 1997; Brady and Ashmore 1999; Heyden 1973, 1975), hieroglyphic and iconographic studies (Stuart 1987, 2005; Stuart and Houston 1994; Stuart and Vogt 2005), and ethnographic data of contemporary Maya groups (Adams and Brady 2005; Hernando-Gonzalo 1999; Vogt 1969; Wilson 1993, 1995), all of which demonstrate the significance of landscape features to the Maya, especially mountains, caves, and water. This approach allows us to address the need for Maya archaeologists to consider the role of the landscape in conditioning ancient settlement decisions as suggested by Ashmore (2003:12).

A Landscape Approach to Maya Settlement Distribution

A discussion of previous archaeological studies in the Belize Valley and the Pacbitun region is necessary to understand the uniqueness of the site, to contextualize our research design,

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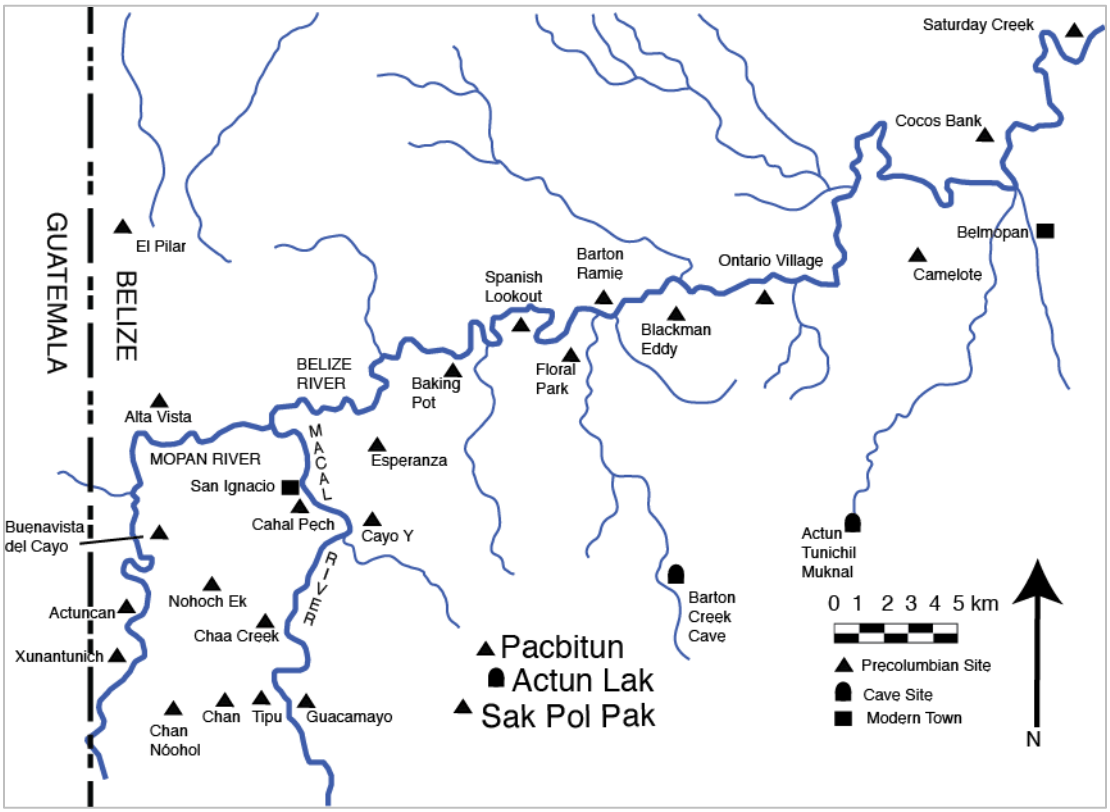

Figure 1. Map of the Belize Valley.

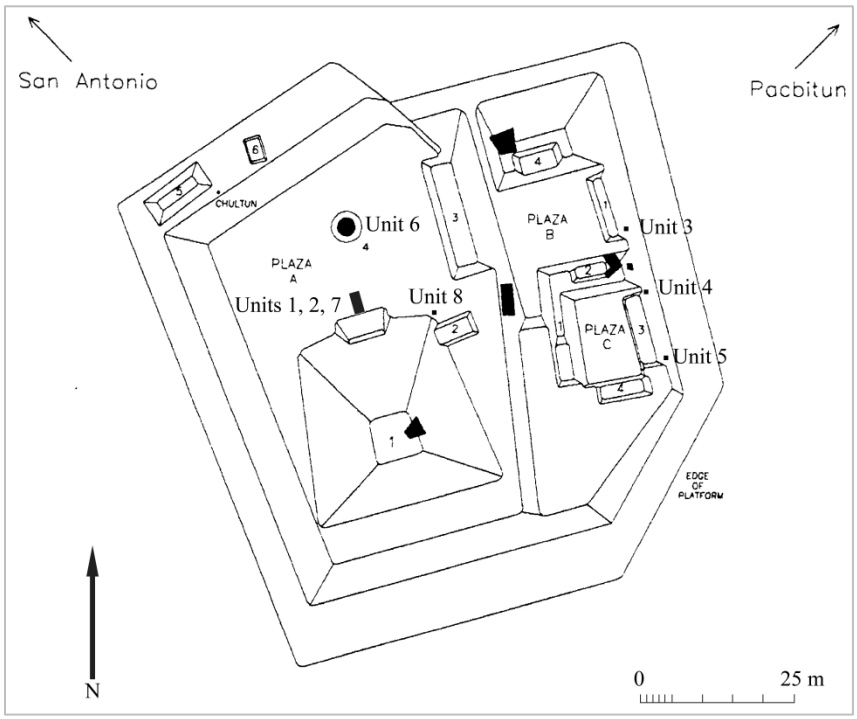

Figure 2.: Map of Sak Pol Pak with PRAP unit locations indicated (adapted from Conlon 1999).

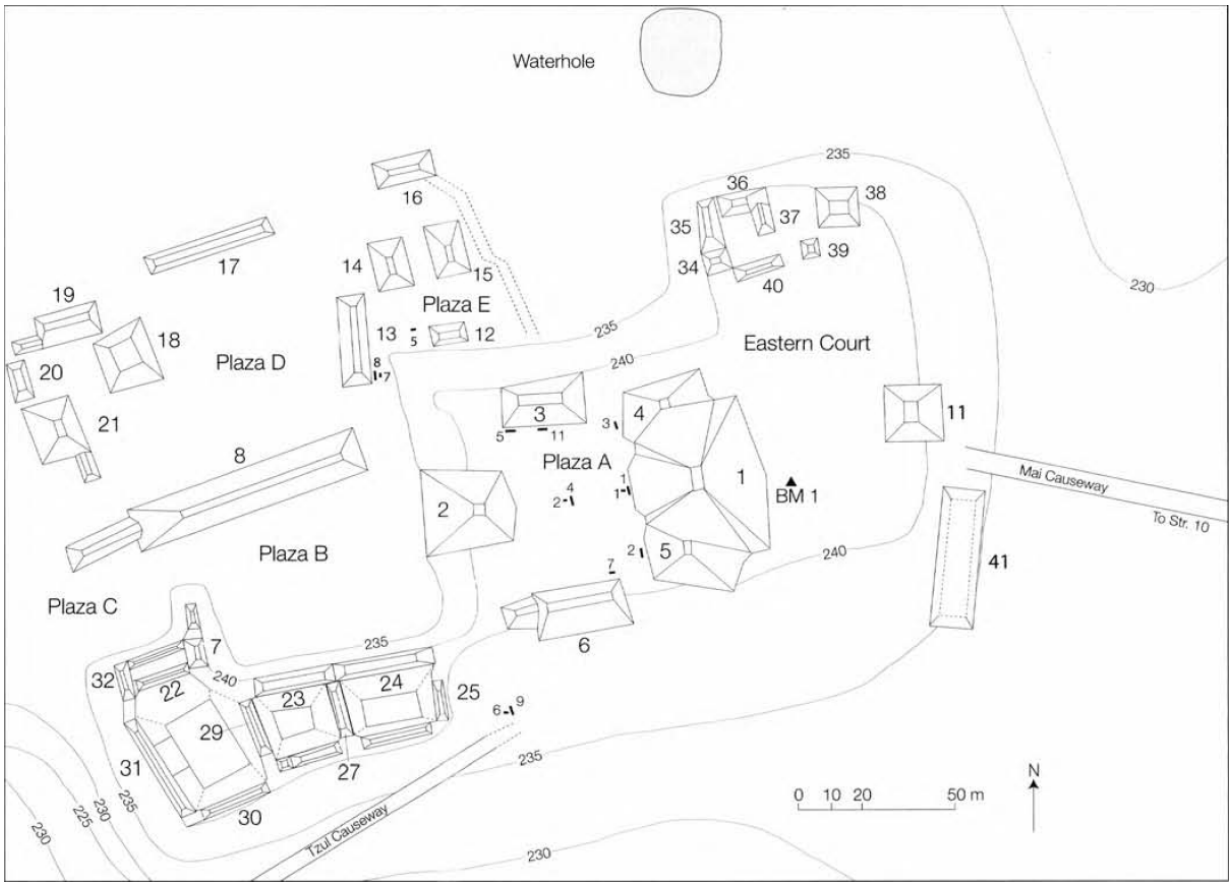

Figure 3. Map of Pacbitun's epicenter (adapted from Healy et al. 2007).

and highlight its utility for projects elsewhere in the Maya lowlands. Archaeological investigations in the Valley began in earnest with Willey's (1965) settlement survey in the region focusing on Barton Ramie. Belize was seen as little more than a gateway to the central Peten, Guatemala with little of archaeological interest prior to their work (Chase and Garber 2004). One of the most significant results of their project was the recognition that the Valley was much more densely populated than previous models had suspected. Nearly 50 years of subsequent research since has demonstrated that most of the major centers were settled during the Middle Preclassic period and were abandoned during the Postclassic period. These investigations have also demonstrated that the condition of the local terrain and soil fertility largely dictated Prehispanic settlement. Flat, fertile lands along the Belize River and its tributaries were the most preferred. The resulting pattern best resembles a central-place model of habitation. The majority of sites are spaced equidistant from each other surrounded by smaller settlement clusters. This pattern suggests that economic logic dictated settlement. In other words, people seem to have settled areas that provided easy and direct access to good, farmable lands while being spaced far enough apart that regular conflict could be avoided (Fedick 1994, 1995; Fedick and Ford 1990; Ford 1990, 1996).

Pacbitun has often been considered unique among these other sites because of its location on the southern rim of the Valley well above the alluvial plain of the Belize River, and directly adjacent to the Mountain Pine Ridge. No other known large site is situated at such a unique geographic setting. This location provided easy access to differing ecozones and resources such as slate unavailable in the Valley below (Healy et al. 1995). The site itself is oriented east to west along three major plazas, A, B, C, with another two, D and E, located to the north of the main site axis (Figure 3). While the site, and its agricultural sustaining area, likely covered a

territory of at least nine km^2, the epicenter covers only about 0.5 km^2 . This "downtown" zone is marked by over 40 masonry constructions, some as much as 12 m tall, including temple-pyramids, palace-like range structures, a ball court, five plazas, three causeways, and a number of smaller courtyard groups. The remains of 20 *stelae* and altars have also been recovered in the epicenter. Ceramic data suggest that the site thrived for close to 2000 years being first settled in the Middle Preclassic period (ca. 800 BC) and abandoned by the beginning of the tenth century (ca. AD 900).

Previous archaeological investigations in Pacbitun's hinterlands used a settlement survey method. Such an approach attempts to understand the layout of buildings in relation to each other (Willey 1953:1). Healy's (1990) work in the site's periphery consisted of the mapping and systematic excavation along four-one km long transects fanning out from the site's epicenter. His project and more recently, the work by PRAP over the past few seasons have recorded numerous settlement clusters and walled, hilltop temples dotting the region, several of which are connected by a series of ancient causeways (Spenard 2011; Weber 2011). Nonetheless, Healy's (1990) transects have been the only large-scale systematic archaeological investigations performed in the periphery to date. PRAP's research at Sak Pol Pak and reconnaissance throughout Pacbitun's periphery demonstrates that the region was densely settled as far away as six kms west from its epicenter, nearing the unstudied site of Guacamayo. As we expand our scope elsewhere, we expect that settlement will remain dense throughout the region.

Sak Pol Pak was named by the residents of the nearby town of San Antonio after a young, white-haired individual who owned the land upon which the site sits and the large, white cliff face that can be seen approximately half-way up the mountain (Figure 4). "Sak Pol Pak" translates to "White Head's Cliff." A large cave opening is located at the northwestern base of the hill into which flows a perennial stream. Several rock shelters and other shallow caves are reported to exist in the cliff face, though we have yet to relocate them.

Figure 4. Photograph of Sak Pol Pak hill and white cliff face. Str. A-1 indicated by bump on right side of hilltop.

The only archaeological investigation performed at this site prior to our work was a two-day mapping and looter trench cleaning expedition in the mid-1990s by Jim Conlon then of the Belize Valley Preclassic Maya Project (Conlon 1999). Conlon (1999) recorded the site as "Pol Sak Pak," but we argue in favor of changing the name to "Sak Pol Pak" as the latter phrase is properly arranged in Yukatek Mayan. Conlon (1999) documented three interconnected courtyards, with 14 structures, two of which he determined to be nonresidential. He designated the largest courtyard Plaza A, and it contains the two nonresidential buildings, an 11 m tall pyramid located to the southern side of the plaza, and a round temple structure to the north of it (Figure 2).

In order to contextualize our research at Sak Pol Pak, we first need to discuss the theoretical framework that shaped it. We will only touch briefly on our first goal of the season, which was to understand the various local and regional communities that comprised and interacted with Pacbitun. This is an ongoing, multi-year component of the project that will investigate the other hilltop plazuela groups that have been identified in the region. We have noted that clusters of house mounds frequently surround these groups, a pattern that Smith (2010) has recently defined as districts and neighborhoods in the Maya area. When studying these groups we will be looking for patterns between them that are indicative of shared practices that indicate community

membership. The three main lines of evidence that we will use to address this question are architectural plans, like those developed at Tikal by Becker (1971, 1982, 1983, 2003a, 2003b), patterns in ceramic decoration and production like those identified in the K'axob region by Bartlett and McAnany (2000), and the presence of the causeway system that connects various areas of the periphery and Pacbitun's site center (Weber 2011; Weber et al. 2011). Becker (1971, 1982) identifies several types of plaza plans around Tikal that he argues were indicative of different local communities. These plans varied by the arrangement and content of structures. Bartlett and McAnany (2000) recognized that the communities around K'axob distinguished themselves from each other through characteristics such as forms, decoration, shape, size, and the placement of features such as handles, spouts, etc. As we currently only have a sample size of one from the hinterlands, we are unable to say anything more at this time about the local communities surrounding Pacbitun except to note that we have observed them up to six kms distant from the site core.

We modeled our research using an archaeological landscape framework to address our goal of when and why the Sak Pol Pak was settled. Such an approach considers the natural and cultural setting in which a site is located. We were particularly interested in what potential role the mountain and any caves, and springs played in choosing that particular location for settlement. Accessing the site is no small feat. The first half of the hill consists of a relatively gentle slope followed by a sharp incline of approximately 20-30 degrees. The archaeological community frequently understands such locations as defensive outposts but the presence of the 11 m tall pyramid and round temple suggests an alternative ceremonial function or functions for the center. Several interrelated possibilities arose.

The first possibility is that the site was chosen for settlement because it reflected the ideational landscape of mountains, caves, and water, as mentioned above. This arrangement of features is a foundational aspect of ancient Maya geographic understandings (Brady and Ashmore 1999), but ethnographic evidence suggests a deeper symbolic relationship between them. A glance around the region that the Maya inhabited will reveal the connection between these places. All three frequently occur in conjunction throughout the Maya world. The Popol Vuh, the 16th century Quiche Maya creation story recorded in the Guatemalan highlands, names this group of features as the first to appear when the gods created the world (Tedlock 1996). The translated text reads, "for the forming of the earth they said "Earth."…Then the mountains were separated from the water, all at once, great mountains came forth…And the earth was formed first, the mountain-plain. The channels of water were separated; their branches wound their ways among the mountains." Though caves are not explicitly mentioned in this opening text, they are implied through the mentioning of the mountains because they are conceptually indivisible aspects of them. Miller and Taube (1997) note that the ocean is thought to be the primordial waters from which the earth rose and now floats on and the subterranean waters found in caves and cenotes, as well as surface freshwater are believed to be from this same source. Finally, caves were understood to be the habitation place of Chahk, the rain god, further demonstrating the connection between caves, mountains, and water.

The specific phrasing used in the Popol Vuh of the mountain-plain appears among other Maya groups in the ethnohistoric past and present. For example, a 1565 Guatemalan land title dispute document called the Titulo del Barrio de Santa Ana frequently mentions a series of mountain tops and rivers followed by the phrase, "these are our mountains these are our valleys" (Sapper 1906). A similar phrase, *tz'uultaq'a*, or mountain-valley, appears among the Qeqchi Maya of the Alta Verapaz and southern Peten Guatemala today. But the *tz'uultaq'a* are understood as more than just mountains. They are animate beings that act like people. They hold council meetings, frequently walk around, and are subject to the full range of human emotion including love, jealousy, and envy. For example, a story about the mountain, Xucaneb, involves his daughter's theft by a local mountain that was in love with her, and a bribe paid to her first suitor to get her back as advised by a council of other *tz'uultaq'a* (Danien 2005). These beings are more than devious trickster's,

Figure 5. East profile of Sak Pol Pak Plaza A excavation units 1, 2, and 7.

they are also the foundation of community identity. Each Qeqchi community will recognize up to 13 of these mountains as significant landmarks, but one always stands out as belonging specifically to them (Adams and Brady 2005; Hernando-Gonzalo 1999; Wilson 1993, 1995).

Communities identifying with particular mountains and their caves have a deep history in greater Mesoamerica. For example, the Nauhatul term, *altepetl* translates to water-mountain, but also means community. Further, logographs for town names throughout Postclassic period Mexico consist of a hill, often times with water flowing from a stylized cave beneath them. The connection between communities and mountains is also seen archaeologically. For example, many scholars have noted the similarity in shape between the Pyramid of the Sun at Teotihuacan to the mountains behind it. Further, a large, artificial cave was found directly beneath the pyramid terminating approximately beneath its center (Heyden 1973, 1975). Brady (1997) has noted that caves and springs played a primary role in determining settlement configuration in the Petexbatun region. Specifically, a distinctive pattern between caves and administrative and ritual architecture was noted (Brady 1997; Brady et al 1997). In fact, all of the major public structures appear to have been associated with caves in some way including the Bat Palace, el Duende pyramid, and the Main Plaza. This pattern is repeated at several other sites in the Petexbatun region including Las Pacayas, and Aguateca, and has been recorded elsewhere in the Cancuen region in the Alta Verapaz, specifically at the site of Raxruja Viejo where settlement is dispersed between cave-filled hills (O'Mansky 2003; Woodfill et al. 2002). Raxruja's main plaza is delineated by a series of range structures and platforms extending from the hills. Altars are set up on these platforms, suggesting that the hills were being treated the same way as pyramids in other lowland Maya sites.

Ethnohistoric documents created during Spanish colonization provide information on the foundation of communities and their structure. García-Zambrano (1994) summarized the unpublished Town and Land Titles documents housed in the National Archives in Mexico City that were collected from several Mesoamerican groups under the rule of King Charles V. The documents described the rituals that were performed when founding a town. A high level of similarity exists among the various groups represented in these documents, suggesting that these practices were pan-Mesoamerican. Cosmovision played the dominant role in deciding on a new area of land to settle. A spot that resembled the first moments of creation was especially sought out. This ideal pattern consists of four corner mountains framing an aquatic universe with a fifth in the middle. The central mountain was the most important because it would become the axis mundi, origin place, or center of the settlement. Ideally, it had to contain caves and springs, though if it did not, artificial ones were commonly excavated. This cave became the mythological origin place for the people of the settlement, and proof of their ownership of the land. A horseshoe-shaped layout of the hills called a *rinconada* was most preferred because its edges marked the transition between the wild and tame spaces.

The foundation rituals began after the location was chosen using the above criteria. They typically constituted a counterclockwise-moving procession beginning and ending on the center mountain. The first action is the sighting of opposite corners of the territory that creates an "X" over the central point. Next, the borderlands were measured with a rope, and permanently established by the setting of stone markers called *mojoneras*. The procession returned to the central mountain after the four sides were established, and boughs were burned. Finally, arrows were shot to the four corners, creating a quadripartite space.

This landscape framework suggested to us several possibilities to address our second research goal, which was when and why was Sak Pol Pak settled? Specifically, did the caves, springs, and uniqueness of the hill play a role in determining the settlement of this site, or could this place have been chosen because it was a directional boundary shrine of Pacbitun?

Sak Pol Pak 2011 Excavation Results

Plaza A

The excavation goals of Plaza A were to establish a chronology for the site, and gain a better understanding of its constructional sequences (Figure 2). We began by identifying what we believed to be the central axis of Str. A-1 using Conlon's (1999) tape-and-compass map. We determined the central point of Str. A-1 by measuring the width of its southern base. Next this point was compared to the structure's platform and its orientation by line-of-sight to Str. A-4. Based on these calculations a 2 m x 2 m unit, Unit 1, was placed in front of the calculated central access point to the structure's platform (Figure 5).

Unit 1 was excavated through two cultural levels to bedrock at 58 cm below ground level in the middle of the unit. The bedrock sloped off to the north and south of the unit and measured as deep as 130 cm. No evidence of a plaza floor remained and the degree of preservation for the ceramics recovered left many of the sherds unclassifiable. Some of the diagnostic sherds located close to bedrock were identified as Sierra Red found in the Barton Creek ceramic sequence (300 – 100 BC) (Gifford 1976:85). However, because of the lack of a plaster floor no definitive evidence exists that they were recovered from a sealed context.

Since bedrock was reached so quickly we decided to expand the unit south towards the temple in effort to recover artifacts from a sealed context. This again revealed no signs of a plaster floor or the beginning of the stair case so an additional unit, Unit 7, a 1m x 2 m was opened and excavated through four cultural levels. This new unit revealed the corner of a two-course basal stair (with one facing stone being well-preserved), and two charcoal samples that were collected at 106 cm below ground level. Five ceramic sherds were recovered from Level 4, which is believed to be the only level in a sealed context. We believe that the context is sealed because of how close it is to the temple, and the presence of a hard packed, dark brown (7.5YR 3/4) soil the artifacts were recovered

from. Two sherds were identified as Fowler Orange-red: Spring Camp Variety found in the Hermitage ceramic sequence (AD 280 – 590) implying that construction at Sak Pol Pak began as early as the Early Classic (AD 250 – 600) (Gifford 1976:155). Some Late Preclassic (300 BC – AD 1) and Protoclassic (AD 1–250) sherds were identified in the lower levels but none were recovered in a sealed context. These data suggest that the site, or the location prior to construction, may have been used during this time. Artifact assemblages recovered from all of these units were fairly homogeneous consisting of small, highly eroded ceramics, slate including one broken carved pendant, low quantities of lithics, and three marine shell beads.

Units 6 and 8 were the other two units excavated in Plaza A. Unit 6 is located inside of a looter's trench dug into Str. A-4, a round feature which may be an altar (Conlon 1999:36). The looter's trench was cleaned revealing a small quantity of non-diagnostic sherds, and a small slate fragment (Conlon 1999). The unit ended before sterile was reached. Our excavations reached bedrock, though we recovered fragments of plastic near the bottom suggesting that the looting had reached a similar depth. Unit 8 was placed in the northeast corner of Str. A-1 to retrieve more evidence of the site's construction history and was halted after two levels ending at the top of huge dry stone core fill.

Residential Zones

Conlon (1999) identifies the residential zones as including one unrestricted plaza, Plaza B, and a restricted plaza, Plaza C, both lying to the east of Plaza A, and oriented north-south. To gain a better understanding of the everyday lives of the Maya at this site, three units, Units 3, 4, and 5 (Figure 2), were placed behind the eastern side of the Plazas B and C. This location was chosen because it offers the best opportunity to locate residential middens, the contents of which can help inform about such practices.

Unit 3 consists of four levels and yielded mostly highly eroded ceramics and high quantities of slate including one slab measuring 70 x 31 x 13 cm. One obsidian blade fragment and a half of a mano were recovered beneath the slab, after which we reached bedrock. One Mount Maloney Black: Mount Maloney Variety (Gifford: 1976:143) rim sherd and one Belize Red (Gifford 1976:255) body sherd were recovered from Level 4, representing the only diagnostic ceramics recovered from the unit.

Unit 4 consists of two levels. It produced highly eroded pottery, two mano fragments, and possibly the spiral end of one pear whelk (*Busycon spiratum*) shell. Cut limestone blocks were also recorded in the north wall. Their configuration suggests that they may have served as a stairway.

Unit 5 was the shallowest unit of the three residential excavation units. It reached bedrock at 10 cm below surface. Few artifacts were recorded though a nearly complete metate was recovered, suggesting that food was being produced at the site and that it was regularly occupied.

Discussion and Conclusion

Overall, our initial investigations in the residential areas and into Plaza A of Sak Pol Pak indicate that this site was an average minor center. Nonetheless, what makes it unique is the presence of the pyramid, the height of which rivals that of the one at Pacbitun, and the round structure opposite of it. Similar round structures have been dated to the Terminal Classic period in other areas of the Maya world. To gain a better understanding of the significance of this settlement, future investigations will need to focus on these structures. The community foundation rituals discussed by Garcia-Zambrano (1994) incorporate the creation of stone piles that act as temporary boundary markers that are eventually replaced by stelae Though none were recovered during our excavations a possible altar was noted in the profile wall of the Plaza A units suggesting that a stelae may also be present. If so, was Sak Pol Pak was one of the directional boundaries of Pacbitun? Furthermore, what was the function of Str. A-1? Was it the Late Classic period boundary marker, or did it have some other function? Other questions to be addressed by future research include, who were the Maya inhabiting this site? Conlon (1999:32) estimates a population of 50 based on the number of domestic structures. Were they caretakers of a scared location and their retainers, or were they

the commoners and elite that typically composed populations of other ancient Maya sites? Time did not allow for a fuller investigation of the caves and springs at the foot of the hill this season, and will therefore be a focus of investigations in coming seasons.

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XX ASSEMBLAGES IN FOCUS: ASPECTS OF THE CULTURAL LANDSCAPE IN THE PERIPHERY OF THE ANCIENT MAYA SITE OF PACBITUN, BELIZE

Jennifer U. Weber, Jon Spenard, and Terry G. Powis

Archaeological investigations in the periphery of the ancient Maya site of Pacbitun have revealed a complex pattern of cultural features such as a causeway system and agricultural terraces interspersed and associated with landscape features such as caves and springs. The primary objectives of the ongoing landscape studies around Pacbitun are to: 1) ascertain the construction periods of the causeway system and its corresponding architecture; 2) determine how the caves were being used and who controlled access to them; and 3) continue to trace the development of Pacbitun as a major ceremonial center. This paper presents preliminary results of our findings to date. In order to determine the relationship between the site center, the causeway system, and the caves in the Pacbitun periphery, the results will be compared with other ancient sites on intra- and inter-regional levels.

Introduction

Pacbitun, an ancient Maya site located in the foothills of the Maya Mountains in the Cayo District of Belize, presents archaeologists with the unique opportunity to investigate the relationship between the site core and various caves, located in its nine square km periphery. The recording of natural and cultural features situated in this area will help us to better reconstruct various aspects of the ancient Maya society at the site. For example, recorded features, like housemounds, water sources, and constructed causeways provide clues about the socio-political and cosmological environment. Particularly targeted in this paper is the causeway system encountered during past field surveys, which connects the site core to a ritually used cave. Through the application of ArcGIS's least cost path analysis tool, we will systematically test and discuss to what extent testable predictions can be made about the causeway routes linking the site of Pacbitun to its hinterland caves.

Pacbitun Background

Pacbitun is situated at the juncture of two eco-zones: the lowland tropical rainforest and the Mountain Pine Ridge (Figure 1). The surrounding terrain is hilly with naturally fertile soils trapped in low-lying catchment basins and valley-like depressions. First inhabited about 800 BC (Healy et al. 2007), Pacbitun reached its peak of cultural development during the Late Classic (AD 600-900) period at which time it likely controlled an area of nine square kilometers. Ceramic analysis indicates that the site was possibly abandoned by the beginning of the tenth century (Healy et al. 2007).

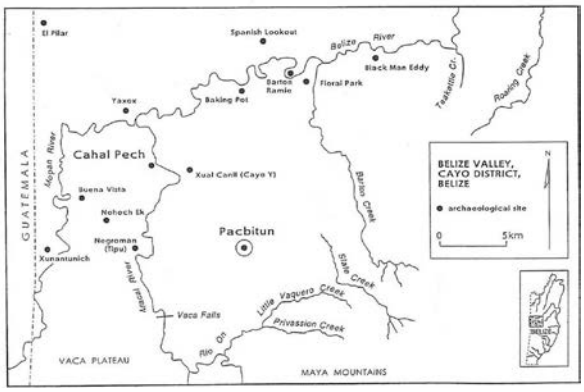

Figure 1. Major centers located in the Belize Valley.

Cave Research 2010-2011

To date, approximately 25 caves have been identified in the Pacbitun periphery. Three of these caves were mapped in 2009 (Actun Merech, Actun Pech, and Tzul's Cave) (Powis 2010). During the 2010 field season, the goal was to survey the area between the site core and these three previously investigated caves (Figure 2). Due to its location close to the other three caves, we incorporated a newly found cave, designated as Crystal Palace, to the area of investigation, widening the prior research area towards the East (Weber 2011; Weber and Powis 2010) (Figure 3). A primary focus of cave investigations during the 2011 season was Actun Lak, which was first recorded during reconnaissance the year before. It was chosen

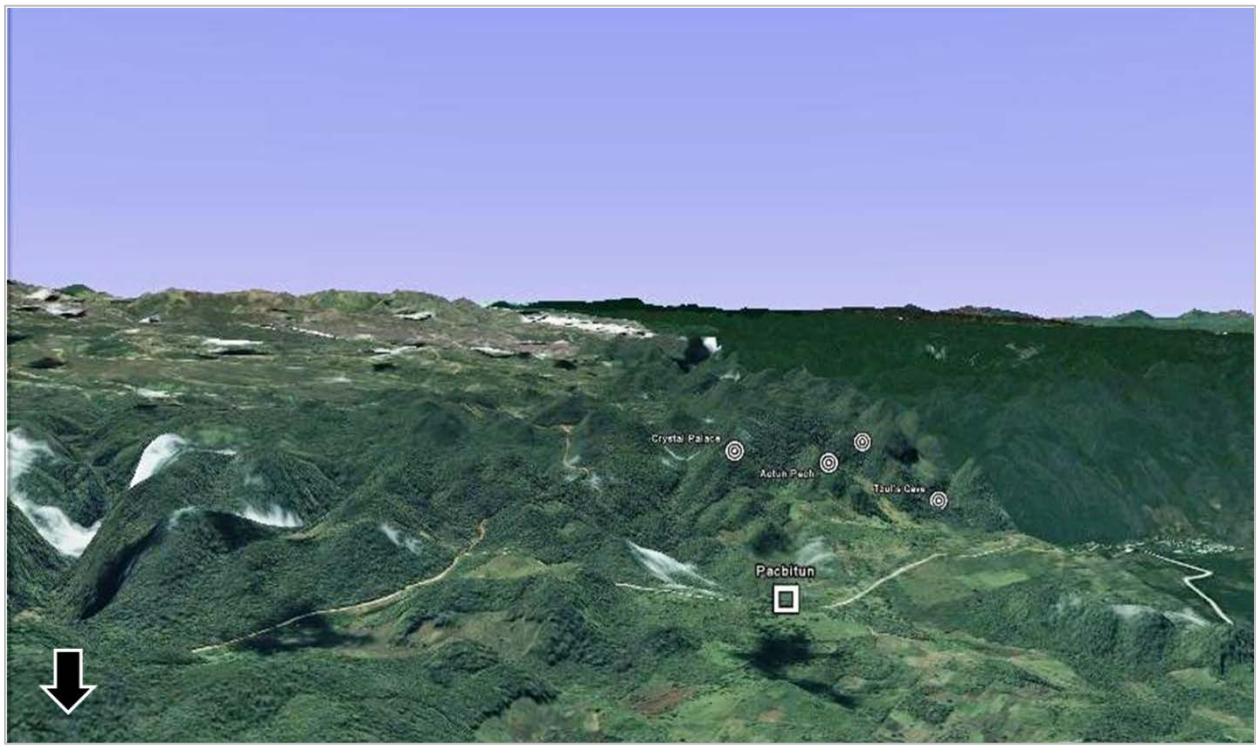

Figure 2. Location of Pacbitun in relation to Tzul's Cave, Actun Pech, Actun Merech, and Crystal Palace.

Figure 3. Location of caves in the periphery in relation to each other.

for investigations because of the unusually high quantity of pottery found throughout, the presence of a group of stalagmitic formations with a natural pavement of fist-sized stones in front of it, and an area of intensive burning, all of which was unseen in the other known caves in the region.

Aktun Lak

Aktun Lak is 45 meters long and consists of three chambers and four ledges. Large quantities of pottery have been found throughout the cave, though a great majority of the sherds are now found swept to the sides of the cave and stacked in piles on small ledges and alcoves, all of which are activities of the land owner who has moved them aside to protect them from being trampled on by tour groups and other visitors to the cave.

We would like to briefly touch on three areas of the cave and present some initial observations made throughout the field season. The first is the entrance area where a five to seven course high terrace created a flat space in the otherwise sloping entrance area (Figures 4 and 5). Furthermore, it was placed along the cave wall directly in front of a three meter drop. The terrace was constructed of uncut stone and laid without mortar. Similar constructions are common in caves throughout the Maya area. For example, the Entrance 2 area of Actun Chapat excavated by Josalyn Ferguson (2000, 2001) in the late 1990s near the Macal River contains a series of step-like terraces that reach up to the ceiling. Amalia Kenward (2005) recorded terraces, single-course stone lines, and other masonry configurations throughout the caves in the Sibun Valley. Kenward argued that these constructions likely delineated paths through the caves. The positioning of the terrace in Actun Lak adjacent to the cave wall and 3-meter drop suggests a function for this construction that is unrelated to the movement of people through space (Kenward 2005). The formations of the cave choke off at this point, which prevents a person standing there from seeing deeper within. This setup negates the possibility that it was constructed as a viewing platform for audiences to witness activities being performed further within (Kenward 2005). On the other hand, it is situated in a location that is

Figure 4. Actun Lak entrance.

Figure 5. Actun Lak, depicting Terrace 1 from the inside.

ideal for people outside of the cave to view activities being performed on it. In other words, it likely acted as a stage for activities meant to be witnessed from outside of the cave.

The second area is the group of stalagmitic columns located roughly in the middle of the cave with an associated rough pavement of fist-sized rocks covered in calcite that extends for two meters from the base of the formation towards the cave entrance (Figure 6). The immediate surface area around the formation has been cleared of larger sherds, but the ground remains composed largely of smaller pieces, suggesting that this was a major focus of ancient activity in the cave.

Archaeological investigations throughout the Maya area suggest that such cave formations were symbolically powerful items. For example,

Figure 6. Stalagmitic Column in Actun Lak.

Chechem Ha contains a stalagmitic stela surrounded by a circle of stones in its rear chamber (Awe et al. 2005). Stela 31 from Yaxchilan, Chiapas, Mexico, is a cave-harvested stalagmite that was literally stuck in the ground and carved (Tate 1992). The recently recognized practice of harvesting these features and placing them within constructions also speaks to their significance. The depiction of a stalagmitic tooth in the mouth of the zoomorphic cave on the murals from San Bartolo, Guatemala suggests that the ancient Maya recognized these features as vital components of caves. Perhaps the most compelling evidence of the significance of these cave features is reported by Ian Graham (1997). He discusses a carved formation at the mouth of a cave in the Peten, Guatemala that was in the form of a life-sized Chaak. This statue, which has since been destroyed, suggests that cave formations may have been understood as the embodiment of the rain deity (Graham 1997; Saturno et al. 2005). All of these examples may explain the ritual attention that the Actun Lak stalagmite group appears to have received.

The final area of the cave is the altar found beyond the stalagmitic columns just discussed. The altar is constructed completely from harvested cave formations including curtains and dripstone columns. Unfortunately, this area has also been disturbed as evidenced by the large pile of formations that have been stacked in an alcove behind the altar. The area that houses the altar can best be described as highly burned. Smoke clouding and charcoal ash cover the walls and ceiling. Water screening of soil samples collected at Barton Creek Cave by Mike and Vanessa Mirro and Chris Morehart from a similarly heavily burned area resulted in the recovery of large quantities of vegetal material as well as cotton textiles suggesting that bundled offerings may have been made there (Mirro 2007; Mirro and Mirro 2001; Morehart 2002; Morehart 2005; Morehart et al. 2004). These results prompted our excavation of two small test units where all soil material was collected and water screened.

While we have yet to perform the ethnobotanical analysis, what we can report is that very high quantities of organic materials were brought in and burned in this area. Several large pieces of wood, as well as several fragmented pieces of greenstone were recovered. These remains suggest that high elite personages were among those visiting the cave and performing rituals within. Its proximity to Pacbitun, only 1.5 km nearly due north, suggests that the elite were likely from that site.

Peripheral Research 2010-2011

Aside from the caves, other survey finds in the periphery included, ninety agricultural terraces, eighty housemounds, six reservoirs, four plazuela groups, three rock shelters, two chultuns, two springs, two wells, one sinkhole, two stelae found in the fields, and several other structures (Figure 7) (Weber 2011). We also re-surveyed two causeways which had been recorded in the site core in previous years.

As a result of this work these causeways in and surrounding Pacbitun became a research focus. These raised roads built by the ancient Maya functioned not only as transport and communication routes, but also reflected different levels of social and political activities and thus can provide insights into these political

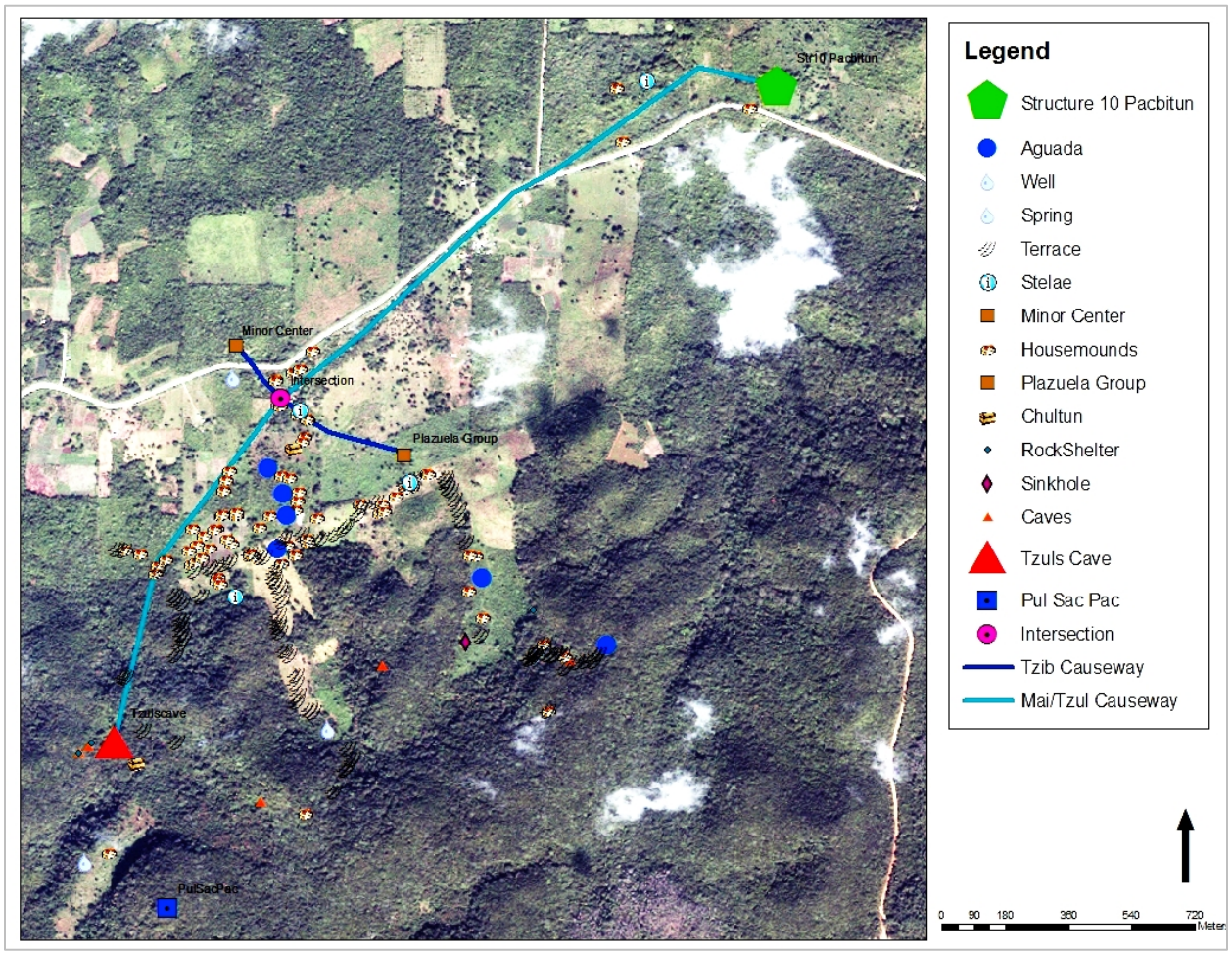

Figure 7. Survey results from the 2010 survey.

activities, social organizations, economics structures, and cosmological values on a site and regional level (Normark 2006). There are three causeways present at Pacbitun and in its periphery: Mai Causeway, Tzul Causeway, and Tzib Causeway (Figure 8).

The Pacbitun Causeway System

In the Pacbitun site core, the Mai Causeway begins adjacent to Structure 11 where it connects with Tzul Causeway (Figure 9). From there, it runs east for approximately 273 meters, before terminating in front of Structure 10. Tzul Causeway also starts at Structure 11 in the Pacbitun site core, similar to Mai Causeway. Modern construction has destroyed parts of the Tzul Causeway, especially where it crosses a modern road, but it re-emerges clearly visible on the other side. Approximately 900 meters from the site core, it intersects with another ancient Maya road, which was named Tzib Causeway (Figure 10). It then continues into the foothills, running for about 1.2 km until it terminates in front of Tzul's Cave. In total, Tzul Causeway is approximately 2.6 km long. Tzib Causeway is much shorter, only about 600 m in length, and connects a plazuela group to a minor center (Weber 2011). Preliminary results of the 2011 field season excavations into the causeway intersection revealed the well defined boulders of Tzib Causeway connecting to Tzul Causeway. The different styles between the two causeways suggest different construction periods, however, further investigations, including ceramic analysis of the construction fill will be required to follow up on this matter.

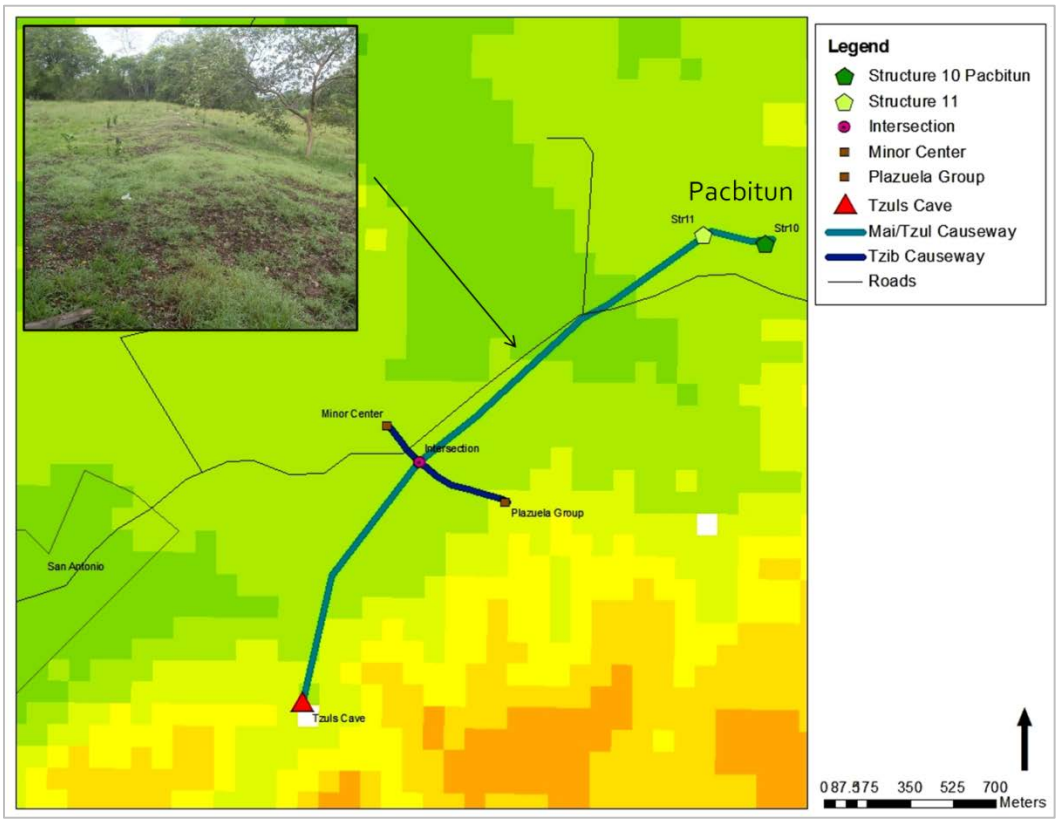

Figure 8. Map showing the recently surveyed causeway system at Pacbitun. The Mai Causeway runs from Structure 10 to Structure 11 in the site center. The Tzul Causeway runs from Structure 11 to Tzul's Cave. The Tzib Causeway runs from a plazuela group to a Termini Complex in the site core.

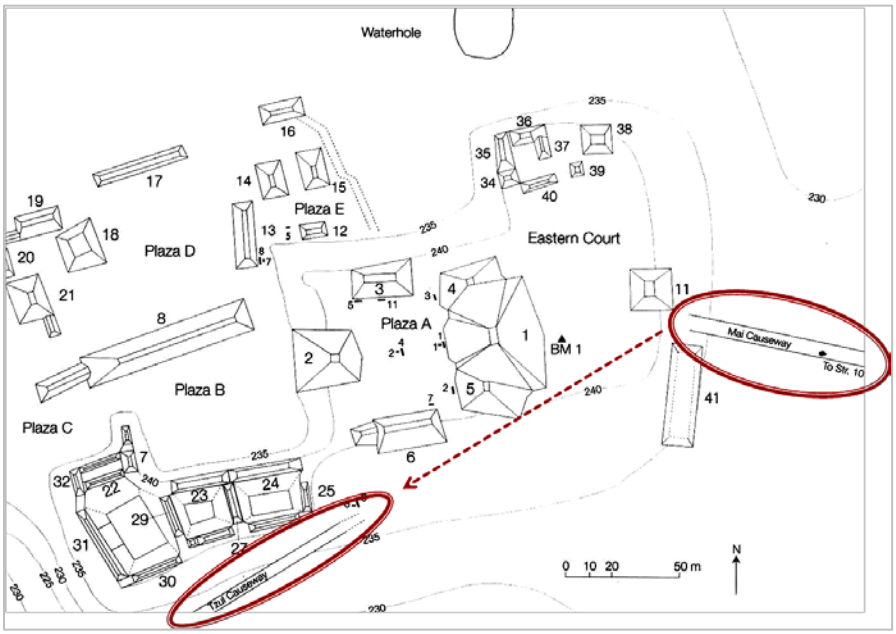

Figure 9. Map showing Mai and Tzul Causeways in the site core (after Healy et al. 2007; modified by Weber 2011).

Figure 10. Map showing the intersection of Tzul and Tzib Causeways.

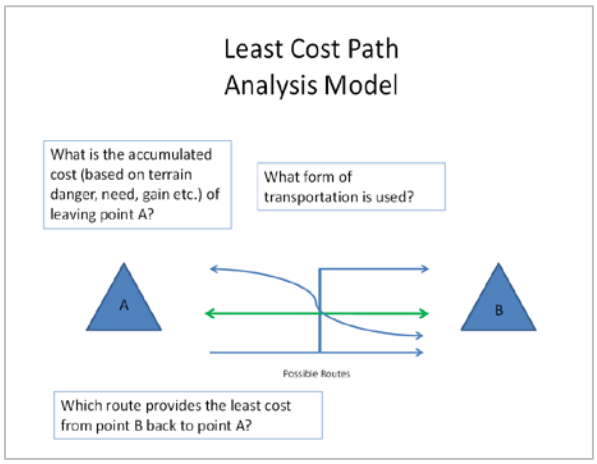

Figure 11. LCP Analysis Model (after Weber 2011).

Least Cost Path Analysis (LCP) – Pacbitun to Tzul's Cave

Considering the presence of several ritually used caves in the Pacbitun periphery, the question arose why the Maya built a causeway to Tzul's Cave and not any of the others. Causeways in association with caves are less common than causeways connecting architecture or settlements, but they have been found. Because caves were an important aspect of the ancient Maya world, one intriguing question regarding the causeway system targeted Tzul Causeway and its actual course. Since the causeway runs into the mountains, the terrain becomes very steep at times. To test whether the ancient Maya built the causeway to Tzul's Cave, based on the easiest route through the terrain or if there might have been another reason for its directional course, we decided to run a least cost path analysis, or LCP, from the Pacbitun site core to Tzul's Cave (Figure 11) (Weber 2011).

In order to calculate the least cost path analysis, a slope file from raster data was created. Next we created the cost distance, an output raster in which each cell was assigned the accumulative cost to the closest source cell, namely the Pacbitun site core in form of a single-point shape file (ESRI 2011). Given the cost distance and the destination cell, here Tzul's Cave, again a single-point shape file, we could then run the cost path analysis. Results showed a path running from the Pacbitun site core to the southwest for approximately 2.2 kilometers before running straight south for about 388 meters to Tzul's Cave. When reviewing the surveyed Tzul Causeway, it becomes apparent that the LCP follows the route of the actual road (Figure 12). Since the LCP was run solely based on slope data, this indicates that there is not an easier route following less steep elevation values from the valley to the cave. The causeway was indeed built following the lowest topographic features (Weber 2011).

Discussion of Causeway Symbology

Another intriguing aspect of the causeway system at Pacbitun, aside from the termination of Tzul Causeway in front of Tzul's Cave, is the intersection between Tzul and Tzib Causeway (Figure 13). Intersections in causeways often served as a way to connect terminal architectural groups with a more well-defined site core (Shaw 2008:73). Of course, the intersection of the Tzul and Tzib causeways could have been a simple consequence of connecting the minor center and plazuela group on either side of Tzib Causeway to the Pacbitun site core. However, this would still leave us with the question of why the intersection of Tzib and Tzul Causeways is where it is, since, to date, not other significant features have been encountered at this location (Weber 2011). Thus, more complex reasons behind causeway constructions need to be considered as well. For example, the process of building major causeways could have also served as a way to unify workers and establish a collective identity that would further the establishment of the territory as a single polity (Shaw 2008:111). The housemound distribution

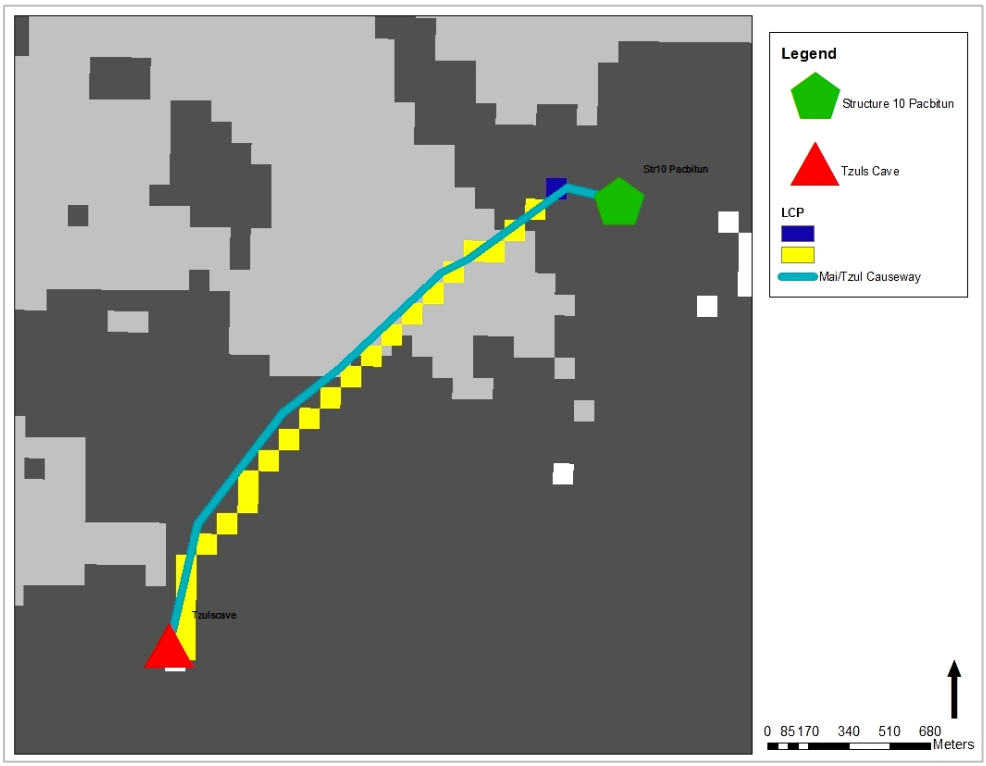

Figure 12. Least cost path analysis in relation to Tzul Causeway.

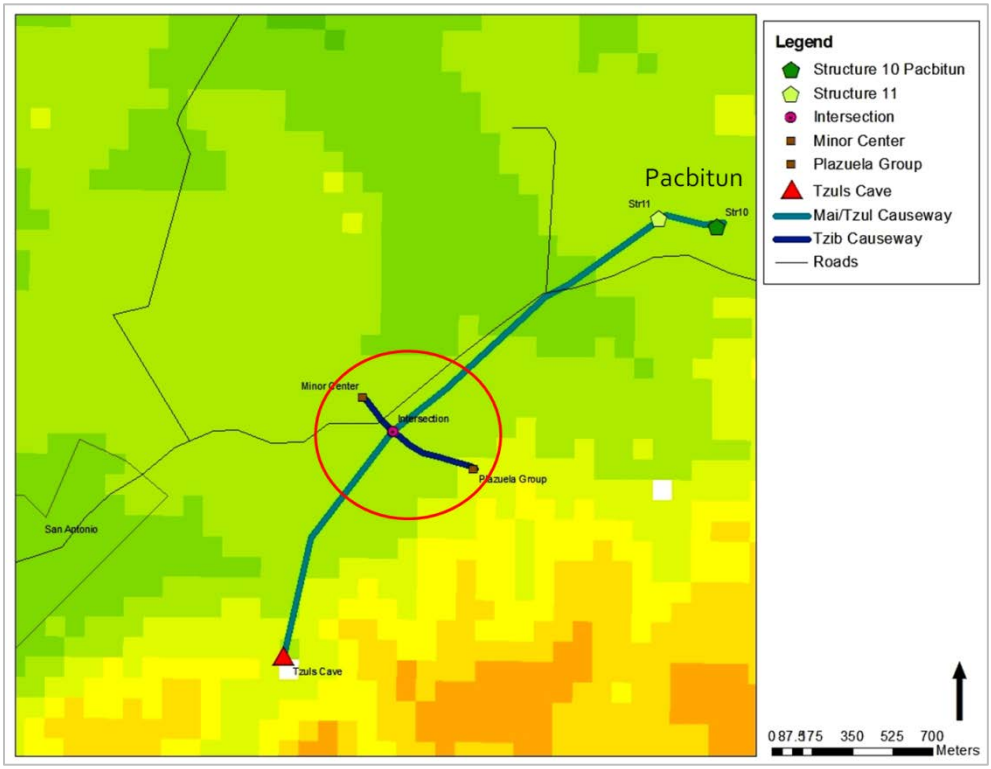

Figure 13. Causeway system with marked intersection.

Figure 14. Settlement around Causeway Intersection.

in the periphery of Pacbitun is clustered just south of the intersection of Tzul and Tzib Causeways. More importantly, they are also located in close proximity to four ancient water basins, or aguadas, which are aligned with a spring and dug well in the mountains (Figure 14). Close water sources are vital to farming, and settlement close them it a logical consequence found in ancient agricultural settlement patterns, as farmers will try settle where they need to in order to farm. Elites residing in the Pacbitun site core, most likely relied on food provided by the commoners and had an interest of tying their loyalty to the site center. A causeway, with practical and symbolic functions, would have been the perfect project for elites seeking to integrate and manage population (Shaw 2008:111).

A long causeway like Tzul Causeway could have undergone several construction and extension phases. It could have possibly first been intended as a connection to the commoner farms, as a symbol of power domination and symbolic importance. Tzib Causeway along with its minor center and plazuela group could have been connected for this reason, further establishing a visible and prominent link to the site center (Weber 2011). An extension of Tzul Causeway from the intersection to Tzul's Cave could have played into various aspects of this hypothesis, either further symbolizing the elite connection to the ritually charged cave or providing access to the cave for the commoners, again displaying dominance in the periphery, as it has been argued that for the ancient Maya, access to or control over sacred spaces and associated rituals served as a fundamental strategy for displaying, legitimizing, and negotiating social power (Prufer and Brady 2005). Here, the placement of monumental architecture over or near caves implied control over these sacred areas by the elites, who provided the financial backing for the construction of the monumental architecture (Prufer and Brady 2005). For example, while caves and cave ceremonies were used by both commoners and elites, elites could (and did in some cases) construct causeways to influence the pilgrimage to the cave (Prufer and Brady 2005).

Further, Stone (2005) argues that since caves and other topographic features have

inherent powers to open communication with spirits and ancestors, and could invoke a spiritual sense of the past which could not be duplicated by the built environment, it was necessary for the elite and the commoners to renew their ties with the sources of sacred power found across the landscape. Hence, pilgrimages to these natural sanctuaries were exploited by the elite to buttress their claim of divine status (Stone 2005:135). If the elite residing in Pacbitun were interested in displaying and reinforcing their power to the commoners residing in the periphery, Tzul Causeway would have been an adequate way to do so (Weber 2011).

Conclusion

As previously discussed, the analysis of the landscape and built environment can greatly contribute to the archaeological understanding of past societies. The GIS based least cost path analysis can help evaluate the components of movement and intention in these environments through predicting the most likely or unlikely route on which the ancient Maya might have build a causeway. The analysis of Tzul Causeway has shown that if the causeway had not been previously encountered, through running the LCP and then ground-truthing the result through a field survey, chances would have been good for it to be found. It has therefore been shown that predictive modeling can contribute important information to archaeological analysis as a research tool, but also as a supportive analysis device.

A common assumption to make about a causeway that leads to a cave would be to argue for cosmological and religious ideologies that caused the initial construction. While this explanation might very well be applied to the direction of Tzul Causeway from the site center to Tzul's Cave, it does not address the encountered intersection, nor why a causeway was built to Tzul's Cave but not any of the other caves in the periphery. Tzul's Causeway could have possibly first been intended as a connection to the commoner farms, as a symbol of power domination and symbolic importance. Tzib Causeway along with its minor center and plazuela group could have been connected in order to establish a visible and durable link to the site center. An extension to Tzul's Cave could have served to either further symbolize the elite connection to the ritually charged cave or provide access to the cave for the commoners, again, displaying dominance in the periphery with the multi-purpose causeway system whose use and meaning changed through time at Pacbitun.

The further investigation of the cave and causeway system in the periphery of Pacbitun through excavation and survey will hopefully provide us with more insights and continue to make a substantial contribution to our understanding of how ritual behavior and pilgrimages influenced settlement patterns or vice versa.

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XX FROM PRECLASSIC TO COLONIAL TIMES IN THE MIDDLE BELIZE VALLEY: RECENT ARCHAEOLOGICAL INVESTIGATIONS OF THE BREA PROJECT

Eleanor Harrison-Buck, Satoru Murata, and Adam Kaeding

During ancient times, Maya settlements in the Belize River valley were economically linked with the large inland city centers of the Petén region, as well as long-distance trading networks of the Caribbean coast that reached as far north as Yucatan. Extensive archaeological investigations have been conducted in the upper reaches of the Belize River valley, where sites like Xunantunich and Cahal Pech show strong connections in architecture and ceramic styles with the Petén. Surprisingly, the eastern part of the Belize Valley, closest to the coast, remains largely unexplored despite the key role this section of the river valley played in the movement of coastal commodities and luxury goods. The Belize River East Archaeology (BREA) project has documented numerous settlements, both large and small, east of the Saturday Creek site that have a deep history, extending from Preclassic to colonial times. Further work in this area will reveal key boundaries of social interaction at this important crossroads and provide insight into how Maya society was impacted during periods of major cultural upheaval—first during the Classic Maya "collapse" period and later during the Spanish and British Colonial periods.

Introduction

The eastern Belize Valley appears to have a long history that extends from the Preclassic through Colonial times. Here, we summarize the results of our investigations carried out during 2011, our first season of the Belize River East Archaeology (BREA) project (see Harrison-Buck 2011 for more details). The BREA study area encompasses the eastern Belize watershed between Belmopan and Belize City (Figure 1). The study area encompasses roughly 6000 km^2. For the purposes of sampling such a large area, five transects were chosen for more intensive investigation. These boundaries ultimately became obsolete as our survey team quickly realized that ancient Maya settlement is virtually continuous along the banks of the Belize River. In this chapter, we present the results of our settlement survey season during the month of January in 2011, which was followed by a 5-week summer season of mapping and excavations at several of the sites in the middle Belize Valley, including Ma'xan, Hum Chaak, and Hats Kaab (Figure 2).

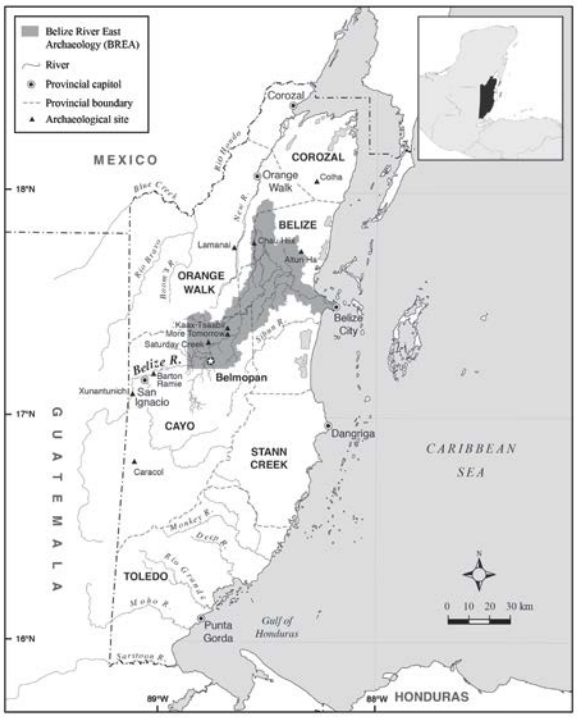

Figure 1. Map of the BREA study area (map prepared by M. Brouwer Burg).

Several goals for the project directed our investigations in 2011. One of our long-term research objectives is to develop a more comprehensive settlement history for the eastern Belize Watershed and better understand its broader relationship with other parts of the Maya Lowlands, including the upper Belize Valley and Peten region to the west, as well as areas to the north and south. Another goal is to pinpoint the location of a north-south overland route that stems from the headwaters of the New River that is noted in the Spanish ethnohistoric documents (Jones 1989). This route is believed to enter the middle Belize River around the site of Saturday Creek (Harrison-Buck 2010). An additional goal is to identify Terminal Classic occupation and examine the distribution of ceramics and architecture in this part of the Belize Valley.

Research Reports in Belizean Archaeology, Vol. 9, 2012, pp. 131-140.

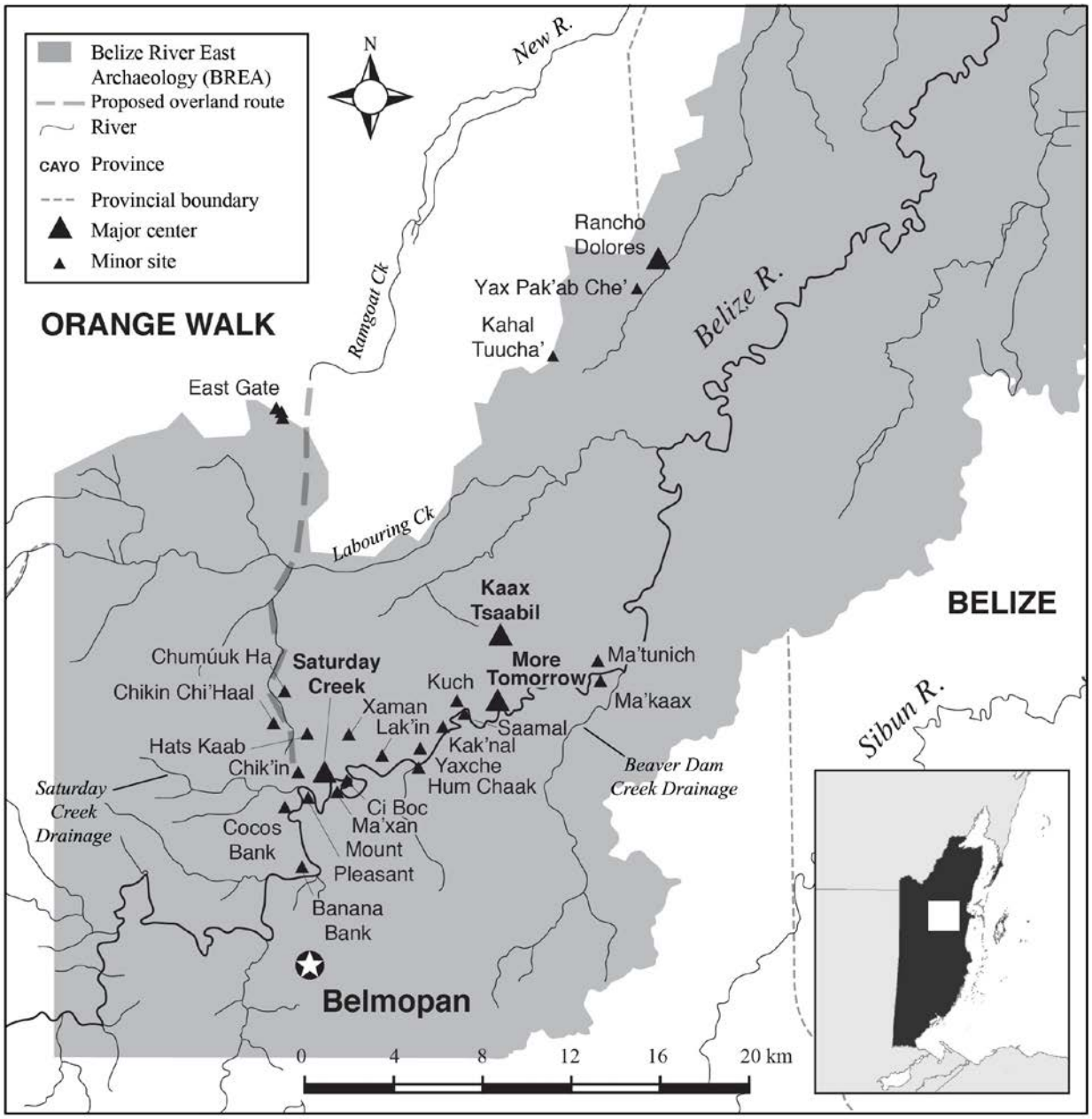

Figure 2. Close-up of the western half of the BREA study area showing sites discussed in text (map prepared by M. Brouwer Burg).

Finally, the BREA project also aims to better understand the colonial period occupation in the eastern valley and investigated several British colonial sites that were observed in our survey along the middle Belize River. Here we will provide an overview of our preliminary results from the 2011 season, with the exception of the colonial finds that are discussed elsewhere (see Kaeding et al., this volume).

Survey and Mapping

During the 2011 season, survey along the Belize River between Saturday Creek and the Beaver Dam Creek drainages revealed over 400 mounds that represent at least twenty discrete settlements with several others found farther to the north, proximate to the Labouring Creek and Spanish Creek drainages (Figure 2). In some cases, site boundaries were difficult to define as

the settlement along the main trunk of the Belize River is nearly continuous in many areas, particularly on the north side of the river. Here we identified three of the largest sites in the area, which include Saturday Creek, More Tomorrow, and Kaax Tsaabil.

The site core of Saturday Creek was mapped by Lisa Lucero and her team from 1998-2001 (Lucero 1999a, 1999b, 2002). The site is very large in aerial extent and we identified hundreds of smaller house mounds to the north, east, and west of the site center (what we refer to as Xaman, Lak'in and Chik'in, respectively). Directly across the river from the Saturday Creek site is another sizeable settlement that we have named Ma'xan (also known as the site of Never Delay). Adam Kaeding mapped this site with a Total Station during the summer season and we placed two excavation units there during that season. I discuss the excavations further below. The site of More Tomorrow represents another substantial Maya settlement that we located during the January 2011 season. The site is on the north side of the Belize River across from the modern village of More Tomorrow. Fortunately, the village residents have been good stewards for the site—it is in bush and has never been bulldozed or plowed and remains relatively undisturbed. We have plans to return to the site in the future to map it with a Total Station. More pressing, however, is the site of Kaax Tsaabil, which is located due north of More Tomorrow. The site is located on a ridge and the hilltops have been modified to create a series of plaza groups with sizeable mounds (Figure 3). Unfortunately, part of the site has been destroyed due to modern quarrying activity and at least one of the hills that apparently once held ancient structures has been destroyed. Even more unfortunate is that the site is still threatened due to more recent quarrying that has occurred in the last year and we are concerned about further damage to the site. We plan to return with the Total Station in January 2012 to map the site, hopefully before any further damage occurs. We are still trying to define the aerial extent of the site. As of now, we have identified at least three large platforms with multiple buildings, including range structures, a main central plaza group circumscribed by structures including a pyramid measuring about 12 meters in height and at least one ballcourt (Figure 3).

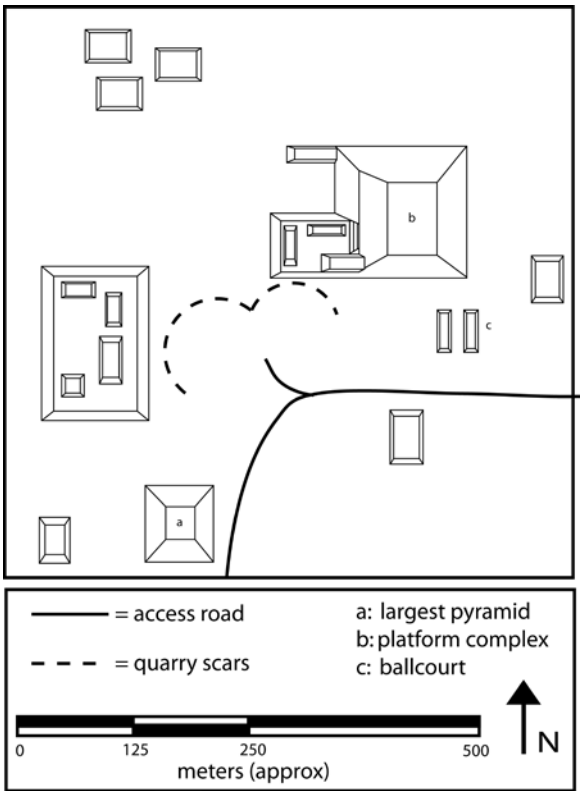

Figure 3. Preliminary sketch of the site center at Kaax Tsaabil (drawing by A. Kaeding).

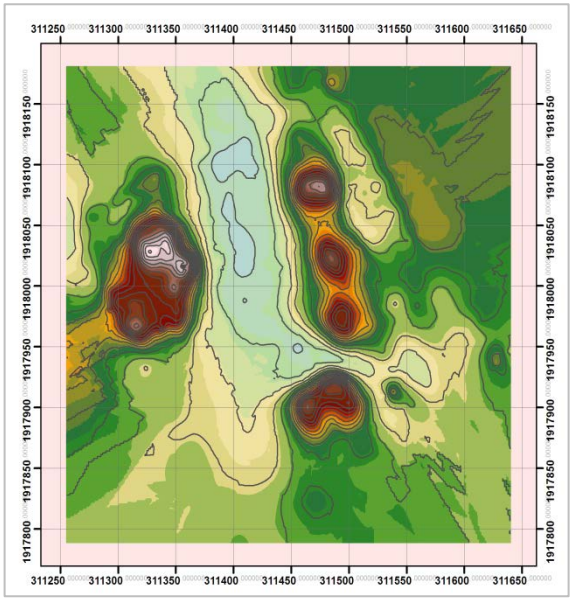

Figure 4. Topographic map and overlaid digital elevation model of Hats' Kaab (map prepared by S. Murata).

During the summer season, Satoru Murata headed up the mapping at the site of Hats Kaab– a possible E-Group found north of Saturday Creek (see Figure 2). The configuration of the site bears a strong resemblance to the layout of the E-Group at Uaxactun (compare Figure 4 with Aimers and Rice 2006:Fig. 1). The cluster of structures at Uaxactun consists of a pyramid to the west that is opposite three cardinally oriented structures to the east. These three eastern structures sit upon a long platform, which defines the eastern edge of the entire plaza group. Frans Blom (1924) discovered that from the vantage point of the western pyramid, the sun rises directly over the central eastern structure on both equinoxes. He also found that the sun rises over the southernmost eastern structure on the winter solstice and over the northernmost eastern structure on the summer solstice. These conclusions led Blom to believe that the E-Group at Uaxactun was used as a solar observatory.

While the Uaxactun architectural complex and other Terminal Preclassic E-Groups may have functioned as solar observatories, by the Early Classic period E-Groups no longer appear tied to astronomical events. Guderjan (2006:97) concludes that these "pseudo" E-Groups "had become multipurpose parts of the sacred landscape of public architecture" (see also Aimers and Rice 2006 for further discussion of E-Group complexes in the Maya Lowlands). On the surface of Hats Kaab, we found both Preclassic and Early Classic material, which suggests the initial construction of the complex may be temporally coeval with the E-Group at Uaxactun, but the possibility of a later Early Classic component may indicate that any meaningful astronomical alignments have been obscured. During the 2011 summer season, we mapped Hats Kaab on the solstice on June 21st and started the day there at sunrise to see if we could observe any solar alignments. Clouds and a threatening thunder and lightning storm inhibited the visibility, but one quick view of the sun while standing on the highest point of the western mound suggested an alignment over the northernmost mound of the three eastern structures, which provides some support for interpreting the group as an astronomical complex. Unfortunately Hats Kaab has been heavily disturbed by bulldozing and repeated plowing over the years so this assignment is tentative until further investigation is undertaken. One local informant told us that the western structure was once a tall pyramid but that bulldozing had removed a large section of the top and the fill was pushed into the plaza area. If so, any accurate astronomical observations may prove difficult. Excavations are planned for 2012 in the hopes of finding some remnants of standing architecture so that a firm orientation for the mounds can be determined, as well as any *in situ* diagnostic material to date the construction. Additionally, further solar observation will be carried out on the solstice in the summer of 2012.

During the summer season in 2011, Satoru Murata also produced a map of Hum Chaak—a small site located upstream from the village of More Tomorrow on the south side of the river (see Figure 2). This modest size settlement consists of two plaza groups, with the western plaza containing a distinctive all-stone structure (Figure 5). The main elite residence was badly looted several years ago and a tomb was encountered based on the remains of an extensive looter's pit and heaps of backdirt containing evidence of human bone and broken ceramics. Another looter's pit was intruding into the stone circular structure. During the summer of 2011 we placed a large excavation unit over this structure and revealed a building that resembles three other circular shrines that have been found to the south in the Sibun Valley (Harrison-Buck 2007, 2012). Our excavations and preliminary findings are described below.

Excavations and Preliminary Findings

Our excavations at Hum Chaak and Ma'xan both yielded evidence of Terminal Classic (ca. A.D. 780-900) activity in this part of the eastern Belize Valley, but in very different contexts. At Hum Chaak, excavations revealed a Terminal Classic circular shrine and at Ma'xan the Terminal Classic material was restricted to a termination deposit that marked the abandonment of the site. Prior to initiating the BREA project, the first author proposed a research model that suggested the eastern Belize Valley participated in a sphere of interaction in the Terminal Classic period with other areas in

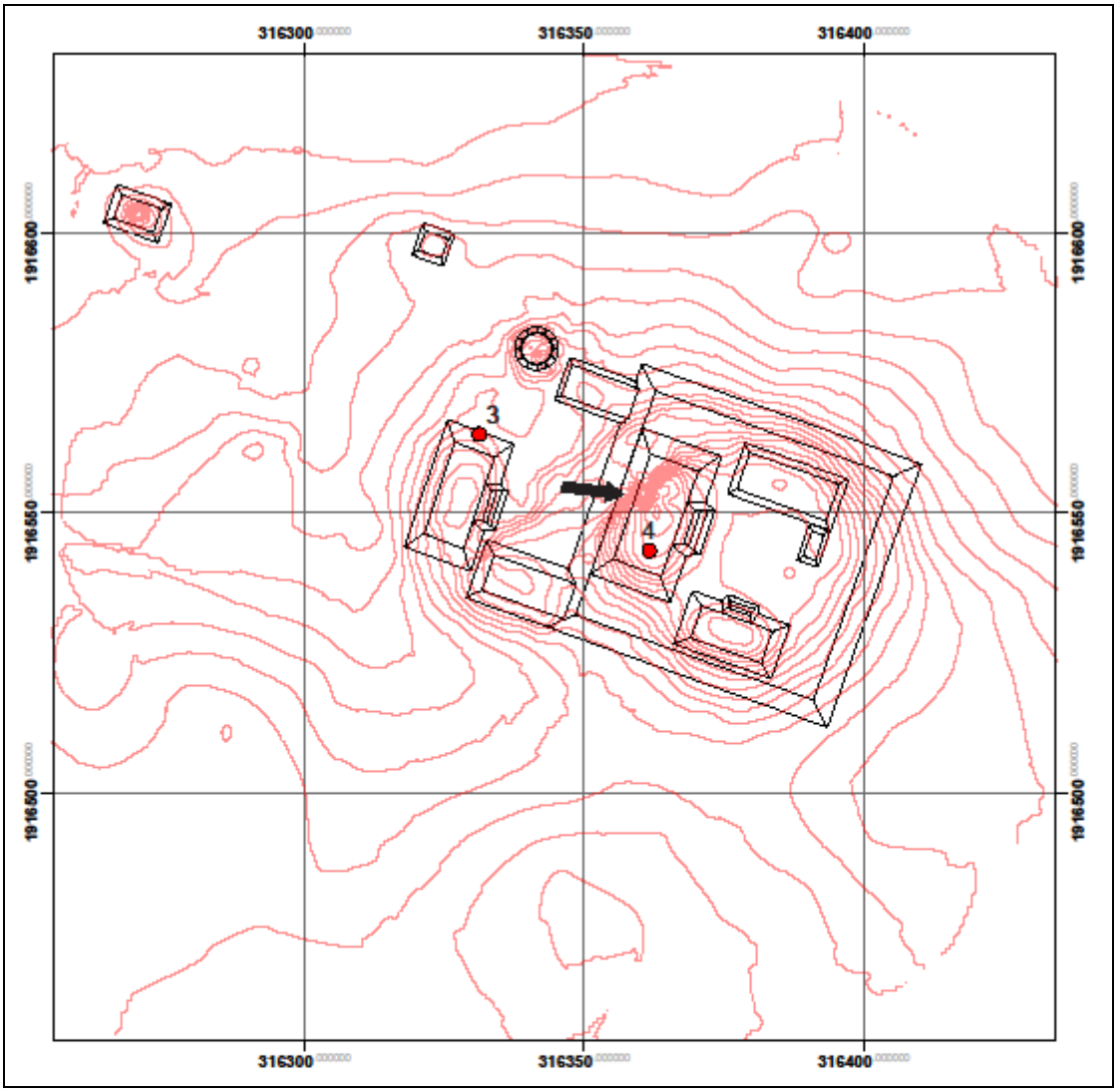

Figure 5. Architectural map of Hum Chaak. The arrow is pointing to the area where intensive destruction of the platform/mound has taken place (map prepared by S. Murata).

north-central Belize, including the Sibun Valley to the south and Lamanai to the north (Harrison-Buck 2010). This model was based on the circumscribed distributions of this distinctive Terminal Classic circular shrine architecture, as well as shared ceramic types that were defined as components of the Ik'hubil Sphere. One of the major goals of the BREA project is to examine this proposed distribution of shared Terminal Classic architecture and ceramics in the eastern Belize valley and our investigations during 2011 yielded a considerable amount of information with regard to this objective.

Elsewhere, the first author has defined the ceramic types that make up the Terminal Classic Ik'hubil sphere (Harrison-Buck 2007, 2010). Primary types of the Ik'hubil assemblage include Roaring Creek Red (and its close relative Daylight Orange: Darknight Variety) and Sibun Red Neck jars (see Harrison-Buck 2010: Figs. 4 and 5). Based on a preliminary study of the ceramics from Lisa Lucero's earlier excavations at Saturday Creek (Conlin and Ehret 2002; Lucero 1999a, 1999b, and 2002), Saturday Creek appears to be a member of the Ik'hubil Sphere and this site may mark an important east-west boundary in the Belize Valley (see

Harrison-Buck 2010:Figure 7). Belize Red types (and to some extent Mount Maloney Black ceramics) are ubiquitous at Barton Ramie, but relatively few of these types have been identified at Saturday Creek despite the close proximity to Barton Ramie (40 km downstream). Based on the artifact distribution of the Terminal Classic assemblages, sites to the east of Saturday Creek (farther downstream) appear to be members of the Ik'hubil Sphere while sites to the west are associated with the Spanish Lookout Sphere, first defined by Gifford (1976) at Barton Ramie. Other primary types from the Ik'hubil assemblage that we have found in high densities in the eastern Belize Valley (but not at Barton Ramie) are from the Kik Group, namely Indian Creek Polychromes and Fat Polychromes (see Harrison-Buck 2010: Fig. 6). Other more specialized types that are found in relatively high frequency in the BREA study area include distinctive black-slipped bowls, referred to as Achote Black (see Harrison-Buck 2010: Fig. 3). This season in our surface collections at sites in the BREA study area, as well as in our excavations at Hum Chaak and Ma'xan these primary types of the Ik'hubil Sphere predominated, so the pattern seems to be holding.

Additional Terminal Classic material associated with the Ik'hubil Sphere was found at Ma'xan, directly across the river from Saturday Creek (Figure 2). Astrid Runggaldier headed up the excavation of a 2 x 6 m unit on the central front axis of a small structure located on a platform that extends off to the west of Structure 1, the largest platform at the site that holds several structures. We aimed to test whether this small platform extending off the back of Structure 1 served as a service area for the elites living on Structure 1. The excavation exposed an extensive bed of sherds positioned along the central, front axis of the structure's south side (Figure 6). The deposit revealed a large quantity of reconstructable sherds and one whole vessel inverted on the bed of artifacts. One complete obsidian blade was found associated with the vessel and throughout the deposit were an array of artifacts, including fragments of ground stone and a large number of obsidian blade fragments. No animal bone was detected in the deposit, except for a high density of marine fish,

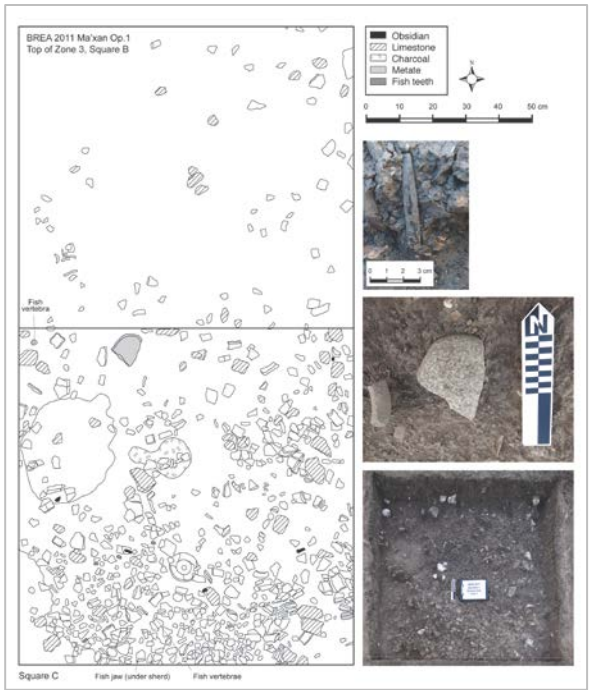

Figure 6. Termination deposit at Ma'xan (field drawing by E. Harrison-Buck; digitized by M. Brouwer Burg; photos by S. Murata).

including pharyngeal jaws from several species of marine fish, namely Parrot Fish and other reef-dwelling species. Surprisingly, no fresh water fish were identified in the assemblage, despite the close proximity of the Belize River. The location of the deposit (on the front side of a structure) and its contents are suggestive of a termination ritual, rather than a haphazard trash dump. The deposit appears to correspond with the abandonment of the building and dates to the Terminal Classic period based on the presence of the Ik'hubil ceramic assemblage. The presence of marine fish and smashed serving vessels suggests the deposit may be the remains of a feasting episode that ended with ritual termination.

Based on our excavation and surface finds at Ma'xan, the main site center seems to end with the Terminal Classic. However, a low mound group about 500 m to the east yielded evidence of later Postclassic occupation. A dense surface scatter of artifacts was recorded during the January season when the area had been recently plowed. Notably, this scatter contained around 400 pieces of obsidian, including 5 or 6 cores, and the ceramics

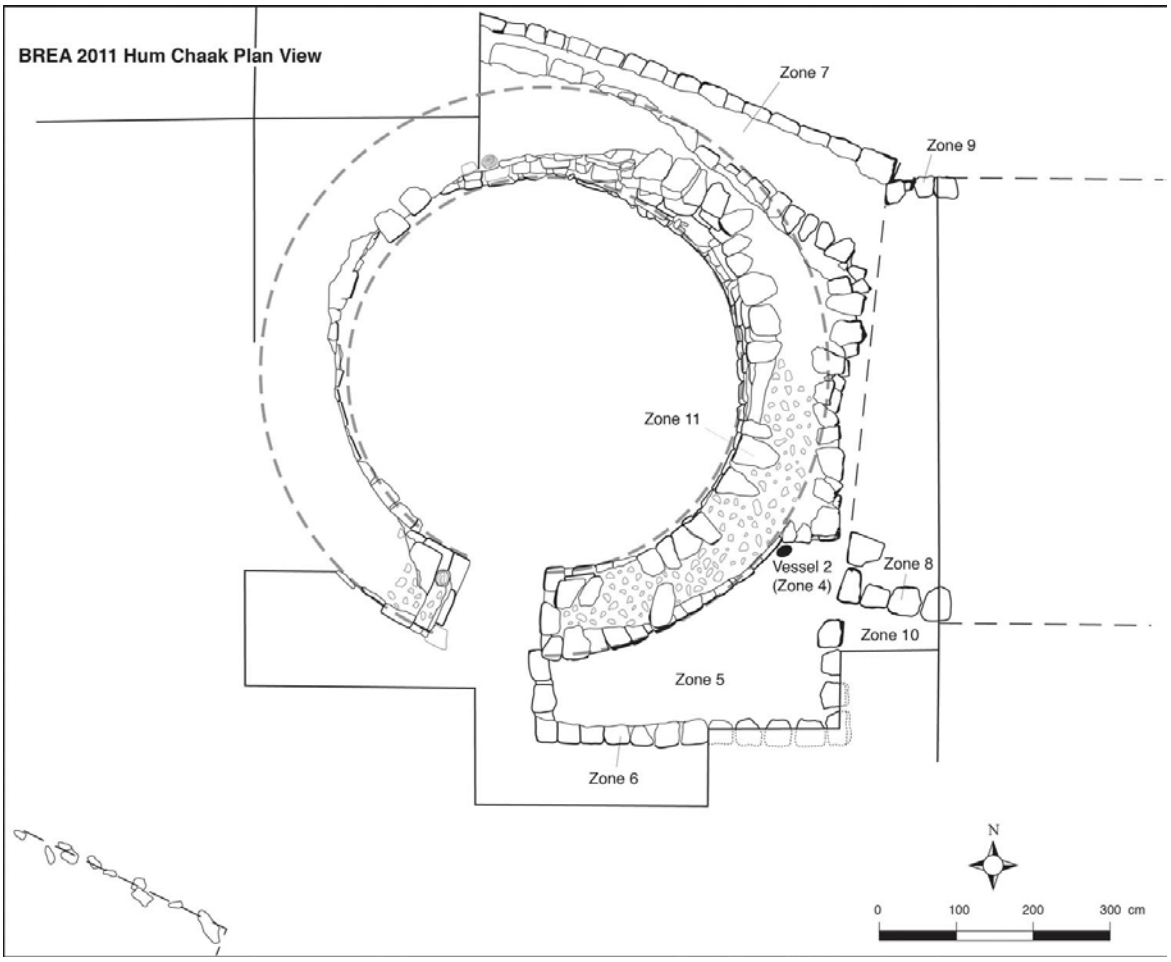

Figure 7. Final planview of the circular structure at Hum Chaak (field drawing by E. Harrison-Buck; digitized by M. Brouwer Burg).

appeared to date exclusively to the Postclassic. With our Trimble GPS we point-plotted the surface finds, including all the obsidian artifacts that we could see on the surface. During the summer season, we placed a 2 x 2 m excavation unit on the top surface of this mound, but found that the plowing had disturbed any intact Postclassic occupation. Our excavations showed that the structure was initially occupied in the Preclassic and was not re-occupied again until the Postclassic period when it functioned, at least in part, as an obsidian blade production area.

Farther down river, our excavations at the site of Hum Chaak revealed additional Terminal Classic occupation. In this case, the Ik'hubil assemblage was associated with a Terminal Classic circular shrine building that is comparable to others previously reported from the Sibun River valley, just to the south in an area where we also find Ik'hubil-type ceramics (Harrison-Buck 2007). In the Sibun Valley, these circular buildings are perched on a low, circular plinth, but at Hum Chaak the circular superstructure is placed on a low rectilinear platform that we partially exposed in our excavations (Figure 7). Although some variation exists, particularly in the substructures of these buildings, the overall design of the superstructure, with a single doorway and interior room, are shared architectural traits at other sites in Belize with Terminal Classic circular shrines, such as Nohmul, the Rosita Group at Blue Creek, and the three examples from Sibun Valley, as well as others found in northern Yucatan at Uxmal and Chichen Itza.

Examining the shared construction style and the distribution of these buildings, some suggest that the famous Caracol building may have served as the template for these distinctive Terminal Classic shrines (Harrison-Buck 2007; Kowalski et al. 1996). The shared construction style and the distribution of these buildings found at sites along the coast and river courses in the eastern Maya Lowlands suggest that these shrine buildings represent a network of trading sites and may reflect growing Yucatec influence in the region by Terminal Classic times (for further discussion see Harrison-Buck 2012). In addition to Hum Chaak, another all-stone circular shrine building was identified in our survey of K'aknal – a similar size Terminal Classic site located 1.8 km downstream on the north side of the Belize River. I suspect that as our survey expands down river, closer to the coast, we will find more examples of sites with circular shrines in the future.

North-South Overland Route

Spanish Colonial accounts note that the junction of an important north-south overland route once connected the mid-section of the Belize River to the headwaters of the New River farther to the north. Based on a careful reading of the Spanish accounts, ethnohistorian Grant Jones (1989) suggested that the north-south overland route entered the Belize River at the site of Chantome—neither this site nor the overland route have been identified archaeologically. If located correctly, this Spanish Contact-period site and the north-south overland route are in the vicinity of the prehispanic site of Saturday Creek, perhaps just west near Chik'in or on the south side of the river near Mount Pleasant (Figure 2). This junction served as a significant crossroads, linking a series of prominent Contact-period centers, including Tipu, Lamanai, and Salamanca de Bacalar. These sites also have important connections during the Classic-to-Postclassic transition (ca. AD 780-900), suggesting that the north-south overland route is Prehispanic in date. Preliminary results from our work suggest that Jones' placement of the north-south overland route in the vicinity of Saturday Creek may be correct. In most cases, we have found that ancient Maya settlements hug the main trunk of the river, but there are several sites that we have found that do not align with this settlement pattern. A number of Terminal Classic sites have been identified due north of Saturday Creek in the vicinity of Laguna Colorado such as Chumu'uk Ha and Chikin Chi'Haal, and other sites have been found due south of Ramgoat Creek near the headwaters of the New River (labeled "East Gate" sites on Figure 2)—none of these are particularly close to navigable waterways and suggest that access to these sites was via an overland route. In surface collections at these sites we observed the primary types of the Ik'hubil ceramic assemblage, suggesting that the overland route may have served to link these sites. The first author has suggested that Saturday Creek and other prehispanic Maya sites found to the north and east along the mid-sections of Belize River were physically connected with Lamanai and sites to the north by this overland route (Harrison-Buck 2010). The boundary of the Spanish Lookout and Ik'hubil ceramic spheres may run along this north-south route and separated, to some extent, these two different interaction spheres as far back as the Terminal Classic period, if not earlier in time.

Conclusions and Future Directions

We will continue to survey for settlement along this north-south trajectory in hopes of pinpointing the location of the overland route. Our future work will continue to document the long history of occupation in the eastern Belize Valley from Preclassic to Colonial times and clarify the temporal and geographic extent of the social, economic and religious networks of interaction that occurred at this important junction in the middle Belize Valley. Our research is revealing a deep history of the eastern Belize Valley, beginning in the Preclassic and continuing through Colonial times. Given the continual occupation, this area offers an ideal context in which to review the changes taking place during periods of significant cultural transformation in Maya history—first during the Preclassic-Classic transition, then later during the so-called Classic Maya "collapse" period, and finally during the Spanish and British colonial periods from the sixteenth through the nineteenth centuries.

Through our archaeological investigations in the eastern Belize Valley, we are beginning to understand the complexity of these profound changes and how they may have differentially impacted Maya groups with regard to their social, political, and economic organization.

Acknowledgements Our two short field seasons—less than four weeks in January and five weeks in the summer of 2011—were incredibly productive and this would not have been possible without the help of UNH students and an all-star BREA staff. I would like to take this opportunity to personally thank Satoru Murata, Adam Kaeding, David Buck, Astrid Runggaldier, and Brian Norris. I refer to this group of five as "The Dream Team"—it is their hard work and commitment to the BREA project that made our first season such a huge success. Together with my co-authors, we also wish to thank our small group of UNH field school students—John DeGennaro, Kerissa Paquette, and Samantha Wood—for their participation and contribution to the BREA project during the summer 2011 season. We thank Marieka Brouwer Burg who joined the BREA team in August 2011 and has contributed her incredible GIS skills and produced many of the beautiful maps presented herein. I am especially grateful to the Alphawood Foundation for their generous support of the BREA project and I also thank the University of New Hampshire for providing additional financial support for the 2011 season. Finally, I wish to thank the Institute of Archaeology for granting me my first permit for the BREA study area, particularly Dr John Morris and Dr. Jaime Awe for all their support and encouragement on initiating this new project.

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XX CLOSE ENCOUNTERS AT THE MANSION: THE COLUMBIAN EXCHANGE AT STRUCTURE H12-08, TIPU, BELIZE

James J. Aimers, Elizabeth Graham and Joshua Horowitz

The arrival of Spaniards in Mesoamerica represents the onset of one of history's most famous periods of trade and exchange, but how is this period represented in material culture on the local level in what is now Belize? In 2009 a portion of the pottery excavated at the site of Tipu in the 1980s was moved to SUNY Geneseo, and in this paper we report on the results of examination of a sample from Structure H12-08. A substantial-sized structure already stood at this location prior to the time when Tipu became the site of a Spaniards mission, but the structure was repeatedly altered and expanded during the colonial period and very possibly up to the time of the routing of the Itza in 1697. Excavations produced European-related material culture including glass beads, olive jars, various metal artifacts, and majolica ceramics. Given its size, Str. H12-8 may have served as the casa real or major guest house used by visiting Spaniards officials. In this paper we describe the pottery deposited throughout the building's use-life, and revisit hypotheses about its function as well as the role of Tipu immediately before and during the colonial period.

Introduction

The arrival of Spaniards in Mesoamerica marked the start of one of history's best known periods of trade and exchange. On the global level it is difficult to underestimate the impact of this exchange, but how is this period represented in material culture on the local level in what is now Belize? In this paper we report on the examination of a sample of over 9000 sherds from Structure H12-8 at Tipu in May 2011. Structure H12-8 spans the Postclassic to Historic periods. In this paper we describe the pottery of H12-8 at this pivotal time, and revisit hypotheses about the building's function as well as the role of Tipu immediately before and during the colonial period.

Tipu in Context

Tipu is located 9 km south of San Ignacio on the Macal River (Figure 1), and was occupied continuously from the Middle Preclassic (800-500 BC) (Graham 1991:319) until AD 1707. Tipu was an important site because of its strategic location and especially for the production of cacao (Muhs, et al. 1985:123). Large cacao orchards in the region allowed for elite Maya at Tipu to gain access to wealth and, in the colonial era, new European goods such as majolica and olive jars (Graham, et al. 1989:1256, 1259). However, the Maya in what is now Belize were not easily controlled by the Spaniards, resulting in periods of hostility and resistance centered at Tipu.

Figure 1. Map of the Belize showing important Postclassic and Historic period places. Debora Trein and Emil Huston.

The start of the Historic period at Tipu is usually dated to 1544 when Alonso and Melchor Pacheco established the first missions and encomiendas from their base at Chetumal (Jones, et al. 1986:41). The Pacheco conquest was famously brutal. Graham (2011:133) refers to Jones' (1989: 42) translation of Fray Lorenzo de Bienvenida's comments on Alonso Pacheco's

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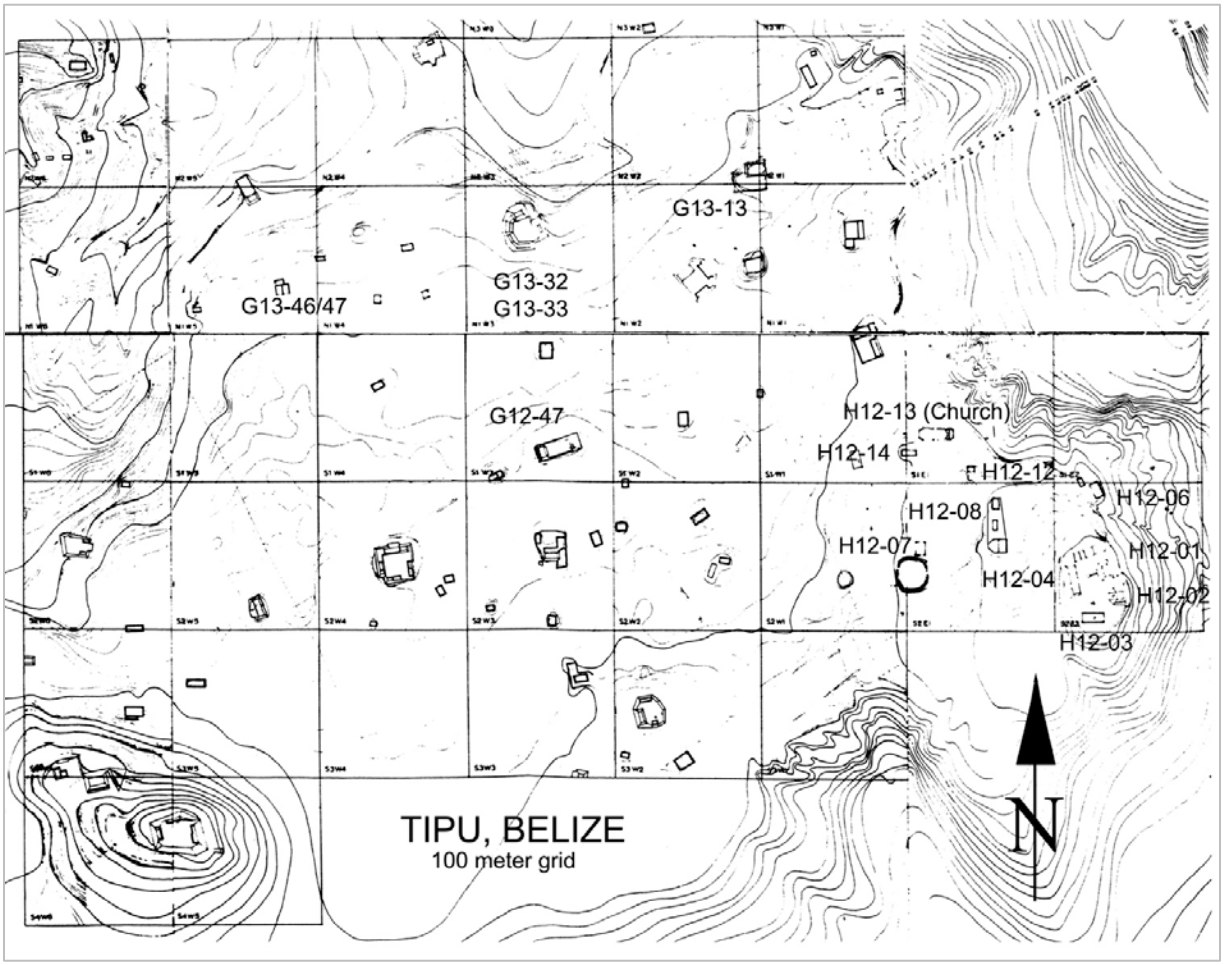

Figure 2: Site plan of Tipu. Map by Claude Belanger.

actions in the province of Chetumal, "individuals were tied to stakes; the hands, noses, and ears of the men and the breasts of the women were cut off; and women were weighted and drowned in lagoons."

Both Tipu and the northern Belizean site of Lamanai were administered from the villa that was subsequently established at Bacalar. In the latter half of the sixteenth century Tipu's church (H12-13) was built. The size of the church and the hundreds of burials there suggest that Tipu was "an active town" throughout this time (Jones, et al. 1986:41); we also know that the town was the focus of a major "reduction" or resettlement of Mayas by Spaniards in the 1560s and in the early 1600s (Jones 1989). Political rebellion was often centered at Tipu, and between the sixteenth and eighteenth centuries Tipu vacillated between cooperation and resistance (Graham 1991:321). There were a number of Maya rebellions against the Spaniards in 1567-68, at which time apostate Maya were resettled at Tipu and the town was reorganized in a more Spaniards plan and style. Further rebellions in 1638 centered on Tipu and in 1641 the Spaniards noted that the Lamanai Maya had burned their church and joined the Tipuans (Jones 1977, 1981, 1983, 1989).

From 1641 to 1695 the Spaniards had very little to do with the area around Tipu and the site thrived as refugees from other rebellious sites arrived. Even in the absence of the Spaniards, the Maya continued to bury their dead in the church. The site's isolation ended in 1695 when Tipu hosted the Spaniards as they set off to conquer the Itza at Tayasal. The size and plan of Structure H12-8 suggests that it may have been the building, noted by Jones (1989:259-267;

note 80) that housed Spaniards soldiers at this time (Graham 2011: 251-52). Tipu declined in importance to the Spaniards after the Itza conquest of 1697 and the Tipuans were moved to Lake Petén Itza in 1707, probably to make them easier to control but also to protect them from being captured for forced labor by Spaniards or enslaved by British buccaneers (Jones 1998:270-271).

Excavations at Tipu were directed from 1980 to 1983 by Robert Kautz, and from 1984 to 1987 by Elizabeth Graham with the assistance of Claude Belanger and others. The most detailed site map available indicates that there are approximately 90 structures within the 4600 m2 mapped area (Graham, Jones & Kautz 1985) (Figure 2). Aimers examined over 37 000 sherds from eleven structures stored in Belize for his dissertation (Aimers 2004). This analysis is a continuation of that work with material recently moved from the Royal Ontario Museum to SUNY Geneseo.

Structure H12-8

H12-8 is located on the north side of the plaza that lay south of the church. Originally thought to be three separate structures (Graham 1985:3), the building is now known to be one large complex. Historic features of the building date back to the mid sixteenth century, but "The earliest faces of the central platform of Str. H12-8 were . . . Postclassic rather than … Historic." and the Postclassic building faced north, not south (Graham 1985: 4). The structure was repeatedly altered and expanded during the peak of Spaniards colonial activity in Belize from approximately 1544 to 1570 (Graham 2011:105), and very possibly up to the time of the routing of the Itza in 1697.

Excavations by Gerhardt-Cartwright, Graham and others produced European-related material culture including glass beads, olive jars, metal artifacts, and several pieces of majolica. Based on these remains and the large additions made to the structure during the Historic period, Graham hypothesized that Str. H12-08 served as the *casa real* or major guest house used by visiting Spaniards officials and the building is thought to have been largely residential in use (Graham 1985: 19). Visiting priests probably used Str. H12-18 as the rectory.

Pottery of the 2011 Analysis

Several people have noted that "the Spaniards had relatively little impact on material culture at Tipu" (Cohen, et al. 1997:79; see also Graham and Bennett 1989:142; Simmons 1995) but Aimers' experience with ceramics at Lamanai, where some changes associated with the conquest could be seen in indigenous pottery, made him curious as to whether similar changes could in fact be seen in a close examination of the Tipu sample. This curiosity was also piqued by Eden Wilson's (1991:vi) Master's thesis on Postclassic and Historic period redwares which established Johnny Walker Red as a late type in the Augustine Group. Johnny Walker Red has a darker maroon slip (10R4-5.5/8) with a matt rather than waxy feel. Wilson (vi-vii) speculated that:

> *Johnny Walker appears to mark the onset of European contact, not just at Tipu but for Yucatan, disrupting long-established trade networks with Petén enough to force locals to produce their own ceramics. Residents of Tipu could no longer rely on regular shipments of Petén produced ceramics. Johnny Walker appears at the site just before the Europeans and differs from the earlier Augustine variety. Handles were attached slightly askew and slips were not highly polished indicating a decrease in time spent in finishing vessels. This decrease in the quality of ceramics produced at Tipu is a common reaction throughout Mesoamerica to stressful contact situations.*

In May of 2011, Aimers and Horowitz examined another 9074 sherds from H12-08. During Aimers' dissertation analysis, about 12000 sherds from Structure H12-08 were examined, bringing the total to over 21000 sherds. Although some Late and Terminal Classic sherds were present (especially in excavations below the old ground surface in the central trench) the relevant pottery complexes and phases of interest here are the Postclassic and Historic ones defined by Prudence Rice: Early Postclassic (Nublado, A.D. 950-1150); Middle Postclassic (Neblina, A.D. 1150-1300); Late Postclassic (Llovizna A.D. 1300-1544); and Historic (Chubasco, A.D. 1544-1707).

All the raw pottery data are available at https://sites.google.com/site/belizepotterywiki/. One of the things we observed is that the rate of ceramic change seems to vary through time at Tipu. Most notably, Terminal Classic types seem to be shorter-lived than Early Postclassic types, and as far as we can tell, some Middle Postclassic and Late Postclassic types are very long-lived right though Spaniards contact and into the Historic Chubasco phase. This is not an unknown phenomenon of course but it is notable in this sample.

There were a few censer pieces but otherwise nothing that would contradict the idea that this was a residential structure. Two varieties of Augustine Red were recorded, an earlier version with tan fireclouds and a later one with black fireclouds that Rice (Rice 1985) used to tentatively separate the Neblina Middle Postclassic from earlier complexes (tan fireclouds = Augustine Red: Augustine Variety ; black fireclouds = Augustine Red: Chata Variety). As Rice noted, dishes became shallower and vessel supports became more cylindrical than bulbous into the Middle Postclassic.

The changes Wilson reported were not observed in our analysis and we do not we agree with her assessment of the ceramics or of the contact situation at Tipu. Wilson was working with samples from other buildings, so possibly the changes are observable in those samples, but overall our conclusions about the contact period are almost diametrically opposed to Wilson's. What struck us was the lack of change after the Early Postclassic. The European-stage ceramics include numerous majolica and olive jars, but these appear in pottery contexts which, without them, would appear entirely pre-Columbian. In other words, if the European materials were removed, the pottery looks entirely Postclassic. This is different from Lamanai, where there are stylistic changes associated with the colonial period.

Like Rice, we saw continuity. For example, Zaczuuz, the Nublado (EPC) tan-slipped ceramic group, continues to occur with later types, albeit in smaller numbers. Unlike Rice, we found no slatewares (which are associated with the northern lowlands), but a few sherds of Zalal Gouged-Incised, the best known type from Lamanai's Buk complex were found, suggesting that perhaps the ties between Lamanai and Tipu known from ethnohistorical documents have preconquest roots from at least Early Postclassic times (we also have an Augustine Red jar at Lamanai which would be right at home at Tipu). At some point in the Early Postclassic, possibly near the end, the imported Petén red-slipped and polychrome types of the Paxcaman group were introduced. Postclassic unslipped types include Hubelna, Pozo, Maskall and Chial Unslipped, types shared with the Petén Lakes and also the Belize Valley in the case of Maskall Unslipped. In the Middle and Late Postclassic, rare sherds of Red Payil Group pottery are present, suggesting ties to the east coast, but overall, Tipu is firmly tethered to Petén. The latest red-slipped Maya type to be introduced at Tipu is Topoxte Red, which appears in the Late Postclassic.

One type that Aimers did not recognize in his dissertation analysis is Fulano Black, which is a dull, black-slipped type with snail inclusion paste characteristic of the Paxcaman Group (Cecil 2001:171, 175). Fulano group sherds sometimes have red mottling so Aimers would have classified these as Achote Black in his dissertation, despite the Postclassic contexts. This is not totally unreasonable because at Tipu, as in the Petén Lakes, there is frequently Late Classic sherds in Postclassic fill or core deposits. Nevertheless, anyone who consults Aimers (2004) should consider that there are likely Fulano Black sherds included with Achote Black.

We found no Trapeche Pink at H12-08, which has been found exclusively in the Early Postclassic at Tayasal, although Leslie Cecil identified one sherd from another building on a visit to Geneseo in 2010. The differential distribution of pottery types is worth commenting on since both Rice and Cecil have written extensively about the connection between Petén sociopolitical groupings and pottery styles and technology (e.g., Cecil 2001, 2009; Rice and Cecil 2009). This could also be a sampling issue as the only excavations that produced good middens of Early Postclassic material were the just south of the church at H12-14 and at H12-12. The church itself disturbed some Early Postclassic deposits.

Social Identity at Tipu

Three major Maya groups are known to have lived in the area around Tipu in the Postclassic and Historic periods (Jones 1998: 3-28). Most famous are the Itza, who seem to have been present in Petén by the Early Classic (Boot 2005; Schele, et al. 1995) but who migrated to the north at some point, only to return from Chichén Itza after its decline. These Yucatecan-speaking people are known from ethnohistorical documentation (including census lists) to have had a strong presence at Tipu as early as the 1400's (Jones 1989:14). Jones (1989:9) calls the Itza "an aggressive, expansionary people, justifiably feared by their neighbors." When Cortez visited them in 1523 the Itza elites in their capital at Tayasal were " a formidable economic force, controlling much of the trade in cacao and other luxury goods between Yucatan to the north, and Verapaz and the Motagua Valley to the south" (Jones, et al. 1986:44) (See Jones 1998; 1989:1-60 for a thorough discussion of the Itza and their neighbors).

Topoxte Group pottery was probably made by the Kowoj, who are thought to have come from Mayapan in the 1530s but possibly as early as the 1300s (Jones 1998), and in fact Topoxte Group pottery does resemble pottery from Mayapan (Jones 1998:17-19; Pugh and Rice 2009:92) Cecil (2001:353) suggests that it was produced in the Topoxte islands area. Cecil and Pugh (2004) have also noted Mayapan-like architectural features at Tipu, further indicating the presence of the Kowoj at the site.

A third, lesser-known group are the Mopan (Jones 1998:19-22). The Mopan had been in the area longer than the Itza or the Kowoj and they may have controlled the route between the Petén Lakes and Tipu. Cecil (2001:531) suspects that Augustine Group pottery, which is common at Tipu--but less common as one moves farther away from the Peten Lakes and Tipu, for example at Barton Ramie and Baking Pot--was made with "resources controlled by the Itzá and/or the Mopan."

Tipu was clearly part of the Itza economic sphere but due to an antagonistic relationship with the Itza, the Mopan may have not lived at Tipu with the Kowoj and Itza. It is possible to look at Tipu as an Itza fortification against the Spaniards (Jones 1998: 39-47). Jones et al. (1986:44) suggest that "Tayasal and Tipu were important centers in a network of Maya alliances that survived the Spaniards economic and spiritual invasion, and that later turned the invasion to their own advantage by incorporating refugees from Spaniards rule." We know, for example, from the Francisco Perez probanza of 1564-5 that people from as far off as Cozumel and Campeche sought refuge from Spaniards control at Tipu (Scholes and Thompson 1977). It is tempting but highly speculative to see their presence represented by rare Red Payil Group sherds which are thought to have been produced on the northeast coast of the peninsula.

The Economy of Tipu

Given the complex political and social situation in the region both before and after conquest, why the apparent stability at Tipu compared to Lamanai which Jones (1989: 98-99) proposes is part of the same post-conquest province of Dzuluinicob? The best explanation is Tipu's relative isolation and its strong economy (Jones 1982). Jones (1989) notes that people of the towns in the region collected wild vanilla, and achiote, a red seed used in flavoring many foods, but the key crop at Tipu was undoubtedly cacao. The small and dispersed nature of communities in the area was ideal for the production of cacao (Caso Barrera and Aliphant F. 2006).

The Spaniards were clearly aware of and interested in this wealth and exacted tribute from the Maya in the form of labor, honey, salt, beeswax, maize and of course cacao (Graham 2011:197). Yet the Spaniards were only rarely present at Tipu, and much of this tribute must have been conveyed, as it was in the Postclassic era, through Maya elites.

Of the Mayas at Tipu who came from Yucatan there were some wealthy and elite individuals who, according to the written record, grew much cacao in large orchards for which the soils along the Macal River were well suited. They sold the valued cacao beans to Mayas in the north, receiving in exchange metal goods which they in turn traded to the Itzas around Lake Peten-Itza. We may speculate that a cacao-producing elite lived at Tipu before the Spansih conquest as well, for the rich offerings found in

the second temple of the large Postclassic ceremonial complex indicate deep investment in long distance trade .(Jones, et al. 1986:47).

Another major difference between Tipu and Lamanai was that Tipu was not visited as regularly as Lamanai. This is attested by the size and nature of Lamanai's second church, which suggests that Lamanai was targeted by the Franciscans for development whereas Tipu was not.

Conclusions

A number of people (Bennet 1985, 1986; Cohen, et al. 1997; Jacobi 2000) looked at the burials from Tipu's church and concluded that the people of Tipu were comparatively pretty healthy, with a varied diet that probably included a substantial amount of meat. Kitty Emery's work (1999) on the Tipu fauna shows little change from the Postclassic, whereas there were changes at Lamanai. The Itza and Kowoj seemed to live together at Tipu (Cecil 2001; Jones 1998) and, based on his analysis of the burials, Jacobi (2000:187) concluded that "…. the Tipu individuals probably represent a mixing with successive migrations of the Itza people over time."

Borhegyi (1956) suggested that Maya folk culture is conservative, and didn't change much through three different types of leadership (internal/indigenous elite, Mexican [Itza] elite, or under Spaniards rule). Fox and Cook (1996:811) suggest that "Lineages split, migrated long distances to fuse with conquered peoples in new localities, and amalgamated with scattered fraternal lineages when threatened." Tipu appears to have been a relatively prosperous town engaged in trade with neighbors in the surrounding area and with access to European goods, but at enough of a remove from Europeans that everyday life was not strongly impacted. There are no Spaniards burials in the 585 colonial burials excavated at Tipu by Mark Cohen and his students from SUNY Plattsburgh (Jacobi 2000). All indications are that the demand for European goods was predominantly Maya, although Spaniards unquestionably spent time at the site.

Graham (2011) deals with one major change –the conversion of the Maya to Christianity. This would indeed have been a major change but nevertheless it was not reflected in the pottery at H12-8. Research on the ceramics in 2011 by Aimers and Horowitz confirms what Graham (1991:323) suggested twenty years earlier: that conquest seems to have had little discernible effect on pottery at Tipu and the formal changes are no more than would expect to see without conquest. We will continue to investigate this issue with more of the sample stored at SUNY Geneseo.

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XX TRADE, EXCHANGE, AND SETTLEMENT IN PREHISTORIC NORTHWEST BELIZE

Fred Valdez, Jr.

A review of settlement in northwest Belize is provided from data of the Programme for Belize Archaeological Project (PfBAP). Twenty seasons of research provide a significant data set for placing settlements across the landscape. Issues of production, trade, and exchange are discussed from three perspectives 1) theoretical premises, 2) evidence of external trade, and 3) internal polity concerns. A general model of exchange between polities in NW Belize is provided as a possible means for polity integration and security. An issue of material culture type and potential for understanding structure form and function is mentioned. Current analysis objectives and proposed investigations relating to trade and exchange across the PfBAP research zone are discussed and proposed for research across the Maya lowlands.

Introduction

More than 20 years of research in the NW Belize region has produced an interesting view of ancient Lowland Maya society. The area of NW Belize has been defined as part of the Three Rivers Region (Adams 1995). The region includes an area of NE Peten and NW Belize. The Peten archaeological sites include Rio Azul, Kinal, La Honradez and the numerous minor sites between; the NW Belize region holds La Milpa, Blue Creek, Gran Cacao, Dos Hombres, Chan Chich and more than 60 known smaller settlements. The Three Rivers Region has seen extensive archaeological investigations since 1983. The initial project of significance was the Rio Azul Project (1983-1987), followed by the Ixcanrio Regional Project (1990-1991) on the Guatemala side of the border. On the Belize side was the Rio Bravo Archaeological Project, The La Milpa Project, the Blue Creek Project and its manifestation, and the Programme for Belize Archaeological Project (since 1992; Adams et al. 2004). The PfBAP completed, in Summer 2011, its 20th consecutive season of archaeological investigations or its first Katun of regional scale research (Figure 1).

The purpose of the regional endeavors (Peten & Belize) was to study Maya society from a "regional" or inter-site perspective rather than a site-centric model. The efforts here were to investigate the large centers, but an emphasis was placed on an attempt at understanding the smaller communities and the various social institutions between small and large settlements.

In addition to seeing how dense the landscape was occupied; we have also observed extensive landscape modifications across the region. Site preparation efforts such as terracing, channelized (or raised) fields, chultunes, and well constructions, all attest to the great knowledge the Maya had of their environments and how to best utilize available resources. It is also important to remember that occupation of the Maya lowlands begins in Paleoindian times, into the Archaic, and then through the Preclassic or Maya beginnings. Hard evidence of Paleoindian and Archaic presence in NW Belize has become recently available (Figure 2; Valdez and Aylesworth 2005).

Regional Expressions and Activities

Efforts at a regional interpretation of the prehistoric civilization provides us the opportunity to re-interpret how the ancient Maya survived for so long in an environment that has often been presented as inhospitable. The Maya area in general has long been understood as an area of great environmental diversity (Scarborough and Valdez 2003). The Three Rivers Region is seen as a small version of the larger Maya world. We find various environmental settings from scrub brush areas and bajos to stands of tall forest. Figure 3 is an aerial view of an aguada east of Dos Hombres and demonstrates some of the environmental variation in a relatively small area. One can easily walk through three or four different environments during the course of an hour walk. Interestingly, we find prehistoric Maya sites or at least evidence of Maya activity in each of these environments. Even though the forest had been portrayed as inhospitable in the past, we now know that this environmental diversity is

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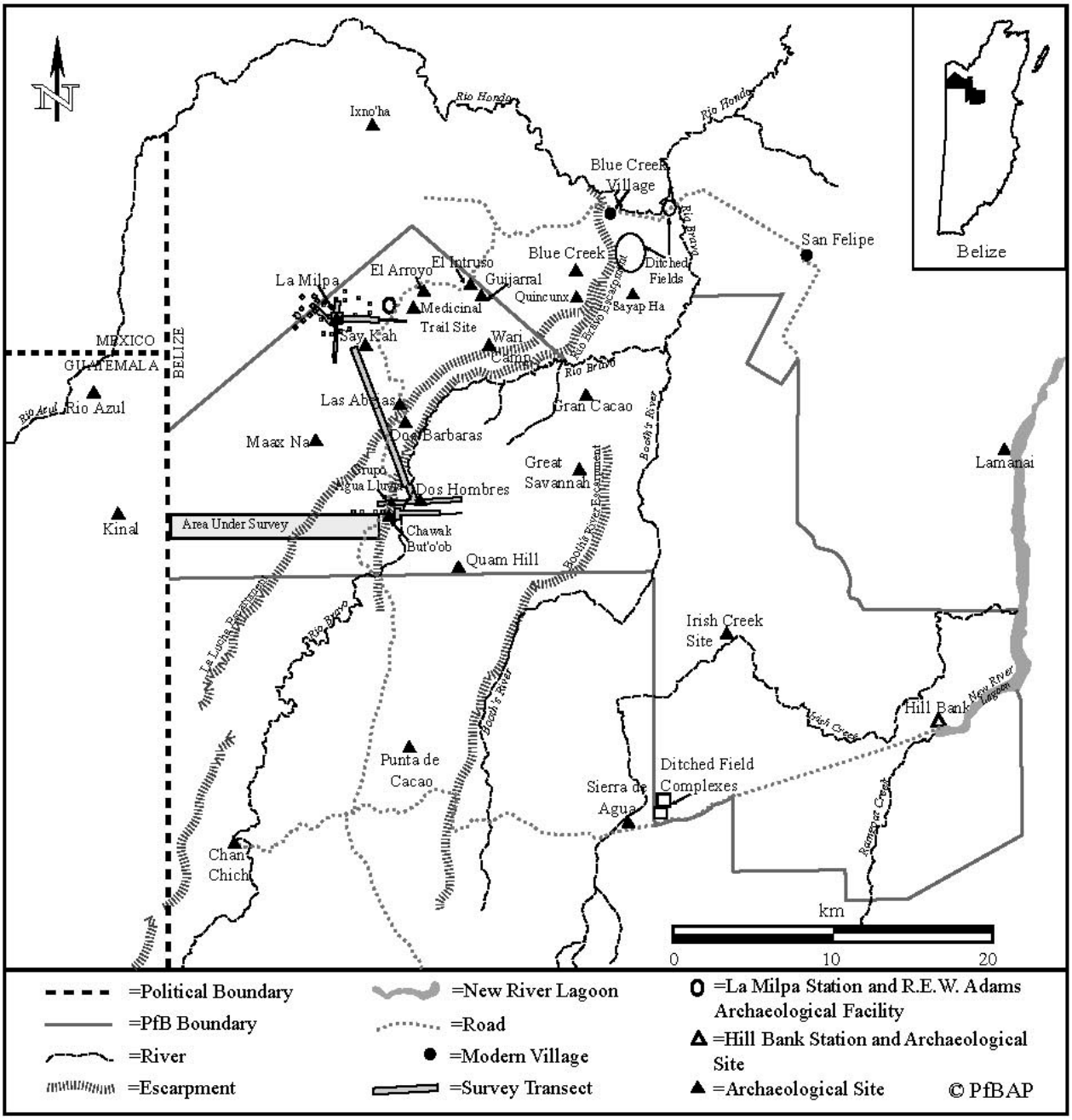

Figure 1. Map of PfBAP research area. Several mapping transects are depicted. Map version by R. Trachman.

quite providing. The catch is to have the needed knowledge to exploit these environments. It is vital in our research among the ancient Maya to keep that context (the natural environment) as an important backdrop for our interpretations.

The Maya clearly had an extensive and intensive knowledge of their surrounding environments. It is highly likely that the Maya inherited this knowledge from their Archaic ancestors, as seen in other New World areas. The Maya permanent settlements of the Middle and early Late Preclassic may have been exploiting the local environments as a generalized strategy, but by the Late to Terminal Preclassic the Maya had likely become specialized or focused on particular resources. This form of specialization may have led to an interdependence between sites of a given polity

and helped to form a stronger "state." Scarborough and Valdez (2009) have termed this strategy as resource-specialized sites. Thus, within a given polity there would be a site (or several) specialized in stone tool production (ex, El Arroyo); perhaps several pottery producing sites where some may have sub-specialized in jars while others focused on bowls, etc. There would also be "agricultural" communities where some produced foods while others concentrated (or specialized) in medicinal plants, fibers/cotton, herbs/condiments and so forth. Figure 4 is a photo of a chicle tree in NW Belize, a resource the Maya may have tended to and harvested. Some of the latter items may have been intentionally produced or harvested from a particular environment as opposed to planted fields.

How can there be within a polity several sites producing the same materials? In most cases, sites are producing similar materials, for example, stone tools, but likely to be different stone tools at each site, although some overlap is likely. This also applies to pottery production where access to good clays, tempering material, etc. may be available to several communities, but each produces particular jars or bowls, even though each is capable of producing the whole range. Each then takes their craft to market, an important social, religious (?), and economic event. The communities can then exchange goods as well as knowledge, ideas, etc. Why could or would such a system exist? This "system" helps form interdependencies for goods and services between the polity's communities. The system or mechanism is perhaps managed/arranged by the larger centers or polity leaders. This interdependence overseen by the polity capitol provides leaders with an authority of managing a unified polity.

An aspect that is critical here and not often given much thought is the role and/or function of perishables. As archaeologists we are obviously focused on the tangibles, the surviving material culture including stone tools, ceramics, and architecture. Yet, at least 90% of material culture is perishable. We can see some of the perishable items utilized by the Maya in the art record of painted pots, murals, carved stelae, etc.; in soil samples (phytoliths, pollen); and occasionally as real remains (cloth in tombs,

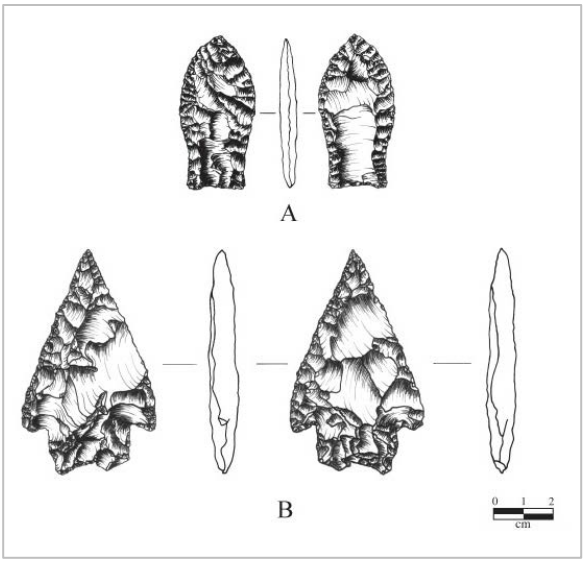

Figure 2. Line drawings of Paleoindian and Archaic points from NW Belize.

Figure 3. Aerial photo of an aguada east of the large center of Dos Hombres in NW Belize.

chocolate residue, etc.) in special contexts. In light of the notion of specialized production we should also keep in mind that there are many materials we often believe don't exist or survive and therefore, we have not looked for them.

It may be that specialized activity whether site-specific or as part of a larger settlement might be present in soils (the soil chemistry) we have not checked. The numerous small sites that we've investigated (or at least mapped) show varying settlement patterns. The sites are distinct and in my opinion may reflect distinct functions. If a site was, for example, specialized in feather processing, we should expect to find distinctive soil chemistry from decades of processing (bird caging might also produce eggs,

for example). The same applies to the possibility of keeping deer in pens (food, skins, antler, fertilizer), and tepesquintle breeding (food). All of these intensive activities, or resource-specialized sites, should leave unique soil chemistry signatures tied to the specialized activity. Is this true about specialized activity? Did it exist? We don't know for the perishable items, but we are just now beginning to look for the evidence to verify any given activity. It is, however, certain that we won't find these answers if we do not search or check for them.

Trade and Exchange

For the purposes of this study, "trade" is simply used to refer to activities concerning the movement of good over long distances, usually moving across several environmental zones or beyond polity lines. Internal movement of goods is here considered "exchange" that takes place between physically close units or within the defined polity.

While much attention in Maya archaeology has gone to large political and religious centers as the source affecting socioeconomic and sociopolitical organization, we would be remiss to ignore other social units of the lowland settlers (Marcus 1993). These other social units are among the many small towns, villages, and hamlets (often archaeologically invisible), located away from the centralizing powers yet served a fundamental economic adaptation.

Accepting the existence of the multiple economic units, at various distances from the large centers, also acknowledges a multifaceted economic and political interplay. A multifaceted economy is a mechanism for understanding the economic foundations of Maya Civilization. Part of the difficulty in reconstructing the ancient Maya economic interplay between the many social units is in the lack of systematic survey over large areas. Given the general ecological setting of the Maya Lowlands, a lack of comprehensive survey is obvious and understandable.

Although research region has remained somewhat incomplete, there has been the production of much valuable data from both large centers and from outlying smaller units

Figure 4. Photo of a chicle tree in NW Belize.

across the lowlands. Surviving material culture from great distances is at times obvious in artifacts of jade, obsidian, and basalt to name a few. Long distance trade into interior zones can be seen in marine shell, shark teeth, stingray spines, etc. trade over extensive distances can also be evidenced from certain pottery styles, and if looked at carefully, in style of production execution such as pottery form and architectural style, among others.

The focus here is on material culture that makes its way into the Maya lowlands and in particular to NW Belize. There are also the many materials that were traded out of the local lowlands into other lowland regions and outside the lowlands. Chert, limestone, and certain ceramics are among the surviving material remains. It has, however, been postulated that many perishables from the lowlands were traded over significant distances. Salt, feathers, wood, and many other forest products were likely delivered to distant regions (see for example Andrews 1983; McKillop 2002; Valdez and Mock 1991). Traded in both directions, or in-and-out, were the critical aspects of ideas and

knowledge that must have included technological innovation and ritual activity.

Data from the surrounding zones of the NE Peten and Blue Creek, La Milpa, Dos Hombres, Chan Chich, and other settlements in NW Belize anchor the "new" model(s) for ancient Maya systems and success. Lithic sites including El Pedernal and El Arroyo serve to validate some specialized activity. Certain terraced sites of NW Belize including Medicinal Trail and Chawak But'o'ob (Hyde et al 2009; Walling 2011), indicate agricultural activity other than traditional crops. As per the Medicinal Trail settlement where small groups as expected are found, but there are also numerous wall and poza features not always seen at other small settlements. At Medicinal trail are terraces on the western areas of the settlement, the core is described as being at the center or core of the settlement, and to the east are the composite features of stone/rock walls, pozas, and isolated platforms. It is these differences in settlement or settlement organization that require much attention as they likely reflect specialized activity and/or production.

At the larger sites of the Three Rivers Region is a great variety of pottery including polychromes that seem to be region specific. These ceramics seem to have been commissioned and produced for particular polities (perhaps as family crests?). The range of exotics at the larger sites also attest to the role played by major centers as holders of market exchange and long-distance trade. Some of the trade as well as exchange activities likely helped to maintain polity solidarity. While the research herein presented remains highly theoretical in its interpretations, useful data and perspectives may prove to be interesting applications for other regions of the Maya Lowlands.

As Scarborough and Valdez (2003) have stated

> Our understanding of the small villages and towns undergirding Maya society is sorely incomplete. The lack of well-preserved surface debris (frequently hidden in vegetal ground cover), coupled with high rates of organic decay, prevents total surface survey coverage of any region in the Maya Lowlands. Because of these methodological constraints, we have emphasized a glorious history of ancient Maya tombs, palaces, and pyramids from the highly visible architectural centers. We have a much less textured view of the rest of the Maya economy and its associated hinterlands.

Ultimately, we must take a careful and calculated look at the survey and settlement data being documented far from the large centers. If we can focus on these small settlements, which are often represented by minimal architecture and features, then compare or contrast them across a given region, such as NW Belize, we may be able to define a very different society from the current almost monolithic view often presented. From this "new' perspective we may find a particular socioeconomic and sociopolitical organization emerging that better fits the prehistoric lowland Maya.

Concluding Comments

Much of the above is to restate that Maya social institutions (economical, political, etc.) were more diverse and interconnected than currently assumed. Taking a strong look at the regional data and the greater engineered landscape beyond the major site cores, we find a network of interdependent activities, perhaps labeled a subsistence economy that involved exchanges of material items and knowledge. "In this context, the subsistence economy is more than the what, when, and where of production; it is the dynamics of how production, distribution, and consumption differ from traditional views of the political economy" (Scarborough, Valdez, and Dunning 2003).

The notion of resource-specialized communities has been presented elsewhere (Scarborough and Valdez 2009), but serves as perhaps the best explanation currently available for what is seen across the broad ancient Maya landscape. Specialized production, whether it is the raw material or some finished product(s), reflects a local community resource. The product(s) from a particular community may be taken to a given marketplace which coordinated exchanges, etc. These resource-specialized communities develop interdependence for each other's product and that interdependency provides for a more unified polity. The most easily defined specialized communities produced

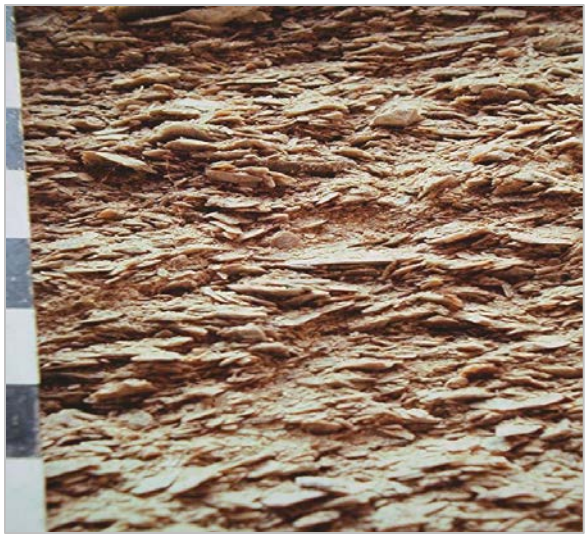

Figure 5. Chert workshop profile photo. Note intensive layering of chert debris from this specialized activity.

the non-perishables such as stone tools. One of the best examples is found at the northern Belize site of Colha where high quality chert was harvested. A profile (Figure 5) from one of the Colha workshops serves as a model of lithic production intensity. For the Three Rivers Region, the small sites of El Pedernal and El Arroyo are local specialized lithic sites, though not as demonstrative as Colha.

Sites that are or may be defined as "unique" from their particular settlement pattern and/or arrangement may also be impossible to assign a resource specialization because of the perishable nature of their resource. In part, sites that specialized in particular plant exploitation, whether cropping or harvesting from the forest or bajos, site that may have specialized in bird production, etc. are leaving no currently identifiable remains. It is, however,

> "all these strategies for specialization permitted the social and economic interplay necessary for long-term bonding between communities. These practical economic ends were complemented by numerous ritual occasions, which communities organized in their own way to further bind the complex network of interdependencies connecting towns and villages separate from the large center order" (Scarborough and Valdez 2009).

For much of the Maya hinterland I would argue that we might claim functional differences based on building/structure configurations in part, without knowing/identifying specific function(s). The Three Rivers Region has generated much data that can be interpreted in traditional models. My personal sense is that such interpretations, while valid in many cases, may be incomplete, unjust, and uncritical in analysis (intellectually lazy?). Some of the premises mentioned here are easy to dismiss and to ignore them makes our continued research relatively easy. Some premises may be validated while others may be negated by future research. To pursue some of these proposed ideas means we accept "the possibility" and to accept the possibility means LOTS of work ahead, both physically and intellectually. It is my hope that we have lots of research ahead.

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XX DEVELOPING MODELS OF MAYA TRADE WITH DATA FROM AMBERGRIS CAYE AND BLUE CREEK, BELIZE

Thomas H. Guderjan

The complexity of Maya trade and inter-polity economics have yet to be fully understood despite significant research efforts during the past four decades, beginning, in a sense with the work of the Harvard – Arizona Cozumel project. Many archaeologists are still skeptical of the notion that Maya trade operated within a large-scale, institutionalized framework. However, the evidence does not support a model of less casual interaction. In this paper I summarize available data from Ambergris Caye on the north coast of Belize and Blue Creek at the headwaters of the Rio Hondo. I argue that the institutional framework for regularized long-distance trade was strong and enduring during the Classic period, facilitating the regular movement of commodities and sumptuary goods among far distant polities.

Introduction

Many archaeologists are skeptical that Maya trade operated within a large-scale, institutionalized framework. However, the evidence supports a model of large-scale, formal interaction. In this paper I summarize data from Ambergris Caye on the north coast of Belize and Blue Creek at the headwaters of the Rio Hondo and argue that the institutional framework for regularized long-distance trade was strong and enduring during the Classic period, facilitating the regular movement of commodities and sumptuary goods among far distant polities.

Following a traditional view of economic anthropology, trade is a function of an early market economy and requires an institutionalized framework that incorporates markets and at least part-time specialists (Polyani 1957). Further, trade incorporates regularized markets with fixed locations and individuals who move goods from market to market. This is in contrast with exchange which exists on a more casual, situational basis without such institutional framework.

Data from coastal sites such as those on Ambergris Caye (Guderjan and Garber 1995) and Wild Cane Caye (McKillop 1996) have shown conclusively that goods moving within the Maya coastal trade network included both elite goods and commodities. Elite goods include jade, shell, ritual craft objects, stingray spines, and other perishable artifacts such as feathers, pelts, and hardwoods, while commodities include agricultural products (food and non-food), salt and other consumables needed by large populations. Importantly, elite goods can be transported via casual or even highly ritualized and formal exchange such as the Kula ring of the Trobriand Islands (Malinowski 1920). However, large scale trade in commodities requires a larger and more permanent infrastructure including production systems, markets, ports, and traders. This view would incorporate Maya trade canoes filled with food and other commodities regularly circumnavigated the Yucatan Peninsula and penetrated into the interior via rivers (Andrews 1983, 1991; Andrews and Mock 2002; Guderjan 1995; McKillop 1996; McKillop and Healy 1989; Sabloff 1977; Rathje and Sabloff 1973).

This issue is immersed in the use of concepts of political economy to explain resource inequities by examining institutions, patterns of behavior and ideologies and relates principally to the development, characteristics and distribution of economic surplus (ie, Masson and Freidel 2002). In its archaeological usage, political economy typically refers to "the control or management of significant components of the economy by elites, who thus facilitated the acquisition, maintenance, and augmentation of their high positions, prestige, wealth, power, and authority" (Webster 2000:187). There are two fundamental features of the political economy model. The first states that resources may be converted into material and political claims, and that some resources, by their nature, may be more productive in this capacity than others. The second states that within a society, avenues exist for some individuals and groups to alienate others from direct and unrestricted access to or exploitation of these resources.

Blue Creek and Ambergris Caye are at terminal points of the Rio Hondo. The river

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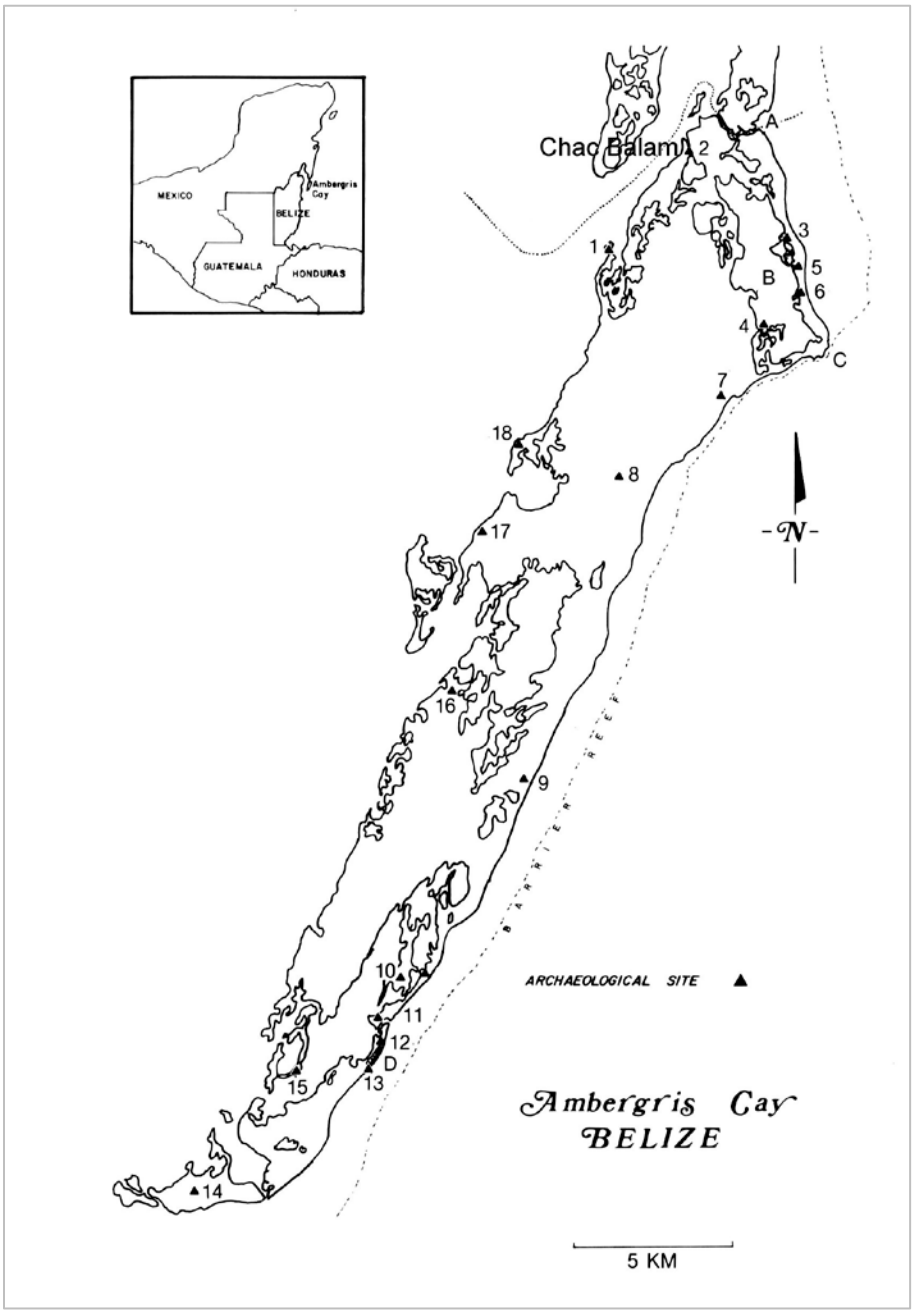

Figure 1. Map of archaeological sites on Ambergris Caye. The following are mentioned in the text: 1. San Juan, 2. Chac Balam, 13. San Pedro, 14. Marco Gonzalez.

originates near the site of Blue Creek where the Rio Azul and Rio Bravo join. From there, it meanders to Chetumal Bay and is the northernmost river on the Caribbean side of the Yucatan Peninsula. This distance of approximately 150 river miles can be canoed in a traditional dugout canoe in approximately 3 days[1]. Aside from Blue Creek, Nohmul is the only other well investigated site on the river. However, several other large sites, such as Cerros, Santa Rita, Sarteneja, Ichpaatun, have been recorded on the shores of the bay.

Ambergris Caye

Most of the field research on Ambergris Caye was conducted by our team (Guderjan

1995, 1997, 2007; Guderjan and Garber 1995) and Elizabeth Graham, first in collaboration with David Pendergast then with Scott Simmons (Graham and Pendergast 1989; Pendergast 1990). Research on Ambergris Caye has led to the location and recording of approximately 20 sites, and has led to the development of an impressive catalogue of academic publications (c.f. Awe, Schwanke, and Guerra 2006, Glassman and Garber 1999; Guderjan 2004; Guderjan, Garber and Smith 1988, 1989; Guderjan and Williams-Beck 2001; Nondeco 1998; Ritchie-Parker 2011; Stemp 2001; Vail 1988; Walper 1999; Williams 2009).

Ambergris Caye is approximately 40 kilometers long and 5 kilometers at its widest point (Figure 1). Despite being commonly thought of as an island, Ambergris is actually a peninsula protecting Chetumal and Corozal Bays from the open sea and separated from mainland Quintana Roo by a small channel known as Bacalar Chico, which may have been constructed sometime before AD 600 (Guderjan 1988; Guderjan and Garber 1995). This may also be an artificial feature, but one that was more likely dredged early in the last century (Andrews 1996). At present, it is unlikely that this can be demonstrated either way (Guderjan 1988). Ambergris, like the general coastline, parallels the barrier reef, except at a location named Rocky Point, where the island and reef intersect. The Bacalar Chico canal (Figure 2) was built as a safe short-cut to the calm, protected waters of the western side of Ambergris as an option to the risk of boating through cuts in the reef into and out of the deeper water east of the reef (Guderjan 1988).

Natural or artificial, the canal clearly facilitated trade and we found Classic period sites with high access to exotic goods on the west side of Ambergris, in clear contrast to the smaller sites with few exotic goods on the east side of the island. These western-side sites include Burning Water, Punta Limon, and Santa Cruz, San Juan and Chac Balam, with the latter two intensively excavated (Guderjan 1988, 1995; Guderjan and Garber 1995). Excavations sponsored by the Royal Ontario Museum took place at the largest site on Ambergris, Marco Gonzalez, located on the far southern end of the island (Graham and Pendergast 1989;

Figure 2. Bacalar Chico Canal with Mexico on the right and Belize on the left.

Pendergast 1990). Additional excavations were undertaken in the town of San Pedro and at the site of Santa Cruz (Mazzullo, Teal and Graham 1994). The following discussion deals only with these Classic period sites in broad terms and does not address the various Postclassic sites and components identified on Ambergris.

While the Bacalar Chico channel made it possible for trade functions to be located in the calm west side of Ambergris, a consequence was that inhabitants of the Caribbean side of the island did not have access to exotic goods, manufactured much of their own, very poor quality sand-tempered pottery, and appear to have lived a locally-focused, maritime based economy. Sites along the east coast may not have been well integrated into the larger Classic Maya system, or they may have supplied marine products to the larger system (see McKillop 2002). This creates a dichotomy in the archaeological landscape between the sites of the western side of the inland, such as Burning Water, Chac Balam, San Juan, Punta Limon, Santa Cruz, and Marco Gonzalez that exhibit formal architecture and large amounts of exotic goods, and those such as Ek Luum, Valencia, Franco and the many undocumented small sites on the eastern or Caribbean side of the island that have none of these attributes. For current purposes, I will term these Type A and Type B sites respectively.

The communities that were active participants in the coastal trade system, Type A sites, share a number of commonalities. In each case, they have associated secure ports for

canoes. In most cases, these are natural inlets where canoes were secure and where on and off loading activities could occur. Chac Balam, the first site west of the Bacalar Chico canal is an exception, however. It is located approximately 100 meters inland and a clearly artificial harbor was constructed at the nearest point on the shore. This harbor is L-shaped, each section being approximately 20 meters long and 5 meters wide. Graham and Pendergast report that Marco Gonzalez was also connected to the western side of Ambergris via an artificial canal that was largely infilled with recent sediment (Graham and Pendergast 1989). In contrast, Type B communities are generally located near the beach, do not have secure harbors and simply would have pulled boats onto the beach or built docks jutting out from the beach.

Type A communities also generally exhibit formal architecture while Type B communities do not. Burning Water, Chac Balam, Punta Limon and Marco Gonzalez all have platforms built around small plazuelas. San Juan, which has a more loosely defined plan, incorporated a 3-tiered round building that approximates the design plan of Yucatecan shrines (Guderjan 1988, Guderjan and Garber 1995, Harrison- Buck 2005). Similar shrines have now been found at Blue Creek (Preston 2007) and Nohmul (Chase and Chase 1988) along the Rio Hondo and three more have been found at sites on the Sibun River (Harrison-Buck 2005). Collectively the presence of these shrines indicates religious and probably economic integration of the Belize rivers and coastline with powerful political and merchant systems of the north.

Type A sites also exhibit strikingly high access to exotic good that were traded from considerable distances. Ceramics at excavated sites such as San Juan, Chac Balam and Marco Gonzalez derived from numerous distant sources. The most striking of these is the presence of *Tohil Plumbate* vessels in Terminal Classic burials at San Juan and Marco Gonzalez (Figure 3). Interestingly, vessels from the two sites are virtually identical, possibly originating from the same workshop on the northwest coast of Guatemala. Vessels from an important burial from Chac Balam include two (un-typed) large trickle-ware plates from the Chichen Itza area

Figure 3. Tohil Plumbate vessel from San Juan

with an elaborate fluted, *Palmar Orange Polychrome* cylinder vase from the Peten area and a *Balanza Black* plate (Guderjan 2004). Numerous other polychromes, most likely from the Peten region were also recovered, as well as one that was likely made at Altun Ha. *Fine Orange* sherds from the Usamancinta region near Palenque were recovered from both San Juan and Chac Balam. A portion of the ceramic collection was re-analyzed and a series of ceramic types from the Rio Bec, Campeche area were identified (Guderjan and Williams-Beck 2001). These included several Early Classic types including *Tacopate Trickle-on-Black, Xoclan Trickle-on-variegated Red and Mundanza Trickle-on-vitreous buff*, Late Classic types including Campeche Glosses (*Estela Red-on-Cream, Sayan red-on-Cream, Plaza Hal and unspecified types of the Cui Group*) and slatewares from the Chenes area (*Ek Mulix Red, Kahalchen*), and Terminal Classic Chenes-derrived types including *Topilchen Thin Slate, Hopilchen unspecified, Dzenhkenchen Trickle, Portia Group unspecified.* It is difficult to imagine a ceramic assemblage that attests more to the far-flung relationships of the Maya maritime trade system. Other artifact categories follow similar patterns. Most Classic period obsidian came from highland Guatemalan sources, especially El Chayal (McKillop 1995). Further by the Terminal Classic, considerable amounts to green obsidian from the central Mexican source at Pachuca are found (McKillop

1995). Also, significant amounts of jade artifacts have been recovered from our excavations (Garber 1995).

In addition to being participants in the long-distance system, residents of Ambergris Caye were also producers of products than were valued by mainland populations. Local salt production has been long associated with Coconut Walk Plain (MacKinnon and Kepecs 1989; McKillop 2002; Andrews and Mock 2002) , a very common ceramic type at San Juan and Chac Balam. Heather McKillop has linked such production in southern Belize to regional trade of lower quality salt that provided a less expensive alternative to the high quality salt available in the long distance trade networks, particularly in the Late Classic period (2002). Further, there was a 17th century request to the Spanish crown for a salt concession on Ambergris which indicated that the requestor had already confirmed the viability of commercial salt production there. So, the high quality salt also seems to have been available from the northern lagoons of Ambergris. To some degree, this is supported by reports from now-elder men in San Pedro who in the 1960's sailed to the north end of the island and "filled their boat" with "the best salt you have ever seen". Unfortunately, after a day of shoveling salt, they tarried to imbibe in Belizean rum and spent the night. The next day their heavily loaded boat was overturned by a hurricane, costing them the entirety of their great wealth (Alan Forman, personal communication). Since then, the lagoons of northern Ambergris are now perpetually inundated due to relative sea level rise and such salt harvesting is not possible. Nevertheless, this supports the idea that Ambergris was a source of both high and lower quality salt for trade to the interior.

Additionally, Ambergris artisans produced significant quantities of shell ornaments which were traded into mainland communities (Garber 1995). Further, sponges which originated from laggons such as those on northern Ambergris have now been found in dedicatory caches at Blue Creek (Bozarth and Guderjan 2004). It is far from clear what the scale of sponge trade was, but it is one of several products that are difficult to trace archaeologically. Further, salted and dried fish may have been regularly ransported from Ambergris to the mainland. In 1985 and 1986, our neighbors at our field camp on northern Ambergris were fishermen from Sarteneja who spent between 2 and 4 weeks at a time fishing and drying salted fish. When their catch was large enough and well dried, they boated to Corozal to sell it in the market there. A very similar process may have occurred prehistorically.

Ambergris residents were able to obtain goods from northern Belize, mainland sources. For example, Ambergris has no known source of chert and assemblages are generally lacking in chert artifacts. However, formal tools were imported in finished form from production sites in northern Belize's chert bearing zone (Hult and Hester 1995). These were then reworked inexpertly by local knappers (Hult and Hester 1995; Stemp 2001). Additionally, stable isotope analyses of human remains from Marco Gonzalez and San Pedro (Williams 2009) and Chac Balam and San Juan (Ritchie-Parker 2011) hint that the Ambergris diet, at least for Type A site residents, may have included considerable amounts of corn and mammalian meat such as deer. It is very possible that dried deer meat was traded as a sumptuary good and it very unlikely that deer populations on Ambergris could have been large enough and sustainable to contribute significantly to the Ambergris diet. Similarly, corn could have been and probably was grown on Ambergris but it is questionable whether it was grown in significant quantities. Further, while it is quiet easy to move from one environmental zone to another on Ambergris, nearly all known sites are located where agriculture would be particularly difficult. The site of Burning Water for example is located on an island in a lagoon on northern Ambergris.

Residents of Ambergris Caye, then, had multiple levels of integration into the coastal and riverine trade system. They were at once traders who facilitated the movement of both sumptuary goods and commodities and consumers of such goods and producers of others.

An important point to be made about the Type A sites on Ambergris during the Classic period is that while they were small and displayed relatively great wealth, none were defensible in any way, much in contrast to later

Postclassic sites such as Tulum and Ichpaatun which had both defensive walls and were located on top of cliffs or prominences overlooking the coast. With the possible exception of Marco Gonzalez, none of the Ambergris sites appear to have been directly controlled by any larger polity. Also, these were not seaports for inland polities (Andrews 1990). Instead, they seem to have peacefully co-existed while undertaking trans-shipment activities as they connected the coastal and riverine routes.

Blue Creek

Blue Creek is a medium sized Maya center that was occupied from approximately 600 BC until approximately AD 830/850 - 1000 (Kosakowski and Lohse 2003; Guderjan 2004a, 2007). Spatially, the "greater" Blue Creek settlement zone covers approximately 100-150 square kilometers (Guderjan 2007; Lichtenstein 2000). This area is bounded by natural barriers and has no other administrative center. Nearly 500 ancient structures have been documented throughout the settlement area, and approximately 20% of these have been investigated through excavation. Excavations undertaken at Blue Creek have explored the diversity of ancient settlement from large, elite administrative precincts to ephemeral, isolated hinterland mounds. Over a decade of continuous research has produced one of the richest databases in the Maya area.

Most of the Blue Creek settlement zone is marked by hill and bajo terrain. Residential structures are preferentially located on hilltops and ridges while bottomlands, characterized by rich colluvial soils, are devoid of settlement, but exhibit numerous modification features such as check dams. Estimates of Blue Creek's Late Classic period population are in the range of 12,500 to 25,000 persons or approximately 100-200 persons per square kilometer. These estimates are based upon large scale surveys and extensive testing of households in known residential groups. Importantly, this is a relatively low population estimate when compared to other Maya sites. For example, Copan's population is estimated at approximately 20,000 persons or approximately the same as that of Blue Creek. However, the Copan Pocket covers only 24 square kilometers, yielding a density of more than 850 persons per square kilometer (Webster and Freter 1990). Seibal's Late Classic population is estimated at 7,577 persons in the central 15.25 square kilometers for a density of more than 600 persons per square kilometer (Tourtellout 1990). Tikal had a population density of approximately 440 persons per square mile in the central 120 square miles during the Late Classic (Culbert, Kosakowsky, Fry and Haviland 1990). Other population estimates range from 300 to 500 persons per square kilometer at Maya sites (Turner 1990). So, even given the possibility of measurement or computation error, Blue Creek's population density was low by generally accepted standards for the Maya.

The possible explanation for the low population density at Blue Creek is the expansiveness of rich agricultural lands separating residential groups. A very crude, but quite conservative, estimate of the amount of agricultural lands utilized by the Blue Creek Maya would incorporate at least 50 square kilometers or 40% of Blue Creek's approximately 125 square kilometers was being cultivated. More liberal estimates could easily rise to 75 square kilometers or 60% of the land under control of the Blue Creek polity (Guderjan 2007).

By the end of the Late Preclassic period (AD 150-250) and through the Early Classic period (AD 250-600), Blue Creek became a wealthy city (Guderjan 1998, 2000, 2004b, 2007). It is clear from the amount and kinds of exotic goods, such as jade, metamorphic grinding stones, obsidian, shells and sponges from the Caribbean coast (Guderjan 1998, 2007; Haines 2000; Marroquin 2009; Pastrana 1999), that Blue Creek was capable of obtaining a volume of import commodities far in excess of other cities of its size.

Blue Creek's wealth clearly derived from two equally important factors. The first was the presence of some of the richest and most extensive agricultural soils in Central America. Blue Creek features the largest system of channelized fields yet recorded in the lowlands (Baker 1997, 2001; Beach and Luzzadder-Beach 2004; Beach, Luzzadder-Beach and Lohse 2007; Beach et al 2002; Guderjan 2007; Guderjan, Baker and Lichtenstein 2003; Guderjan, Preston,

Figure 4. Ditched fields and excavation trenches at Blue Creek

Luzzadder-Beach and Beach 2007)(Figure 4). On-going research within the field complex supports the contention that a wide variety of food and economic crops were cultivated (Bozarth and Guderjan 2002**;** Luzzadder-Beach and Beach 2007).

The second factor for its economic success was that its location afforded extraordinary access to distant markets through river-borne trade (Barrett and Guderjan 2006; Guderjan 2007). Blue Creek is located at the western terminus of the Rio Hondo, the northern-most river draining into the Caribbean Sea. Trade canoes from the Caribbean could enter the river system at Chetumal Bay and reach Blue Creek at the edge of the eastern Peten in only three days. Docking facilities, attesting to the infrastructural support for river-borne commerce along the Rio Hondo, have been recorded at several sites including Blue Creek and Nohmul (Barrett and Guderjan 2006; Pring and Hammond 1975).

Without question, Blue Creek was a large scale importer of exotic sumptuary goods. While artifacts of all kinds of exotic stone were found at Blue Creek, the quantities of jade were the most significant and lent themselves to social analyses (Guderjan 2007; Marroquin 2009). "Jade" is a covering term that does not distinguish between the minerals jadeite and nephrite since they are generally not visually separable. At Blue Creek, we recovered more than 1500 jade artifacts. Most were from a single, Early Classic, ritual deposit in Structure 4 (Guderjan 1998). However, hundreds of others were recovered from non-elite residential contexts. My view is that these were gifted to non-elites by royalty I return for valorous service (Guderjan 2007). However, another view is that jade had fungible value (Freidel 1993) and, therefore, these non-elite were simply relatively wealthy. Regardless which position is correct, jade at Blue Creek is a proxy for the community's wealth, which was derived from its agricultural production and access to export of agricultural products.

Summary

It is clear that during the Classic period large amounts of sumptuary goods passed through Ambergris Caye *en route* to communities such as Blue Creek. Further, Blue

Creek as a consumer of such goods must have been able to provide agricultural products in return. The only real uncertainty pertains to the scale of production and trade in commodities. Blue Creek clearly produced agricultural goods far in excess of its own needs and these were surely exported *via* canoe down the Rio Hondo. Importantly, recent research along the Hondo indicates that many other large ditched agricultural systems exist (Guderjan 2011) so it appears the Blue Creek agricultural production systems are not unusual and that the agricultural production of the Rio Hondo valley was much higher than previously understood.

The sites on Ambergris were trans-shipment points for goods flowing into and out of Chetumal Bay and the Río Hondo. Like other coastal sites, Ambergris participated in the long-distance coastal trade network that moved goods into and out of the nearby riverine networks. Secondarily, marine products were supplied to the interior from Ambergris Caye.

In summary, Ambergris Caye and Blue Creek offer windows into two components of the larger system of economic interaction of the ancient Maya. Blue Creek exhibits significant displays of wealth as seen in the quantities of status reinforcing goods. But these are only the visible traces of a larger system that certainly included the trade of salt and other commodities. Since Blue Creek did not have access or control over local sources of raw materials that could be fabricated into exchangeable status reinforcing goods, the export of commodities that probably included food, cacao and other agricultural products would be the only option to explain its wealth. Blue Creek's success was facilitated by its setting at the terminus of the Río Hondo and access to more distant markets.

A still under-investigated aspect of the Blue Creek-Rio Hondo-Ambergris corridor is the correlation between economics and Late/Terminal Classic expansion of Yucatecan ideological systems. Architecture and ceramics at San Juan, Chac Balam and Nohmul impressively link the riverine communities to the northern Yucatan. Further, the last effort at survival in the Rosita group of Blue Creek included the incorporation of a Yucatecan style shrine linking the survivors at Blue Creek to Nohmul and beyond. Yet, it is still uncertain whether these architectural and artifactual affinities represent ideological linkages or in-migration of peoples from Yucatan into Chetumal Bay and the Rio Hondo.

In conclusion, we are attempting to build broad but specific models of Maya trade and economic interaction. To do so, we need to examine the roles of individual sites and setting to construct a more complete understanding of the geography and institutional framework for his system which is certainly far more complex than can be known by only viewing the "tip of the iceberg".

[1]In July, 2002, Henry Lingenfelder, Bob Hibschman, Gerry Emannuelson and Terri Fonseca canoed from Blue Creek downstream for 3 days using a traditional Maya dugout canoe built in the village of San Felipe for the trip.and two modern commercial canoes. They reached the approximate halfway point between Blue Creek and Corozal Bay. However, not knowing the route, they began looking for campsites in mid-afternoon, typically stopping early as they did not know what possible campsite lie ahead. Their assessment was that there would be no problem in making the entire trip in three days for experienced paddlers who knew where to stop in advance, especially if such locations were previously prepared. Also, interestingly, the dugout canoe far outperformed the modern aluminum and fiberglass canoes. It had very little freeboard, only a few inches, but maximized the effort of paddling far better and was much less affected by wind than the modern canoes with little draft and high freeboard. Equally important is the fact that the canoe built for use on the calm waters of the sluggish Rio Hondo would be completely unsuitable for the coast, even in Chetumal Bay. Even a small wave of 50cms would capsize the canoe.

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XX PROCESSION

Laura J. Levi

Archaeology, ethnohistory, and ethnography in the Maya lowlands all point to a remarkable, near continuous movement of people. This ebb and flow of humanity occurred at multiple geographical scales and implicated populations of variable size. There are wholesale abandonments of communities, vast residential construction programs signaling the resettlement of large populations, and compelling tales of far-flung migrations. There are also the more subtle indices of pilgrimage revealed by the dedicated objects gracing the stairways of shrines and abandoned temples. In this paper I will explore how the circulation of people through the lowland Maya landscape has never been a simple matter of historical expedience nor purely a ritual act set apart from everyday pursuits. Rather, it is one of the most highly visible ways that affiliation was both practiced and experienced. Viewed from this vantage, processional movement must be considered a creative force in the production of space and sociality in the Maya area.

Introduction: The Problem

This paper is one piece of a larger, ongoing study of the social power that inheres in human landscapes. It takes as its point of departure a cluster of imposing residential temples recently found at the site of Wari Camp in northwestern Belize. An unusual occurrence at Wari Camp, nevertheless, clusters of residential temples do have parallels elsewhere in Mesoamerica, most notably at Tikal. There Joseph Becker (2004, 2008:12) observed that the residents of such groups were "crafters" and that their temples were loci of prestigious burials. When confronted by temple clusters along Teotihuacan's Street of the Dead, Annabeth Headrick (1999) made the interesting suggestion that these were the sites of family shrines, each of which housed a mortuary bundle with oracular abilities. Oracle shrines are also known from the Maya area. The possibility of a connection between the two – family based specialty production and oracular pronouncement – brought to mind Mesoamerica's ubiquitous pilgrimage fairs.

In what follows I attempt to finesse some of the linkages among Maya residential temples, avenues of pedestrian traffic, and the relations of power that tied diverse community constituencies into dynamic political wholes. While initially I anticipated that the literature on pilgrimage and visitation would provide the necessary intellectual tools, I confess to being disappointed. The material seems hopelessly mired in functionalist / anti-functionalist debates over the social value of pilgrimage sites (Coleman and Elsner 1994). Do formal visitations promote unity or disunity? Do sites cement social hierarchies or collapse them? At least a few scholars find the terms of debate limiting (e.g., Coleman 2002; Morinis and Crumrine 1991). Along with these others, I suggest that a way to circumvent the problem is to seek emergent properties not simply from sites of visitation but from the process (e.g., Coleman 2002:362-364). I will depart a bit from the herd, however, by suggesting that what is salient about the process is the act of procession (Coleman 2000) and what is emergent in the process is power.

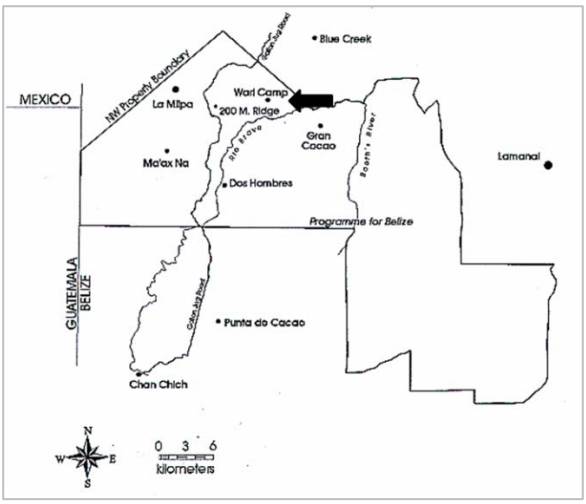

Figure 1. Selected archaeological sites on Programme for Belize property, northwestern Belize.

History of Research at Wari Camp

The principle that has governed research at Wari Camp is that human landscapes are produced through relationships among people, the materials they produce, and the things in

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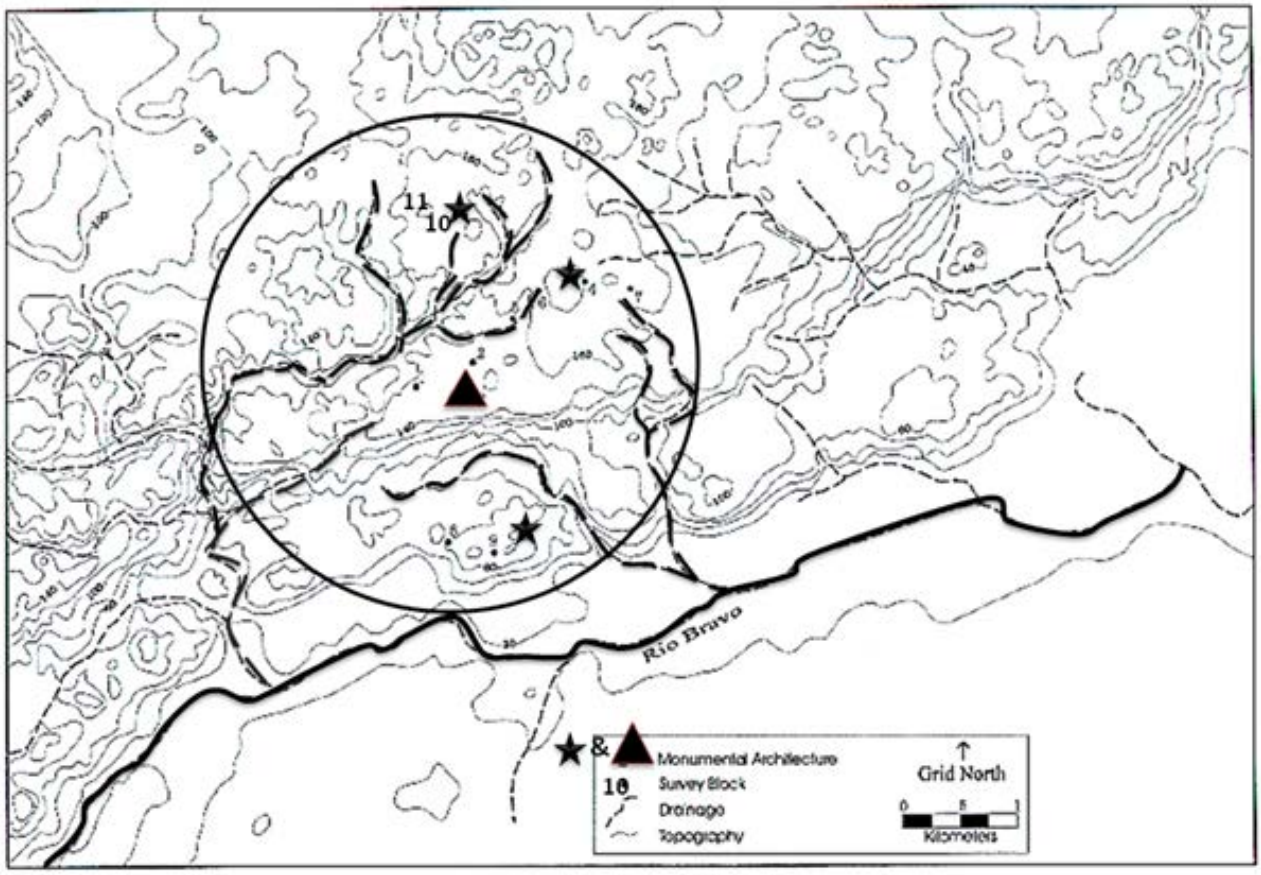

Figure 2. The Wari Camp settlement area showing topography, precincts of monumental architecture, and survey blocks.

their environment. As detailed below, initial work at the site focused on how such relationships structured the community as a whole. More recent work has begun to delineate the specific productive and ritual practices in which community members engaged.

Wari Camp is one of several large sites found in the Programme for Belize forest preserve. Centered atop the Bravo Escarpment, the site lies 10.75 km due east of La Milpa , 12.25 km northeast of Dos Hombres, and 8 km south of Blue Creek (Figure 1; UTM: zone 16 BQ, 19 71 100 [N], 2 92 150 [E]). The prehispanic settlement area spanned extremely rugged terrain, extending from low-lying, seasonally inundated wetlands formed by the Rio Bravo, up a series of steep terraces, across a vast drainage system, toward a flat upland bajo at the top of the Bravo escarpment (Figure 2). At its center was a large precinct of monumental architecture composed of six functionally distinct plazas with commanding views of the river to the south and the escarpment drainage system to the north. Three associated satellite precincts have been found, each spaced roughly 1.5 kilometers from the center. Each consisted of an elite residential compound and a hilltop plaza housing a monumental temple pyramid on the eastern side.

An Archaeology of Affiliation

Recently, historian Matthew Restall (1997, 2004) suggested that a pan-lowland identity first emerged among Maya speakers well after imposition of Spanish rule. What mechanisms contributed to identity formation among the pre-conquest and early colonial Maya? Restall (2004) argued that shared territory was greatly instrumental in forging bonds of affiliation. Of primary importance in this regard was the community, or *cah*. In addition to the *cah*, Restall came across

Class Label	Map Abbrev.	Class Description
COMP4V (Composite Group)	C4	3+ structures. Four integrating mechanisms include: 1) plaza, basal platform, wall, & abutment; or 2) plaza, linear basal platform, wall, and abutment; abutments may occur more than once
COMP3VA (Composite Group)	C3A	5+ structures. Three integrating mechanisms include: plaza, linear basal platform, and abutment; plaza &/or abutment repeated 2 or more times
COMP3VB (Composite Group)	C3B	2+ structures. Three integrating mechanisms include plaza, wall, and abutment; typically, wall &/or abutment &/or plaza repeated 2 or more times
COMP3VC (Composite Group)	C3C	3+structures. Three integrating mechanisms include plaza, linear basal platform, and abutment; each mechanism occurs only once
COMP3VD (Composite Group)	C3D	3+structures. Three integrating mechanisms include plaza, linear basal platform, and wall; wall may be repeated 2 or more times
FG2VA (Focus Group)	F2A	3+structures. Two integrating mechanisms include plaza plus either wall or abutment; wall or abutment occurs twice in each unit, plazas occur only once
FG2VB (Focus Group)	F2B	3+ structures. Two integrating mechanisms include plaza plus either wall, abutment, linear basal platform, or linking platform/walkway; plaza and 2nd mechanism occur only once *per* unit
PP2V	P2	Paired structures. Two integrating mechanisms include plaza plus wall or abutment or basal platform; mechanism occur only once per unit

Table 1. Wari Camp residential classes, in which two or more architectural conventions integrate individual structures into a single residential unit.

Class Label	Map Abbrev.	Class Description
FG1V (Focus Group)	F	3+ structures. Plaza mechanism only; plaza occurs only once per unit
PP1V	P1	Paired structures. Plaza mechanism only; mechanism occurs only once per unit
I1VA	IA	Isolated structure. Possesses a plaza defined on all sides by accretive construction techniques (i.e. the accumulation of building materials to create walls or artificially-elevated platforms)
I1VB	IB	Isolated structure. Possesses a plaza defined on 2 or more sides by terrain reductions (e.g. leveling, edging); in some units, small, discontinuous wall segments may enhance plaza definition
PP0V	P	Paired Structures. Only the proximity of the structures signals group inclusion; likely that not all members of the class served residential function
I0V	I	Isolated structures possessing no visible mechanism of structure incorporation; likely that not all members of the class served residential function

Table 2. Wari Camp residential classes in which, one or no architectural conventions integrate individual structures into a single residential unit.

numerous references to the *chibal*, or patronym group. However, he found no indication that such groups were corporate in character. Nor were they localized or territorially-bounded (Restall 1997:29). Restall (2004) concluded that for every lowland Maya individual, the community was the single most important source of enduring relationships, the focus of all significant social and economic energies, the well-spring of self-awareness and personhood.

Many scholars of the pre-conquest would take issue with this portrayal. Archaeologists and epigraphers studying the classic Maya hyper-elite might point to such things as dynastic lineages, estates, and alliances as both cross-cutting and undercutting the determinative

power of community. For those archaeologists pursuing settlement pattern research, it is immediately apparent that Restall's colonial documents pay scant attention to the domestic realm. And this makes it all too easy to overlook the fundamental importance of family life. It would seem that Restall's understanding of the community was incomplete and, at least for the prehispanic era, offered far too monolithic a portrayal.

Phase I 1997-2002: The Structure of the Wari Camp Community. Phase 1 research was designed to contribute to an understanding of the ties of affiliation that knitted together Wari Camp's prehispanic Maya community. On the basis of earlier research (Levi 2002, 2003), it was anticipated that the community possessed at least two kinds of social units. The first was the family, or household – a group within ancient Maya society that has been extensively studied by archaeologists (see Robin [2003] for a review of this work). The second was a community subdivision that, when observed, is often given the label, ward. Ethnographer Hugo Nutini (1996:84) noted the prevalence of such territorially-based social units within highland Mesoamerica's towns and villages. Curiously, this phenomenon is absent, or has gone unrecognized and unrecorded, among most contemporary lowland Maya communities (Wilk 1988:135-136; Mulhare 1996:97). On the other hand, Spanish-language documents of the Colonial Period make sufficient reference to such units to warrant a search for territorial subdivisions at prehispanic lowland Maya settlements. Empirical studies are rare, however, and scarcer still are archaeological assessments that make an effort to sample whole communities. Of the latter, Edward Kurjack's (1974) pioneering settlement pattern work at Dzibilchaltun remains the definitive study, followed closely by Kintz and Fletcher's (1983) research at Coba. Both of these investigations delineated wards according to spatial discontinuities in residential settlement. But while settlement density and topographical features may have been important considerations in ancient Maya boundary-making behavior, they did not always signal breaks within or between communities (e.g. Levi 2003).

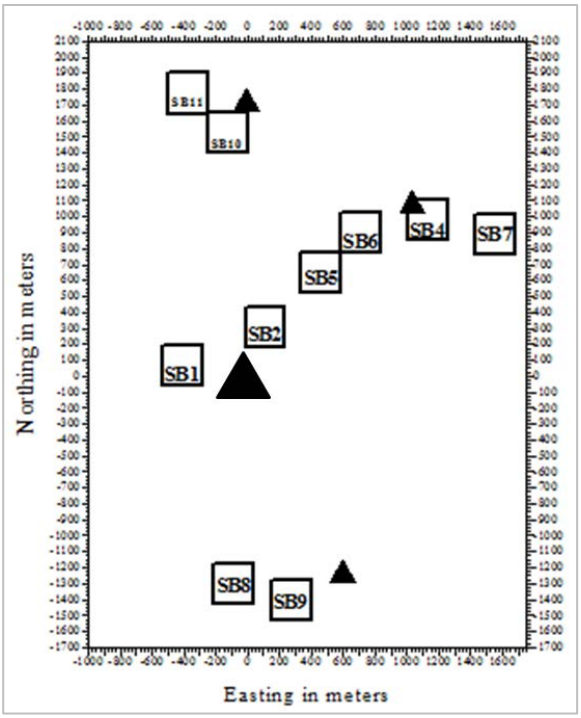

Figure 3. Distribution of survey blocks at Wari Camp. Pyramidal shapes indicate central and satellite precincts of monumental architecture.

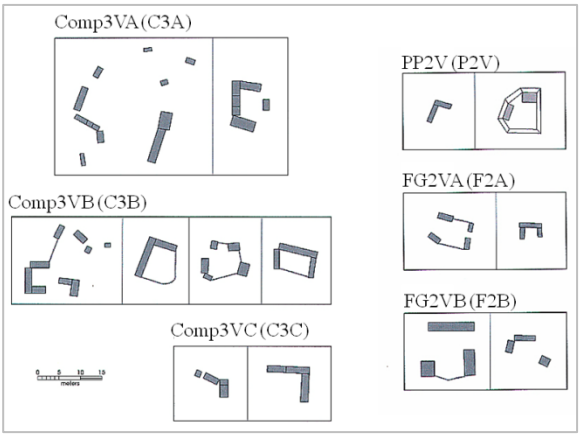

Figure 4. Selection of residential classes

By contrast, I have found extraordinarily nuanced indicators of group affiliation and cohesion in the architectural conventions used to forge domestic spaces out of individual structures. I refer to these conventions as "integrating mechanisms" (see Tables 1 and 2). To date, the Wari Camp Project has mapped close to 600 structures organized into about 200 residential groups (Figure 3 depicts a schematic of the residential areas surveyed at the site). Tables 1 and 2 and Figure 4 present an

abbreviated classification of Wari Camp's residential groups based on the number and kinds of integrating mechanisms found in each. When these classes are examined on the basis of spatial contexts and distributions, they point to the existence of a rich array of household and supra-household units.

Superficially, at least, the Wari Camp community appears to have been very similar to the "complex *cah*" described by Matthew Restall for the early colonial period (Restall 1997:29-37). The complex *cah* was a large, diversified township called *cah* that was comprised of separate territorial subdivisions, each also referred to as *cah*. One of the subdivisions was larger and more centrally situated than the others, and housed the leader of the entire township. In their turn, the smaller subdivisions possessed their own administrators who were subordinate to the township head. For the sake of consistency with existing literature, I use the term ward to refer to these major territorial subdivisions at Wari Camp.

The Wari Camp community also exhibited characteristics that do not find overt parallels in ethnohistoric accounts. In what may have been a phenomenon common to many ancient Maya communities (Levi 2002), residential arrangements at Wari Camp varied with distance to ward precincts (Figure 5). In addition, however, the residential groups of a particular ward were organized into several smaller clusters, or neighborhoods, marked by pairs of Composite Groups. At present, I am able to distinguish between two kinds of neighborhoods (Figure 6). Type 1 consists of pairs of C3A and C3C groups and an adjoining settlement area marked by the prevalence of residential units with walled plaza enclosures. Conversely, in Type 2, one or both Composite Groups (C3B, C3D, and/or C4) possesses plaza boundary walls yet wall segments defining plaza spaces never occur elsewhere in the neighborhood.

Figure 7 depicts my understanding of the complex weave of affiliations that helped to create the Wari Camp community. The area spanned by the large rectangle represents the community-wide affiliation shared by all Wari Camp residents. At the center of the diagram is the precinct of the principal ward where the accoutrements and personnel of community

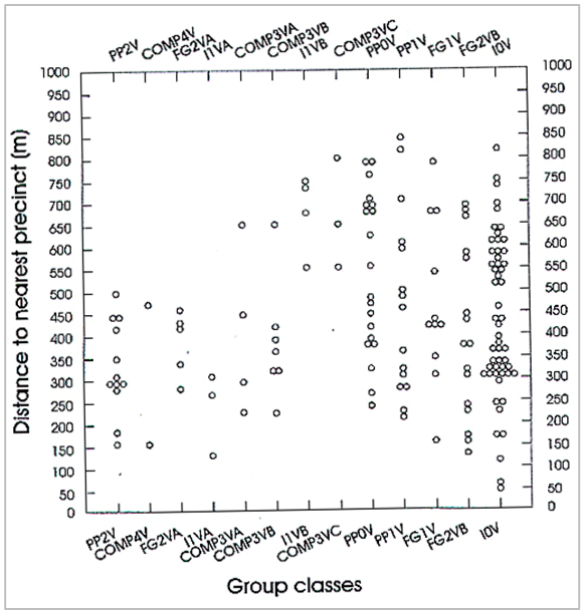

Figure 5. Distribution of residential units according to distance from nearest monumental precinct. Units are grouped by residential class affiliation.

governance were housed. Stippled areas extending beyond this precinct reference distance-dependent changes in residential settlement that very likely related to different kinds of connections between individual households and ward administrators. Also at the center of the diagram, the smaller clear and hachured circles represent cross-cutting household affiliations stemming from associations with either Type 1 or Type 2 neighborhoods. Finally, moving to localities northeast and south of site center we see the pattern repeated for two of Wari Camp's lesser wards.

Phase 2(2008-Present): Organizational Process. Phase 2 research inaugurated investigations at Wari Camp's Northern Satellite, first located in 2002. Project goals have become far more specific – and far more ambitious. Principally, I hope to find material indicators of social, ceremonial, and economic activities: 1) that discriminated among household forms; 2) that tied households into different kinds of neighborhoods; and, 3) that connected households to ward administrators and ward administrators to one another in relationships that cross-cut neighborhood and ward affiliations. In short, Phase 2

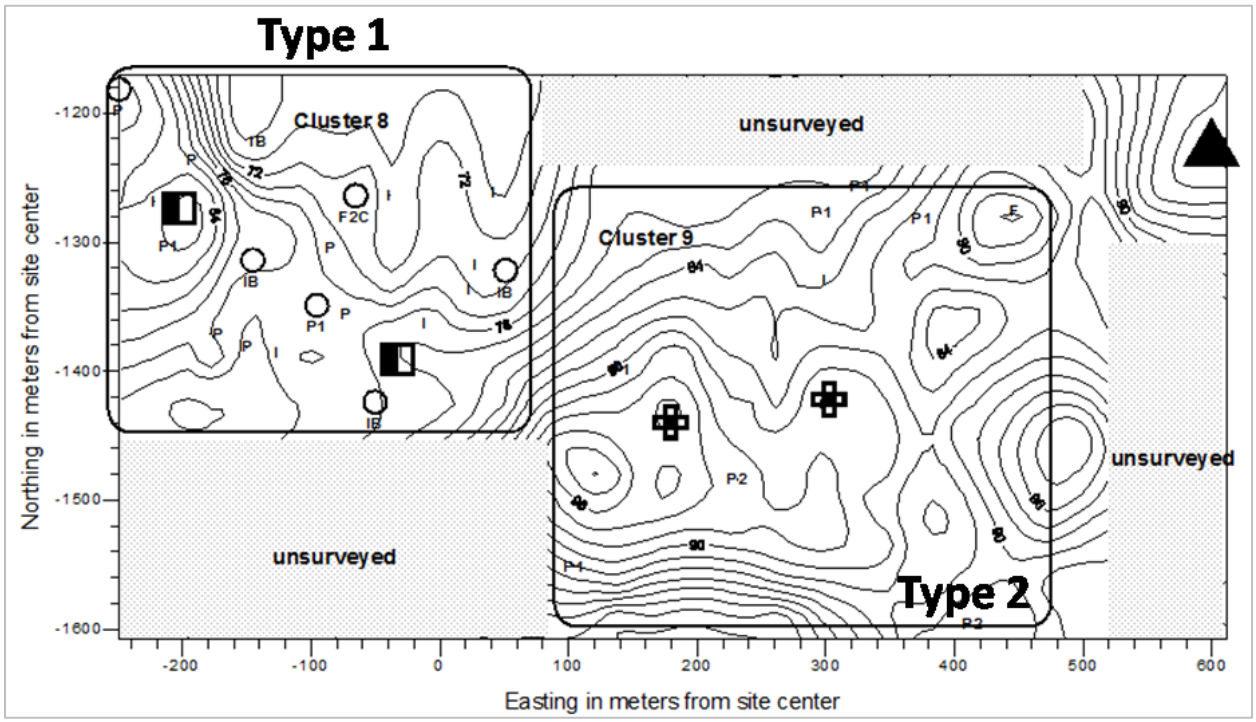

Figure 6. Residential distributions around the Riverine Precinct, one of Wari Camp's satellites. Pyramid shape indicates monumental precinct; outlined cruciform shapes are C3B, C3D, and/or C4 Composite Groups; half-filled squares are C3A and C3C Composite Groups; outlined circles are small residential units with fully- and partially-walled plazas; P2, F2, etc., are alpha-numeric codes designating other residential group classes.

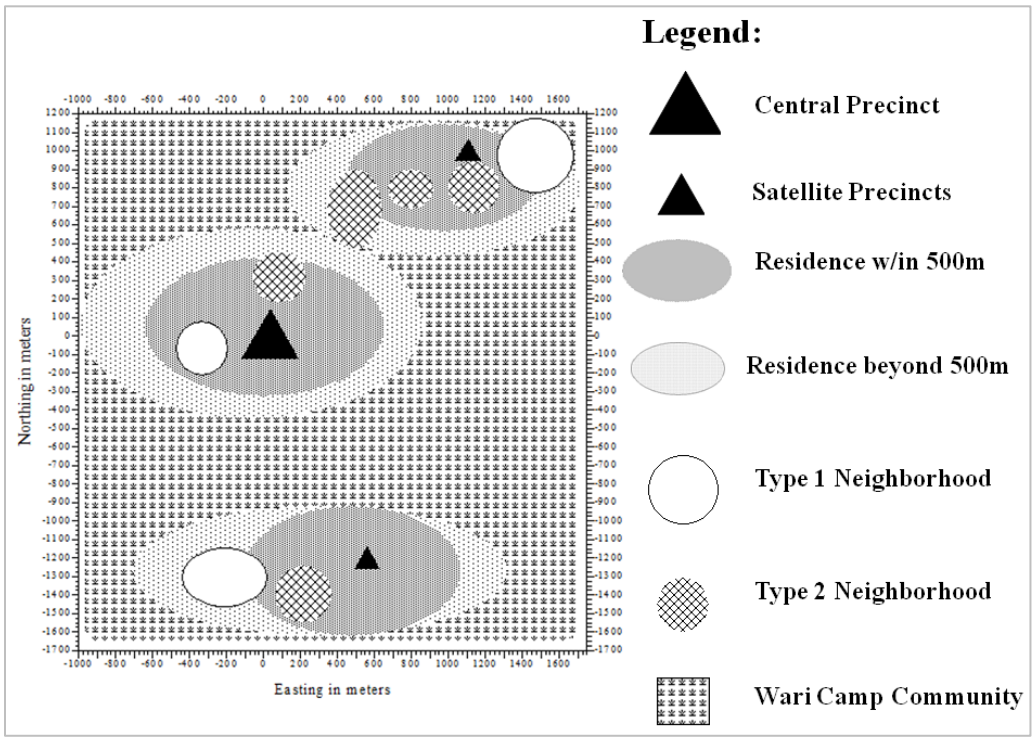

Figure 7. Schematic of the relationships of affiliation defining the Wari Camp community

investigations seek to understand the practices that produced Wari Camp's residential patterning and that formed the nexus of social power within the community (i.e., "organizational process" *per* Wolf 1990:591).

Data gathered since 2008 have confirmed many of the conclusions about community structure arising from Phase 1 research while at the same time suggesting novel ways to approach Phase 2 goals. With regard to the latter, the discovery of several temple-on-the-east groups in the Northern Satellite's residential settlement has focused attention on certain kinds of ritual activities that may have knitted together some of the community's diverse constituencies. Only six temple-on-the-east groups had been identified at Wari Camp prior to 2009 and, of these, three were hilltop temple complexes identified as ward administrative precincts. Work in 2009 and 2010 turned up four additional groups, each with monumental temple pyramids and each part of the residential settlement surrounding the Northern Satellite's ward precinct. Also important was the discovery of an isolated hilltop stela about 325 meters south of the precinct (Figure 8). A small seasonal wetland lay at the northern base of the stela hill while the terminus to an arm of Wari Camp's massive drainage system carved out the hill's southeastern side (Figure 9).

As rare as residential groups in possession of large easterly-situated temples might be at Wari Camp, rarer still are clusters of these groups. To date, only two have been found, with the Northern Satellite's cluster being the larger and more conspicuous. Taken together, temple-on-the-east groups in residential areas at Wari Camp exhibit a common constellation of features:

1. all temple pyramids range between five and seven meters tall and all were heavily trenched by looters – a testament to their function as loci for burials and caches;
2. the structure arrangement in each group conformed to one or another of Wari Camp's residential classes;
3. each group adopted the architectural conventions of its specific neighborhood (i.e., those found in Type 1 neighborhoods frequently possessed walled plazas while those in Type 2 neighborhoods did not).
4. And finally, clusters of such groups were constructed in close proximity to the Wari Camp drainage system.

Association with the drainage system is probably the most revealing aspect of this list. While there are no ready modern analogs to point to, Wari Camp's massive drainage system was a likely avenue of pedestrian traffic. Outside the drainage, the settlement terrain is a heavily dissected surface of hills and valleys. Inside, the climbs and descents are much smoother. Individual arms of the drainage would have connected far flung areas of the settlement, from the riverine territories at the base of the escarpment to the distant northern escarpment uplands. Nor could it be insignificant that most all arms of the drainage system eventually converged upon the heart of Wari Camp's central ward (Figure 2).

Figure 8. Hilltop stela, Wari Camp Survey Block 10.

Acts of Procession

I think a reasonable argument can be made that the Northern Satellite's residential temples played a significant role in many of

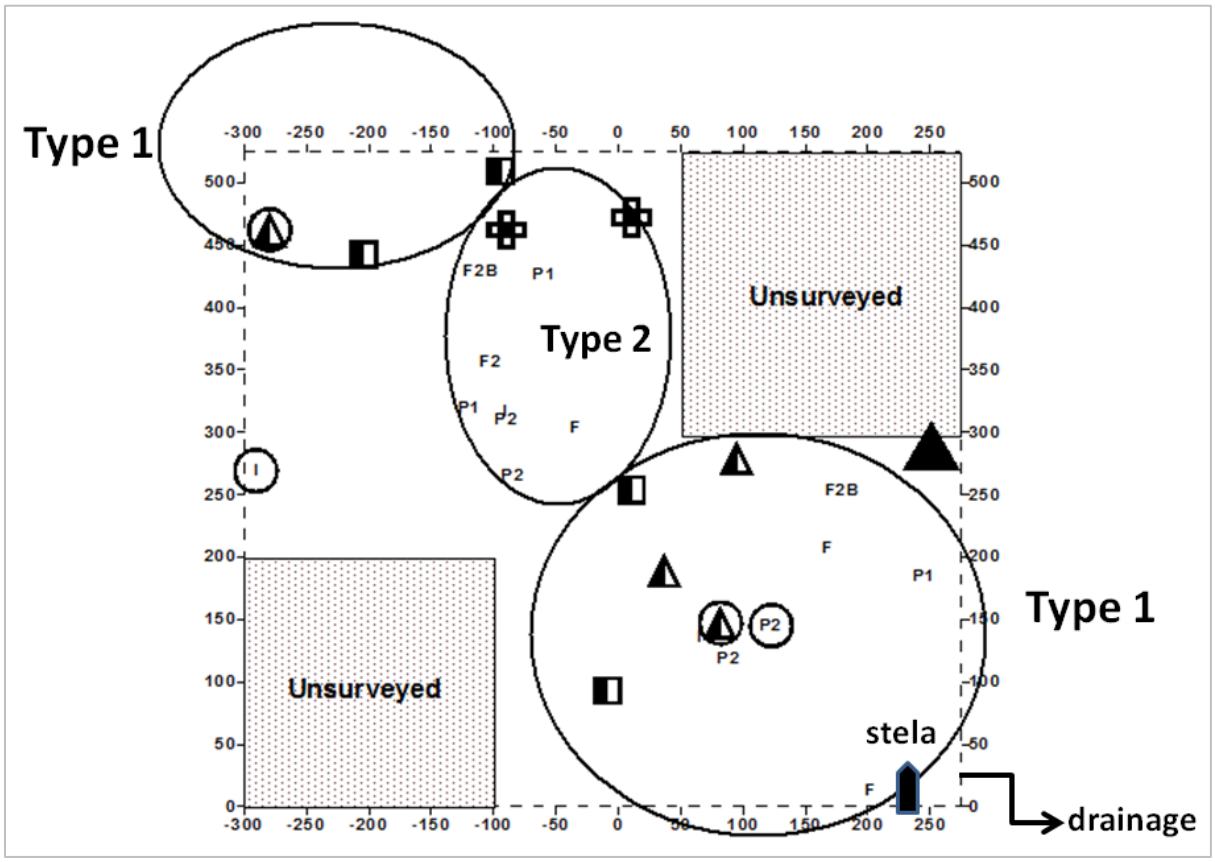

Figure 9. The Northern Satellite. Solid pyramid shape indicates monumental precinct; half-filled pyramid shapes indicate residential units with temples; outlined cruciform shapes are C3B, C3D, and/or C4 Composite Groups; half-filled squares are C3A and/or C3C Composite Groups; outlined circles are small residential units with fully- and partially-walled plazas; P2, F2, etc., are alpha-numeric codes designating other residential group classes.

Wari Camp's processional events. Maya processions are well documented, ethnographically and historically, and they vary according to scale of participation and overt functions. Some appear to be solitary endeavors specific to particular specialists. Shamanic divination, where a diviner consults a series of shrines in an individuated circuit of ritualized movement, is a case in point (e.g. Watanabe 1992:66). Other processions implicate small cadres of individuals, such as family members of the deceased in a funeral procession or litigants to a property dispute in a formal inspection of contested boundaries (McAnany1995:86-95). The K'in Krus ritual circuits that circumscribe family lands and resources, described by Evon Vogt for Zinacantan, are also evocative of this kind of small-scale processional movement (Vogt 1976). Still other processions require the participation of a broad array of community members and, again, others draw large numbers of participants from multiple communities. The widespread practice of processional circuits to mark a community's "four corners" (e.g., Konrad 1991:130; Tedlock 1982:71) or quadripartite divisions (Mathews and Garber 2004:52) would be an example of the former, while pilgrimage fairs epitomize the latter (e.g., Adams 1991).

Clearly processional events in the Maya area are undertaken in response to many different goals, and they have many different functions. Moreover, any one act of procession might have a multiplicity of goals and functions. In all likelihood, processional events involving the Northern Satellite were equally varied. Its cluster of temples and its position relative to the community, as a whole, are suggestive in this

regard. Situated at the far northern end of Wari Camp's drainage, the Northern Satellite would have been a gateway of sorts, marking a principal avenue of access to the rest of the community and an important point of visitation on ritual circuits delineating the "corners" of the Wari Camp Community. Indeed, one of the most interesting attributes of the Northern Satellite is its cardinal orientation due north of Wari Camp's central precinct of monumental architecture. Cosmological associations of north with "up", the sky, and "the source of life and sustenance" would have made this a ritually potent area (Konrad 1991:127; see also Ashmore 1991 and Mathews and Garber 2004). Perhaps not surprisingly, therefore, the locality exhibits a constellation of features that other researchers have associated with petitions for "agricultural fecundity" (Morehart and Butler 2010:803), including temples, a standing stone marker, watery or wetland areas, and a processional pathway (Morehart and Butler 2010; Moyes et al. 2009; Pitarch 2010:138-139).

Theorizing Movement

Determining the specific kinds of processional circuits and ritual practices enacted at the Northern Satellite will require a rigorous program of excavation. For now, I would like to explore how it is that the act of procession lends power to such a ritual site – and to the ritual process itself. I begin with the issue of movement, which has been carefully theorized by Timothy Ingold and Alfred Gell. Both addressed the subject of finding one's way, and both questioned whether people engage the world differently through map-less wayfaring as opposed to map-based navigation. The difference between their two responses is instructive.

Ingold's overarching philosophy is informed by Merleau-Ponty's (1962:19) appreciation for the sensory memory arising from bodily movement. With reference to finding one's way, Ingold (2000) argued that there is a fundamental difference between practical wayfaring through familiar territory and map-based navigation in unknown lands. The crux of his argument rests on the distinction he maintains between space and place. For Ingold, space is an abstract domain of locations bound to a fixed, arbitrarily-imposed orientational scheme. On the other hand, places are sites of intimacy that arise from a history of everyday experiences. Wayfarers do not "plot a course from one *location* to another in *space*" (Ingold 2000:219). Rather, they rely on the bodily memory of "journeys previously made" (Ingold 2000:219). Wayfarers travel from one place of experience to the next in a "matrix of movement" that is not cognized, but embodied (Ingold 2000:219). Ingold argued that we apprehend the world according to our bodies' positioning within this matrix. As a result, the understandings we reach are quite literally contingent upon our point of view.

By contrast, in his 1985 paper on the "practical logic of navigation", Alfred Gell found little use for embodiment and drew no distinction between space and place. His goal was to delineate connections among movement, material things, and thought processes by outlining points of comparability between "practical way-finding" and map-based navigation (Gell 1985:272). Gell made the case that everyday (map-less) navigation through known places calls upon the same set of cognitive techniques demanded by map-based navigation in less familiar territory. In both cases, the images people hold of their positions in the world index a prior set of "propositions" or "beliefs" about relationships obtaining among things in the environment (Gell 1985:278-279). Spatial associations are necessarily conceptualized in a fixed, relational framework, rather than being solely contingent on point of view. How space is negotiated, therefore, is always informed by a set of expectations about what will be encountered and where. Successful navigation, practical or otherwise, requires that these expectations be met in the material world.

I find both perspectives to have merit. Ingold's raises the necessary connections between movement, experience, and point of view. In a telling analysis of records of processions to mark the borders of a colonial Yucatecan town, William Hanks (2000:249-270) investigates why two different circuits around the same town, made by two slightly different groups of people, produced two overlapping yet distinct boundary representations. It seems that each group was referencing a slightly different

network of social affiliation and alliance, in addition to specific material aspects of the town. While underscoring Ingold's point that the spaces of social life are biographically contingent, nevertheless, this same example also suggests that wayfaring must be more than bodily movement along paths already taken. It has to be, simultaneously, an intellectual process (Mazzarella 2002), whereby the memory of people and things establishes expectations for what will be encountered along the journey (*per* Gell 1985).

Where Expectations Come From

To better understand the workings of this process, how the material and the social conjoin in the creation of expectations, we must return to Gell and his use of the semeiotic term, index. An index is a sign that lends itself to a certain kind of causal inference. The inference is not deduced from a universal law, nor is it inductively derived from direct observation of the case in question. Instead, the cause that the index points to requires a certain leap of faith that logicians call abduction (Eco 1990:157-160). The classic example of an index is smoke which, for many of us, signals fire despite the fact that we all know smoke can be produced in the absence of fire.

In a world of ***social*** causality, abduction works through a process "in which 'objects' merge with 'people' by virtue of the existence of social relations" (Gell 1998:12). There is a conjoining of identities so that the appearance of one invokes the instrumentality of the other. But objects and people do not exist as discrete dyads. They form historically dense and richly textured networks of "enchainment" (Gell 1998:141, from Wagner 1991:163). Through abduction, objects index the co-presence of people and other objects, while people come to stand as indexes for social others, be they objects or other persons. Indexes therefore condense multiple layers of reference into themselves, and inspire a complex array of expectations about social life.

Conclusions: Why Expectations Matter

The process by which indexes generate expectations has been likened to an especially insidious form of social agency (Gell 1998; Knappett 2004). Wari Camp consisted of intricate networks of people, the things that they made, and the things in their environment. Movement through the area entailed an inventory of those indexes. It forged a set of expectations about what was likely to occur and where; as well as what was unlikely or impossible. I would contend that creating a set of expectations about experience to a very great extent determines experience, and this very determinacy is the substance of social power. To conclude, I will borrow a phrase coined by Victor Turner. He argued that performance was a process of "putting experience into circulation" (in Bruner 1986:12). I would suggest that when movement is formalized into acts of procession, what has been put into circulation is power.

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XX A DECADE OF RESEARCH AT CHAN

Cynthia Robin, Laura J. Kosakowsky, and David Lentz

Chan is an ancient Maya farming community with a 2000 year history of occupation (800 BC to AD 1200) spanning the Preclassic, Classic, and Postclassic periods. This article provides a synthesis of a decade of research at Chan. We ask: what did residents do to facilitate the longevity of their community? Archaeological evidence from large-scale excavations at Chan's community center and a representative sample of households indicates that knowledge of sustainable agriculture established over centuries and passed down over generations, forest maintenance practices, use of local resources, avoidance of extremes of wealth and power, development of inclusionary ritual and political practices, and reasonably equitable distribution of exotic goods are some of the social and environmental practices that farmers developed at Chan which facilitated the longevity of their community. The goal of this article is to provide a vibrant picture of life at Chan and in so doing illustrate the importance of studying life in a farming community for understanding the organization of ancient civilizations.

Introduction

The Maya farming community of Chan is located in the upper Belize Valley region of west-central Belize, in an upland area between the Mopan and Macal branches of the Belize River (Figure 1). The Chan site is named after the landowners Don Ismael and Derric Chan of San Jose Soccotz who have watched over and cared for the site for decades. Chan's ancient inhabitants constructed a productive landscape of agricultural terraces and homes across its undulating upland terrain surrounding a small community center. This agricultural base supported Chan's 2000 year occupation (800 B.C. – A.D. 1200), which spans the major periods of political-economic change in Maya society (the Preclassic, Classic, and Postclassic periods).

The Chan community consists of 274 households and 1,223 agricultural terraces surrounding a community center (Figure 2). Chan's community center is located at the spatial and geographical center of the community on a local high point in the topography. It consists of two adjoining plazas: the plaza of the Central Group and the West Plaza. The Central Group is the largest architectural complex and plaza at Chan and its main location for community-level ceremony, administration, and adjudication (Figure 3). It also houses a residence and associated ancillary structures for Chan's leading family. On the east and west sides of the Central Group are an E-Group, a distinctive type of architectural complex common throughout the Maya area that was an important location for ritual and ancestor

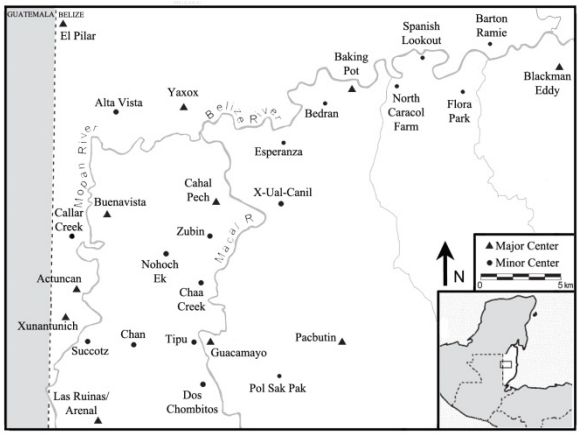

Figure 1. Location of the Chan site in the Belize River Valley.

veneration. The east structure of the E-Group is the tallest structure at Chan, rising to a height of 5.6 m (Figure 4).

Unremarkable in terms of its size or architecture, Chan is none-the-less a community that flourished while the fortunes of nearby major Maya civic-centers waxed and waned. Given that 2000 years is a long period of time, what did Chan's residents do to facilitate the longevity of their community?

The scale of the Chan community provides a window into the lives of people who lived in what was a prehistoric Maya agrarian community. Chan's deep chronology provides a means to examine diachronically how farmers' lives were embedded within and significant for the construction of a complex society. The research of the Chan project demonstrates the critical role of farmers and farming communities

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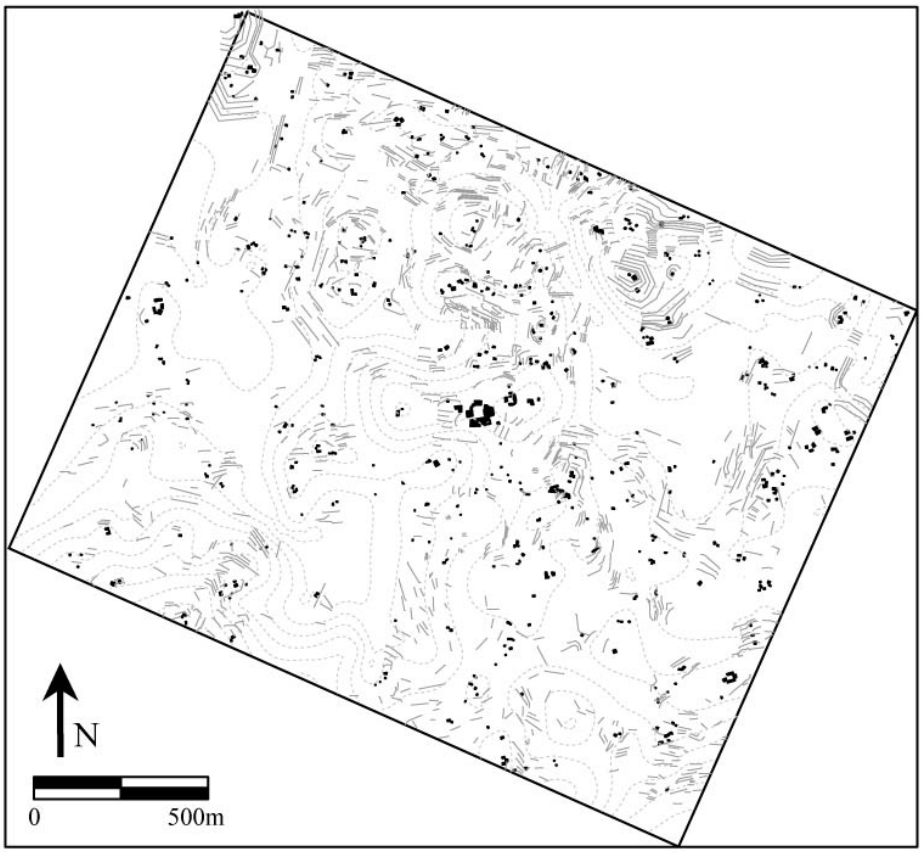

Figure 2. The Chan Site: Settlement, Terraces, and Topography.

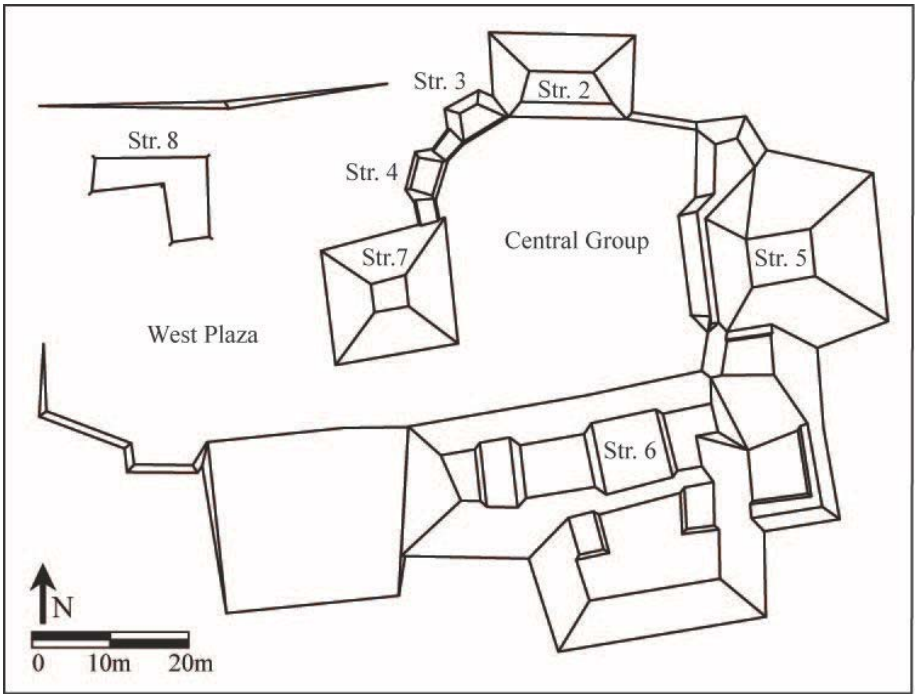

Figure 3. Chan's Community Center.

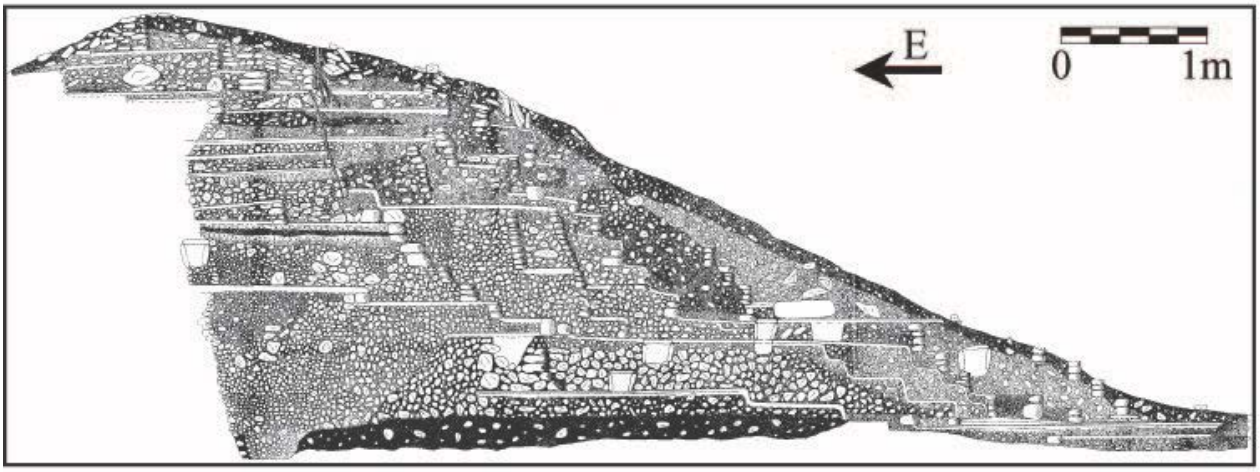

Figure 4. East Structure of Chan's E-Group: Stratigraphy.

in the development and organization of Maya civilization.

Research at Chan

Between 2002 and 2009 a team of over 120 archaeologists, botanists, geologists, geographers, chemists, computer scientists, artists, students, workers, and volunteers from Belize, the US, England, Canada, and China collaborated on a study of Maya farmers at Chan (Robin 2012). The project received a half million dollars in funding from the National Science Foundation, National Endowment for the Humanities, National Geographic Society, Heinz Foundation for Latin American Research, Foundation for the Advancement of Mesoamerican Studies, Northwestern University, and many of the other institutions represented by our researchers.

The project was organized into three phases. During the 2002 and 2003 seasons the project mapped a 3.2 square kilometer area and documented 274 households, 1,223 agricultural terraces, and Chan's community center (see Figure 2). The Chan settlement survey combined topographic mapping, archaeological reconnaissance, surface collections, and Geographical Information Systems (GIS) to develop an understanding of Chan's changing cultural landscape. Topographic mapping and archaeological reconnaissance were employed to collect information on natural features (e.g., land formations, vegetation, environment) and cultural features (e.g., architecture, agricultural

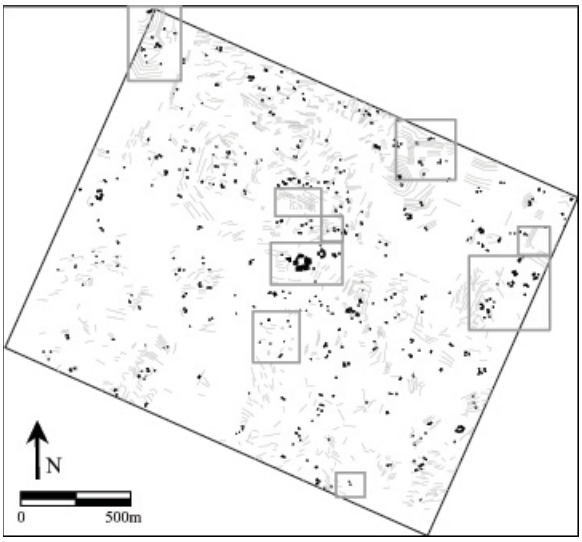

Figure 5. Excavation areas at Chan.

fields, other human constructions) and these were digitally recorded using a Topcon GTS 605 laser theodolite. Ceramic surface collections were conducted at all identified cultural features to provide a relative chronology of inhabitation. Finally, a GIS constructed by Elise Docster [Enterkin] (2008) brought together the cultural, natural, and chronological data to model Chan's changing cultural and natural landscape.

Between 2003 and 2006 and in 2009, excavations were completed at a 10 percent sample of Chan's households (26 households), to examine the temporal, socioeconomic, and vocational variability in households at the site (Figure 5). The settlement survey data helped us

	Calendar Years[a]	Chan Ceramic Complexes[b]
Early Postclassic	A.D. 900 - 1150/1200	(Not a complete complex)
Terminal Classic	A.D. 800/830 - 900	Vieras
Late Late Classic	A.D. 670 - 800/830	Pesoro
Early Late Classic	A.D. 600 - 670	Jalacte
Early Classic	A.D. 250 - 600	Burrell
Terminal Preclassic	A.D. 100/150 - 250	Potts
Late Preclassic	350 B.C. - A.D. 100/150	Cadle
Middle Preclassic	650 - 350 B.C.	Boden
Late Early Preclassic/ Early Middle Preclassic	1000/800 - 650 B.C.	(Not a complete complex)

Table 1. Chan Chronology Chart.

[a] Calendar years are approximate dates based on correlation with other sites in the Maya Lowlands. See table 2 for radiocarbon dates.
[b] Chan ceramic complexes are named for geographic bodies of water in and around the Belize Valley.

select a 10 percent sample of households that would represent the range and variability in households present within the community: we sampled across types and sizes of households; we sampled areas of the community that had been occupied for different lengths of time; we sampled settlement areas at various distances from the community center; and we sampled within different household occupation types. All ritual, residential, and administrative buildings at Chan's community center were also excavated. All excavations were conducted following cultural stratigraphy for which Harris Matrices were generated. All sediment was screened, minimally through ¼ inch mesh, and all in-situ artifacts were point provenienced. We not only excavated the mounds (architectural remains) that form the traditional corpus of Maya studies, but we also conducted extensive post hole testing grids extending for 30 to 50 meters from visible architecture to define and allow us to excavate the activity areas in the open spaces that surrounded peoples' homes. To enhance our understanding of everyday life in the past at Chan a number of samples for microanalysis were collected from excavation contexts. These included 10 gram soil and plaster samples for chemical analyses taken across all floor, occupation, and activity contexts to elucidate the signatures of ancient activities that are no longer visible in macro-artifact and architectural remains; 10 liter flotation samples for paleo-ethnobotanical analysis; and microartifact analysis taken from all contexts to determine food consumption and production and the micro debris remains of ancient activities that are otherwise swept away or removed at abandonment by ancient inhabitants.

Laboratory analyses of excavated materials from Chan were undertaken in each season and continued through 2009. Two seasons, 2007 and 2008, were devoted entirely to laboratory analysis. The roughly half a million objects of everyday life at Chan form one of the largest archaeological samples of Maya farming life. All artifact classes were analyzed by specialists who worked collaboratively with each other and excavators, largely within our field lab in Belize to produce a contextual understanding of Chan's excavated materials (technical analyses that required instrumentation not available in Belize excluded).

Chan's chronology was established through relative ceramic dating of approximately 321,000 sherds, as well as whole and partial vessels, based upon well-established sequences in the area which was combined with 24 radiocarbon dates from carbonized wood and human teeth (Kosakowsky 2012; Tables 1 and 2).

Laboratory Number	Structure	Material	Context	Ceramic Complex	Conventional Date	Calibrated Age	2-σ Range
Beta-256798	Structure 1	Carbonized wood	Fill	Boden	2480±40 BP	BC 740, 690, 660, 640, 550	BC 780-410
Beta-256803	Structure 6	Carbonized wood	Fill	Boden/Cadle	2210±40 BP	BC 350, 290, 220	BC 390-170
Beta-256809	Structure 5	Carbonized wood	Fill	Boden/Cadle	2200±40 BP	BC 350, 300, 210	BC 380-170
Beta-256797	Structure 5	Carbonized wood	Burial 10	Cadle	2270±40 BP	BC 380	BC 400-340; BC 320-210
Beta-256801	Structure 7	Carbonized wood	Burial 14	Cadle	2180±40 BP	BC 340, 330, 200	BC 370-150; BC 140-110
Beta-256812	Structure 5	Carbonized wood	Cache 8	Cadle	2250±40 BP	BC 370	BC 400-200
Beta-256808	Structure 5	Carbonized wood	Burial 9	Cadle	2290±40 BP	BC 390	BC 400-350; BC 290-220
Beta-278921	Structure 7	Human tooth	Burial 16	Cadle	2440±40 BP	BC 520	BC 760-400
Beta-256802	Structure 7	Carbonized wood	Burial 16	Cadle	2460±40 BP	BC 720, 700, 540	BC 770-410
Beta-278922	Structure 7	Human tooth	Burial 17	Cadle	2050±40 BP	BC 50	BC 170-AD 30
Beta-256805	Structure 7	Carbonized wood	Burial 17	Cadle	2540±40 BP	BC 770	BC 800-720; BC 700-540
Beta-256811	Structure 5	Carbonized wood	Burial 8	Cadle	1980±40 BP	AD 20	BC 50-AD 90
Beta-256806	Structure 5	Carbonized wood	Burial 6	Potts	2040±40 Bp	BC 40	BC 170-AD 50
Beta-256815	Structure 5	Carbonized wood	Burial 2	Potts/Burrell	1770±40 BP	AD 250	AD 140-380
Beta-278920	Structure 7	Human tooth	Burial 12	Burrell	1610±40 BP	AD 420	AD 380-550
Beta-278924	Structure 8	Human tooth	Burial 20	Burrell	1550±40 BP	AD 540	AD 420-600
Beta-278919	Structure 5	Human tooth	Burial 7	Jalacte	1510±40 BP	AD 560	AD 430-640
Beta-278923	Structure 8	Human tooth	Burial 19	Jalacte	1420±40 BP	AD 640	AD 570-660
Beta-278918	Structure 5	Human tooth	Burial 3.4	Jalacte/ Pesoro	1350±40 BP	AD 660	AD 640-710; AD 750-760
Beta-278917	Structure 5	Human tooth	Burial 3.2	Pesoro	1230±40 BP	AD 780	AD 680-890
Beta-256810	Structure 5	Carbonized wood	Burial 3.2	Pesoro	1170±40 BP	AD 880	AD 770-980
Beta-256813	Structure 5	Carbonized wood	Cache 17	Pesoro	1260±40 BP	AD 720, 740, 770	AD 660-880
Beta-256814	Structure 5	Carbonized wood	Terminal Deposit 3	Vieras	1150±40 BP	AD 890	AD 780-980
Beta-256804	Structure 6	Carbonized wood	Cahce 22	Vieras	1170±40 BP	AD 880	AD 770-980

Table 2. Summary of Radiocarbon Dates from the Chan site.

Background of the Chan Site

Chan is located in west-central Belize in an interfluvial area of undulating limestone uplands between the Mopan and Macal branches of the Belize River. Chan is situated at the interstices of the major Belize Valley centers of Actuncan, Buenavista, Cahal Pech, Guacamayo, Las Ruinas, and Xunantunich (see Figure 1). Most of these major centers are located 4 to 5 km from Chan, with Cahal Pech being that most distant, located 9 km away. In terms of its location, Chan fits David Driver and James Garber's (2004) definition of a Type 3 Minor Center, as it is located equidistant between more than two major centers. Across Chan's 2000 year history it interacted with numerous Belize Valley centers in complex and overlapping relations of influence and authority.

During the late Late Classic period – around AD 670 to 830 – in a short-lived florescence, Xunantunich establishes itself as a polity capital incorporating the western Belize

valley area that includes Chan (LeCount and Yaeger 2010: Leventhal and Ashmore 2004). Thus we can explore what impact Xunantunich's florescence had on the Chan community and more importantly we can look at how a farming community might have affected the rise of this polity capital. Chan with its long history developed resources and production, and complex webs of socio-political and economic relations with multiple Belize valley centers that provided a constraint on the network of power that the rising Xunantunich polity-capital hoped to dominate and indeed ultimately only achieved for a short period of time.

Research Findings about Chan

Agricultural Terraces

The majority of Chan's residents were farmers. Farmers' agricultural terraces are the most ubiquitous and substantial constructions at Chan and these were the subjects of Andrew Wyatt's dissertation (Wyatt 2008, 2012). With a density of 382 terraces per sq km, Chan's upland terrain has the highest density of terraces recorded in the Belize Valley region. Farmers constructed terraces up and down hill slopes and across channels. Farmers' homes were surrounded by their agricultural terraces making the farmstead the basic settlement unit at Chan.

As Wyatt's work indicates the engineering of these systems required detailed local knowledge of the natural environment, landscape, and water acquired through long-term residency. One of the most significant pieces of Wyatt's research is his finding that terrace agriculture began at Chan long before its population maximum and the florescence of the polity capital of Xunantunich. Agricultural terraces were built up through time. The earliest small and informal terraces at Chan, like its earliest houses, date to the Middle Preclassic period.

This evidence contradicts traditional interpretations of terrace agriculture in the Maya area. Drawing on the work of Ester Boserup and Karl Wittfogel Maya terrace agriculture has been interpreted as developing in response to Late Classic population maximums and the increasing tribute demands of Maya states. Instead, Wyatt shows that terrace agriculture at Chan is a local development by farmers to manage production in hilly terrain. Farmers' development of terrace agricultural systems avoided soil erosion and maximized water infiltration. This knowledge of sustainable agriculture established over the centuries and passed down generation after generation are some of the means through which Chan's residents sustained their community for 2000 years.

Forest Management

David Lentz and colleagues' (2012) analysis of over 1,500 macro-remains and micro flotation-extracted plant remains from across Chan revealed the botanical depth of farmers' agricultural and forest management practices. Farmers developed a complex, diversified agro-forestry system that included annual crop species such as the triad, maize, beans, and squash; a variety of fruit trees such as cashew, nance, sapote, coyol, and avocado; and the manipulation of economically important wild species such as hardwood trees and palms (including poison wood, copal, dogwood, chico zapote, mahogany, and cohune palm) used in construction and ritual, and weedy species which could have been used for food or other purposes such as making matting. Additionally residents imported pine, an odoriferous wood that produces large amounts of smoke when burned, from 17 kilometers to the south in the pine ridge area of the Maya Mountains.

Perhaps the most significant finding of Lentz and colleagues' paleoethnobotanical analysis is that across Chan's history residents had access to a large diversity of mature, closed-canopy, tropical forest hardwood trees (Table 3). This was even the case as population expanded at Chan during the Classic period and farmers had a growing need for fuel, construction material, and agricultural land. A two-tailed t-test comparing the weight of hardwood charcoal identified at Chan during the Preclassic and Classic periods indicates a highly significant difference ($p=0.0103$). As table 4 illustrates, unsurprisingly, residents' use of hardwood expanded at Chan in the Classic period.

More surprising is the large diversity of hardwood trees that farmers' had access to even as population expanded and even in the final days of their occupation of the Chan community

Time Period	N	Genera and Species
Late Preclassic	56	Manilkara zapota, Pouteria sp.
Terminal Preclassic	41	Manilkara zapota
Early Classic	18	Anacardium occidentale, Manilkara zapota, Metropium brownei, Sapotaceae
Early Late Classic	31	Amyris, Spermatophyta
Late Late Classic	123	Annonaceae, Aquatic plant, Manilkara zapota, Swietenia macrophylla
Terminal Classic	102	Annonaceae, Flacouriaceae, Guarea excelsa, Manilkara zapota, Swietenia macrophylla
Building Termination	38	Albizia sp., Annonaceae, Astronium graveolens, Brosimum alicastrum, Byrsonima crassifolia, Colubrina arborescens, Grias cauliflora, Guarea excelsa, Licaria cf. campechiana, Manilkara zapota, Pisadia piscipula, Pouteria sp., Protium copal, Sapotaceae, Schefflera morototoi, Vitex gaumeri
Early Postclassic	7	Spermatophyta

Table 3. Chan hardwood species listed by time period.

(see Table 3). Chico zapote (*Manilkara zapota*), a hardwood prized for its strength and favored in building construction across the Maya area, is found regularly across Chan's history. Unlike at Tikal, one of the largest Maya civic centers, where residents ran out of chico zapote in 741 A.D. (Lentz and Hockaday 2009), Chan's residents always had access to this wood. Other insights come from the residents' incorporation of a diverse array of mature, closed-canopy, tropical forest hardwood trees in a series of terminal ritual deposits. These were placed within the central ritual and administrative architecture at the community center as the use of these structures was terminated at the end of the Terminal Classic period (ca. 900 AD). These included chico zapote (*Manikara zapota*), mahogany (*Swietenia macrophylla*), copal (*Protium copal*), and muskwood (*Guarea excelsa*), among others. Amongst these, mahogany is quite significant because its seedlings will only flourish in the shade of other tall trees. Despite two millennia of occupation and agricultural production, a mature, closed-canopy, tropical forest remained around Chan. The paleoethnobotanical evidence does not allow us to infer what residents' forest management practices were, but whatever they were, residents established forest management practices across the centuries that allowed them to maintain the mature, closed-canopy, tropical forest while simultaneously expanding settlement and agriculture.

Craft Production

In addition to farmers' households, other residents in the community produced chert bifaces, limestone block, shell ornaments, and obsidian blades for community-level consumption. Chan's leading families were the small-scale producers of exotic shell ornaments and obsidian blades dating back to the Preclassic period (Keller 2012; Meierhoff et al. 2012). Small craft-producers developed community-scale production of utilitarian chert bifaces and limestone blocks in the Late and Terminal Classic periods (Hearth 2012; Kestle 2012). The late development of community-level production of utilitarian goods at Chan illustrates how residents drew upon their internal labor and production to promote their economic viability during changing times.

Quality of Life

Other lines of evidence additionally suggest that there was a quality of life shared by residents of Chan. Anna Novotny's (2012) osteological analysis from Chan suggests that levels of health remained comparable across the community's 2,000-year history. The consistent presence of a low degree of biological stress in the Chan skeletal population seems to indicate

the persistent good health of the community. This contrasts with evidence from major centers in the Belize Valley and across the Maya area that indicate that health declined across the Classic period (Haviland 1967, Healy 2004). As human health and the health of the forest often go hand in hand, these two practices at Chan may have co-facilitated each other.

Avoidance of Extremes of Wealth and Power

All of Chan's residents, from its humblest farmer to community leader, lived in perishable buildings with thatch roofs constructed on stone substructures. 59% of mounds have an average elevation of less the 0.50 m and 91% have an average elevation of less than one meter. The variable elevation of stone house platforms across the community was a visible way that residents perceived and signaled to one another, on a daily basis, social differences within the community. But equally as visible each day would have been the social commonalities between residents that cross-cut these differences: every resident from community leader to humble farmer, across 274 households in a 3.2 square kilometer area, lived in a perishable house with a thatch roof.

The lesser degree of social stratification seen at Chan in terms of housing, was also expressed in other visible ways across the community, in terms of people's belongings, particularly the luxury items they wore and other exotics they possessed. Only a single commodity, non-Guatemalan obsidian, was restricted in access within the community to its community leaders.

Chan's leading families had quantitatively more luxury items such as jade, shell, and Guatemalan obsidian than other residents across the community, again marking their distinction in visible ways (Blackmore 2007, 2011, 2012; Keller 2012; Meierhoff et al. 2012). Still, all residents across the community had access to luxury items of comparable quality and style in their homes and for their bodily adornment, and this would have re-enforced commonalities across the community. Residents of lower and higher status had comparable access to similar marine shell ornament types of similar quality and obsidian blades from the three primary Guatemalan sources: Ixtepeque, San Martin Jilotepeque, and El Chayal (Keller 2012; Meierhoff et al. 2012).

Inclusive Ritual and Political Practices

The political strategies that Chan's leaders developed across its 2,000-year history were always a blend of what Blanton and colleagues (1996) refer to as individual-centered and group-oriented strategies, but by the Classic period, political strategy at Chan was dominated by group-focused strategies (Robin et al. 2012a). Individual-centered political strategies involve principles of hierarchy and political actors' monopoly control of sources of power. Group-oriented strategies involve principles of heterarchy and sharing of sources of power among groups.

Individual-centered political strategy can be seen in the veneration of individual ancestors and the revisitation of their graves across the Preclassic and Classic periods, although ancestor veneration was also a group endeavor, as the living relatives of the deceased were responsible for the burial of ancestors and larger groups of people, even at times the whole community, came together to revere their burial. The feasting that took place as part of community-wide festivals across the Preclassic and Classic periods would have underscored group-oriented political dynamic in all periods.

The focus on the individual ancestor as a part of ritual and political process was most marked at Chan in the Preclassic period. Preclassic burials were accompanied with more grave goods than their Classic period counterparts (Novotny 2012). Curated Middle Preclassic figurines with unique facial characteristics that may represent actual portraiture were interred in Late Preclassic ancestral burials, possibly to link the deceased with founding members of Chan (Kosakowsky et al. 2012). In terms of shell ornamentation, only two burials at Chan, Late Preclassic Burial 10 and Terminal Preclassic Burial 2, were accompanied by shell ornaments that marked individual identity (Keller 2012).

While the political strategy of Chan's leaders always combined both individual-centered and group-focused strategies, by the Classic period political strategy at Chan was dominated by group-focused strategies. Ritual

activity in Chan's community center shifted from a focus on individual ancestors to a focus on the community as a whole (Robin et al. 2012b). This is seen in a shift away from burying ceramics and other material objects with individual ancestors, to burying these items in caches and terminal deposits, foregrounding the community, rather than the specific ancestor, as the focus of ritual activity (Kosakowsky et al. 2012), and an increase in the number of multiple over single interment ancestor burials (Novotny 2012).

The group-focused political strategies seen at Chan are distinct from the political strategies of Classic period kingship practiced at royal centers across the Maya area, which epitomize the individual-centered strategy in Blanton's and colleagues' model. Group-oriented political strategies are documented at the end of the Classic period associated with political fragmentation of systems of kingship (Fash 1993; Fash et al. 1992; Tate 1992) and in the Postclassic period (Braswell 2001; Ringle and Bey 2001). Such political strategies are generally seen as a breakdown in the Classic Maya system of kingship. But as Angela Keller (2012) discusses, the Classic period development of group-oriented political strategies at Chan indicates that there was a greater variety of forms of governance in the Classic period than systems of kingship. Group-focused political strategies of the Postclassic and colonial period may have owed as much to the development of such strategies on the part of Classic period farming communities as they did to the breakdown of the system of kingship. Even during the Classic period there were tensions between the more centralized and extractive forces of kingship and the long duration of kinship structures that disperse authority more broadly (McAnany 1995).

Conclusion

For 2000 years farmers, crafts producers, diviners, and community leaders lived at Chan. Chan's residents innovated conservation-wise agricultural technologies and forest management strategies that were some of the environmentally effective strategies that enabled the establishment of a long-lived community. Chan's terraced agricultural landscape was constructed by cooperating farm families and the agricultural system developed and expanded through time. It avoided soil erosion and maximized water infiltration, incorporating complex small-scale irrigation and water storage systems. A forest maintenance strategy, maintained a diverse mature, closed-canopy, tropical forest even as population expanded during the Classic period (A.D. 250 – 900) and farmers had a growing need for fuel, construction material, and agricultural land. The type of sustainable forest management practiced at Chan is distinct from the more extractive practices seen at larger Maya civic-centers where royals culled the mature forest across the Classic period.

In social terms, extremes of wealth and power were avoided within the community, as all residents from humblest farmer to community leader had access to a similar range of exotic items and lived in perishable houses with similar outward appearances. Health remained consistent for residents across its 2000 year history, in contrast to that seen at larger Maya civic-centers where residents' health declined by the end of the Classic period. Ritual and political practices within the community incorporated all residents and focused on the community as a whole, rather than individual community leaders. Avoidance of extremes of wealth and power, more equitable distribution of goods, consistency in health, and communal focus of ritual and politics are some of the socially effective strategies established by residents.

From a traditional archaeological perspective Chan would be considered a minor center, unremarkable in terms of size and architectural elaboration, but this perspective misses the richness of everyday life at Chan. Opulent Maya civic-centers with their towering temple pyramids that usually are the focus of Maya archaeological research, may have been impressive in their time, but had rising and falling political histories. When we compare Chan's longevity and its social and environmental strategies with much more opulent centers and their inequitable distributions of wealth, hierarchical political institutions, declining health, and deforestation, we see the ways in which we may learn some of

our most important lessons about human societies, and the importance of social and economic sustainability, from a seemingly unremarkable place such as Chan.

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XX A MODERN MAYA RITUAL AT XUNANTUNICH, BELIZE AND ITS IMPLICATIONS FOR ANCIENT MAYA RITUAL BEHAVIOR

M. Kathryn Brown

A modern Maya ritual event was documented at the site of Xunantunich. This ritual was held on the summer solstice, June 21st, in front of Structure A4, a relatively small pyramid located on the eastern side of the Classic site core. This paper discusses the details of this ritual and its implications for ancient Maya ritual behavior at the site. Recent excavations by the Mopan Valley Preclassic Project has documented a series of Preclassic ritual deposits located in front of a small eastern pyramid in the Preclassic ceremonial core of the site. These deposits are examined in light of the modern ritual event and our current understanding of ancient Maya cosmology

Introduction

It is well documented that Maya people in colonial and modern times have often returned to ancient ruins to conduct rituals (Chuchiak 2009; Maxwell and Garciá Ixmatá 2008; McGee 1990; Palka 2005). The visitation of ancient sacred places on the landscapes in order to conduct rituals appears to have been an important religious activity in Precolumbian times, as well (Brown 2011; Hammond and Bobo 1994; Houk et al. 2008; Maxwell and Garciá Ixmatá 2008). A close examination of these rituals as practiced today can provide some insight into contemporary Maya cosmology and ritual behavior, which in turn can help us interpret archaeological features. This paper describes a single ritual event, a modern Maya ritual held at the archaeological site of Xunantunich, and discusses its implications for understanding ancient Maya ritual behavior. I focus closely on the interpretation of the archaeological remains of rituals that took place in front of a small eastern pyramid in the Preclassic ceremonial core of Xunantunich in light of the modern ritual event described below.

The 2011 Summer Solstice Ceremony at Xunantunich

On the morning of the 2011 summer solstice on June 21st, I was driving with my archaeology crew to Xunantunich to begin our work day. As we crossed the ferry, I was told that there was to be a modern Maya ceremony in the site core. Several local individuals were walking up the hill to participate in the ceremony, so I offered them a ride and walked with them to the location of the ceremony. My Field Director, Jennifer Cochran and I, were welcomed and invited to stay for the ceremony. Having a strong interest in ritual activities, especially related to solstices, I was quite excited to participate and document the ceremony.

The event was approximately three hours in length. Although the ceremony was conducted in Spanish, a translator repeated everything that was said in English. The description below is based on this English translation and my personal observations. As an archaeologist, I focused on the material aspects of the ceremony and tried to document the material offerings made during the various stages of the ritual. My notes were quite detailed, and I present a detailed description below. Although I am not an ethnographer and my interpretations of this event may reflect this, the ceremony shared many elements with ethnographically documented modern Maya rituals. At the same time, it was infused with references to New Age philosophy and the upcoming 2012 winter solstice event.

The ceremony occurred directly in front of Structure A-4 (Figure 1), a relatively small pyramid located along the eastern side of Plaza A-I at the southern end of an in-line triad of buildings. The formal arrangement of this group resembles the eastern component of an E-group. Although there is not a western pyramid clearly associated with this group, it may have been part of an E-group at one time in the sites history (Jameson 2010). While our understanding of E-groups has evolved since their first documentation (Blom 1924), the idea that E-groups were solar observatories has remained central in both popular and scholarly literature. E-groups may have been associated with observing solar cycles in the Preclassic

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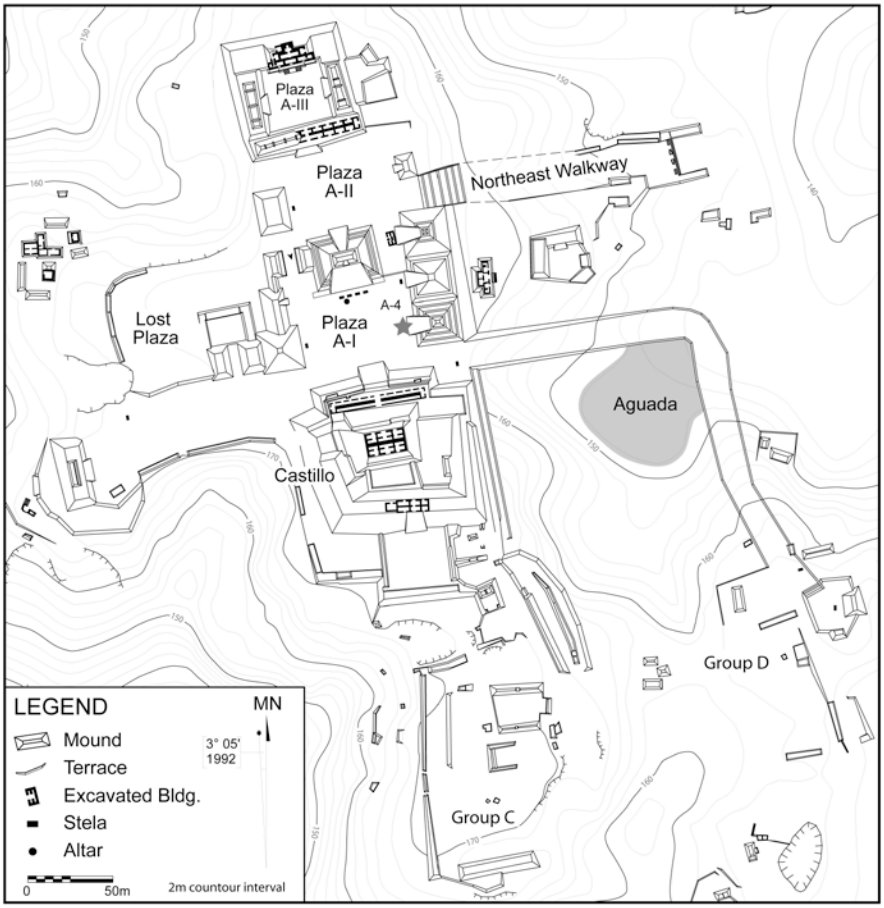

Figure 1. Map of Xunantunich Showing Location of Modern Maya Ritual (used with permission, copyright Jason Yaeger and Angela Keller).

(Cohodas 1980) and were possibly associated with K'atun cycles (Aimers and Rice 2006) in the Classic period. It has been documented that ancestor veneration was an important aspect of rituals associated with E-groups (Chase and Chase 1995), as was the case with other eastern architectural features (Ashmore 1991; Brown 2011). The cardinal direction of East is also emphasized in modern Maya rituals today (Hanks 1990), suggesting strong continuity in the role of East as the directional focus of ritual activity. In this case, the position of the pyramid on the eastern side of the site's main plaza was the reason why it was chosen as the location for the ceremony.

The ritual was led by three individuals, two men and one woman. Additionally, there was a fourth woman dressed in all white who assisted with the ceremony. Approximately twenty observers were present, several from the local community, Succotz. The ceremony began before the site officially opened for tourists, but by the time it had concluded several tourists had gathered around to observe.

The ceremony began with the construction of the basic framework of a ritual offering, which was then burned. This began before I arrived, but the elements of the layers were described prior to the beginning of the ceremony by the lead male ritual specialist. The offering was placed directly on the ground and was constructed to represent the cosmos. The vertical dimension was established by placing nine layers beginning with a layer of white sugar (Figure 2). Incense of different types was placed on top of the sugar, as well as tree resins, cigars, and chocolates. Six colored candles were set into the ground to establish the horizontal layout of the offering. A red candle was placed on the east side, black to the west, yellow to the south,

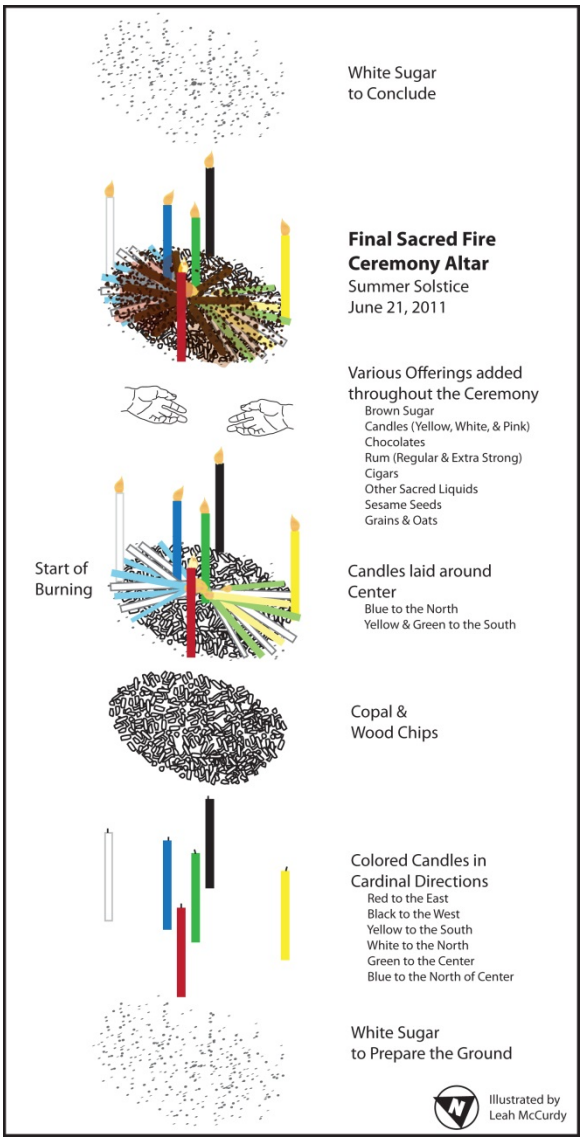

Figure 2. Illustration of Sacred New Fire Ceremony Layered Offerings (Illustrated by Leah McCurdy).

white to the north, and green in the center. Additionally, a blue candle was placed directly north of the central green candle to represent the sky. Smaller candles were laid on the ground around the central candles with blue to north and green and yellow to the south. It should be noted that the use of colored candles to represent the cardinal direction has been documented in other modern Maya ritual ceremonies (Maxwell and Garciá Ixmatá 2008).

The meaning of the colors was described in detail: red represented blood, black represented protection and skin and hair, yellow represented meat and muscle, and white

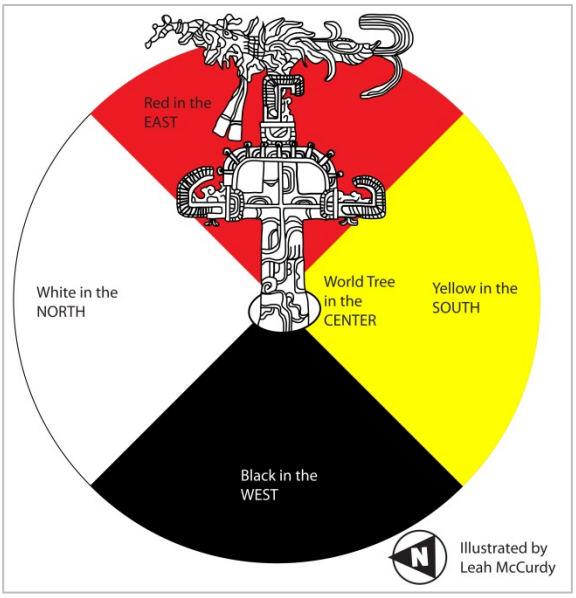

Figure 3. Maya Directionality and Associated Colors (Illustrated by Leah McCurdy)

represented bones. All the colors together further represent the faces of humanity and the different colors of corn. Additionally, red symbolizes the rising sun in the east, black the darkness where the sun sets in the west; white symbolizes north, where air starts clear and picks up illnesses and then carries it to yellow in the south (Figure 3).

The ritual specialists offered blessings, and two yellow candles were passed out for each observer. The event was described as a Sacred New Fire Ceremony, and it was announced that similar ceremonies were being held simultaneously at the archaeological site of Tikal and in the Yucatan. References to the upcoming 2012 winter solstice were clearly infused with New Age notions regarding the end of the current great cycle of the Maya Long Count calendar, as well as a sense of revitalization and Mayan nationalism. It was stated that Mayans were light after discord and it was time for the Mayans to lead the way in the rebirth of knowledge and harmony with nature. The lead ritual specialists emphasized the need to recognize the Mayans' greatest achievements and their spiritual connection with the cosmos and the grand Supreme Being, as the world moves toward December 21st, 2012, when the Fifth Sun will end. The latter is clearly a reference to Aztec cosmogony and the belief that

we are currently living in the era of the Fifth Sun.

The observers were thanked for bringing positive spiritual energy and asked to raise the level of spiritual energy and to share this energy with others. Additionally, we were thanked for our physical presence. It was stated that the Mayans and Mayan books have informed us that in 2012, the planets will harmonize and align. The lead ritual specialist thanked the scientific community for discovering that this alignment will occur. It was stated that a calling had gone out over the world and that many communities have started the process of preparing for this event. Navajos, South American indigenous peoples, and people in Japan all had started lighting candles. A strong spiritual calling had gone out to indigenous people across the world to start the process of lighting candles. Again, it was stated that the Sacred New Fire Ceremony was being held at three places in the Maya world, and that they began at the same time with all voices joining together. They stated that although Mayans are leading this ritual, they are doing so for the entire world. They said that the Mayans are inviting the world to join the arc, but that most of the world is too busy accumulating money. In an apparent apocalyptic reference, it was said that this process will select the seeds of humanity for the next era, as humanity is purged every 5,000 years and only the good seeds survive.

At this point in the ceremony, a series of blessings began. The blessings were preceded with the naming of archaeological sites across the Maya region. There was a long and exhaustive list of sites that included most of the well-known sites in Belize, as well as several less known sites. I was happy to note that Blackman Eddy and Dos Hombres—both sites where I have conducted research previously—were named. While the list of sites was being called out, the other two ritual specialists prayed and chanted. Rum was poured around the offering and the ritual practitioners lit white candles and laid them in the central portion of the offering with the burning end toward the center. Observers placed yellow candles in the fire. Brown sugar was then poured on top.

A calling went out for a good path to travel, one free of mud, stones, and thorns, a good path for wherever we are going. Copal incense was added to the burning fire. At this point all the participants and observers were asked to form a circle around the burning offering. A calling went out for the forces of good to play a game against the caretakers of the underworld. It was described that a plant had been planted in the ground. If the plant flowers, it is as sign that the forces of good were victorious; if the plant shrivels and dies, it is a sign that the forces of good were defeated. The lead ritual practitioner placed green candles in the fire.

Prayers were said to Ix, to the sun, stars, moon, earth, plants, and ground, representing all of Mother Nature. Four yellow candles were placed in the fire. All observers received a handful of sesame seeds. These were placed in the fire for food and health. Prayers to the ancestors followed, and they were asked for guidance. Cigars and white candles were given to the lead ritual specialist, and two white candles were passed out to the observers. Brown sugar was placed on the fire, and white rum was placed around the fire. Observers then placed candles into the fire. This was followed by prayers for positive energy and knowledge, and to know God and be like him. Two large white candles were then placed into the fire by the lead ritual practitioner and smaller white candles were placed in the fire by the other two ritual practitioners.

At this point in the ceremony, the lead ritual specialist blessed the women dressed in all white. He prayed around her at key places and on top of her head using a candle and smoke. He then placed the candle into the burning offering. This was followed by additional blessings. Prayers went out to obsidian stone. It was stated that this is the same type of stone that falls when meteors hit the ground, and that it is used for both good and bad. The surgical use of this stone cuts out unhealthy elements of our life. Oats and brown sugar were then placed in the fire. Prayers went out to women and the feminine aspect of the world, the female part of the world that sustains us. Red candles were placed in the fire and then covered with brown sugar and sprinkled with oats.

It was then stated that the Hero Twins visited the underworld, and one was sacrificed

and then distributed to five places of the cosmos. They burned his bones and placed them in the river. He rose into the sky and gives us light. He is the constellation known as warrior or great hunter. Cigars and red candles were then placed into the fire with incense. Prayers went out to call upon the waters, the rivers, lakes, and seas, the source of life, the source of our beginnings, and of our life-giving force. Water was then poured around the fire. We were asked to pray that man-made forces, such as global warming and shortages of water be rectified. Pink and yellow candles were placed in the fire. Prayers for air and for the ability to have air for strength followed. More brown sugar was placed on the fire.

The lead ritual specialists then asked for prayers of clarity, calling on darkness, and transparency in life, for these forces to do good in the world. Additional offerings were placed in the fire, including three pink candles and one large white candle in the center, followed by pieces of chocolate, two small white candles, and a sprinkling of grain. This was followed by a prayer for the element of fire, with the power to cleanse. The observers were warned that we must be careful as fire can entrap, and that we must pray for freedom, not entrapment, and to reach beyond earthly things. Additional offerings were placed in the fire, including three pink candles, brown sugar, and more grain. This was followed by prayers to the feathered serpent, who was said to keep us informed of natural events.

As the blessings continued, the offering burned, consuming the additional offerings as they were placed in the fire. At this point in the ceremony, prayers went out to death. The prayers were not that she would come, but to give us the time to live and not die early. This was a prayer to allow us a full life. Small sticks, white candles, and cigars were added to the fire. White rum was poured around the outside of offering and to the cardinal directions. Then extra strong rum was poured to the cardinal directions and around the edges. The observers were handed one white candle, and a prayer was made for the force or element of strength, for the guardian that carries the earth and brings goodness to the earth. Observers placed candles in the fire one by one, and sesame seeds were again added for health. Then yellow candles were added to the fire. A large black candle was placed to the west and pink candles placed to the north and east. Four larger sticks were placed in the cardinal directions, and then white candles were placed above the sticks and to the inter-cardinal directions. Blue candles were placed in the cardinal directions, with sugar placed above these.

The ritual specialists prayed to the cardinal directions and the forces of the earth to bring rains. Grains were then placed in the cardinal directions. Sacred fluid was placed on the fire and extra strong rum was poured in the cardinal directions. This was followed by the pouring of red liquid in the cardinal directions. Two white candles were passed out to the observers and everyone kneeled. More candles were placed in the cardinal directions, except south. Additionally, sugar was poured in the cardinal directions.

The final blessing was for loyalty. Prayers went out to our faithful companion the calm, peaceful, and loyal dog. The ritual specialists prayed for forgiveness and for our ability to participate in spiritual awareness. Three large white candles were placed in the fire, one to the north, east, and west as well as a handful of small white candles. Praying continued while the fire was stirred. The ceremony concluded with a series of final offerings. White sugar was placed to cover the fire, with white candles placed in cardinal directions and cigars in the center. White rum was poured in the cardinal directions, and chocolates sprinkled over the fire. The ritual specialists prayed for the uniting of all indigenous people and kissed the ground in the cardinal directions. We then placed our white candles one by one in the final burning stages of the fire. Several observers were blessed and the ceremony concluded. We were thanked for bringing positive energy to the ceremony. We were told that while the fire was still burning, the spiritual world was still present and was still bringing positive energy to us. The ritual practitioners shook beads towards the cardinal directions above the fire and continued to bless anyone who wanted a blessing. This included several tourists that had happened upon the ceremony at the final stages and decided they

wanted to be blessed. The blessing included the use of red liquid for ritual cleansing. I, myself, was not blessed.

Interpreting Precolumbian Ritual Features at Xunantunich Group E

The ritual I have just described holds great potential for several avenues of interpretation. I will limit myself here to a discussion of the insights that the ritual brought to my interpretations of a series of features placed in front of Structure E-2, the eastern pyramid in Xunantunich's Group E.

After the ceremony concluded, I closely examined the physical remains of the burned offering. I photographed the location of the burning immediately after the ceremony's conclusion (Figure 4), and I returned to the location five days later to photograph the remains of the burned offering again (Figure 5). It had rained between the two photographs.

I noted that the exterior of the circular area of burned grass and soil was darker in color, while the interior had a higher concentration of ash and carbon. The area directly around the burned location appeared to be unaffected by the heat. I was quite curious about the physical nature of this burned location, as scorch marks are often documented in the archaeology record. In fact, we encountered a small circular burned area in Group E.

Xunantunich's Group E is a Preclassic ceremonial center that lies approximately 800 meters down slope and to the east of the Classic-period site core (Brown 2011; Brown et al. 2011; Robin et al. 1994) (Figure 6). This group consists of two Preclassic pyramids, Structures E-1 and E-2, respectively framing the western and eastern sides of a large sloping plaza. The east/west axis evokes the passage of the sun, which was an important symbol of authority in Preclassic Maya civilization (Brown 2011). The northeastern sector of the site is framed by a monumental, flat topped platform measuring 100 meters north-south by 115 meters east-west, rising 13 meters on its tallest side. This enormous platform dates to the Preclassic period as well (Robin et al. 1994).

The Mopan Valley Preclassic Project has been investigating Group E since 2008 (Figure 7) and has documented additional Preclassic

Figure 4. Photograph of the burned offering after Ceremony.

Figure 5. Photograph of burned offering five days after the Ceremony.

buildings and platforms buried beneath the group's plaza surface, including a terraced platform located just west of Structure E-2 (Figure 8). The final construction phase of Structure E-2 and the associated terraced platform appear to date to the Late Preclassic. Although both architectural features were abandoned around this time, this location appears to have continued as a place for conducting rituals for centuries.

As we have discussed elsewhere (Brown et al.2011; McCurdy and Brown 2011), numerous Protoclassic vessels including partial

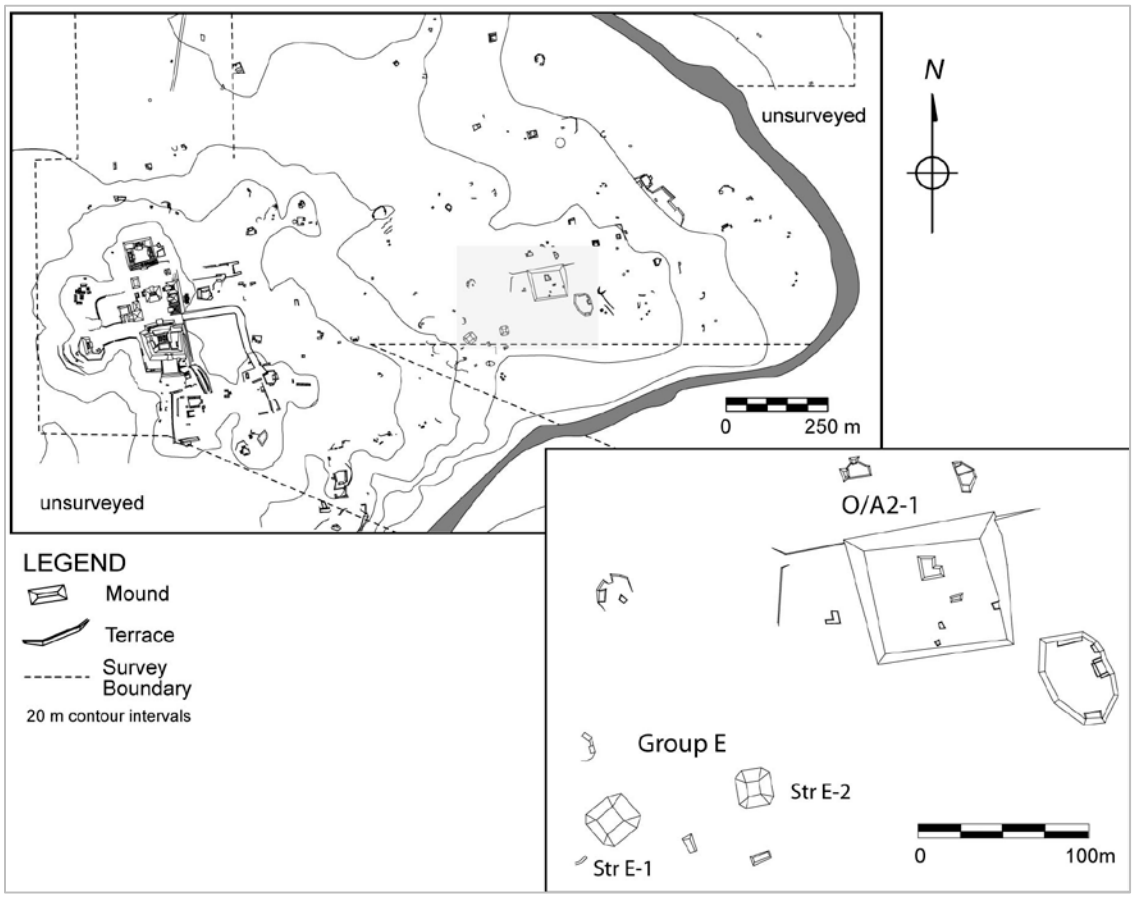

Figure 6. Map Showing Xunantunich Site Core and Group E.

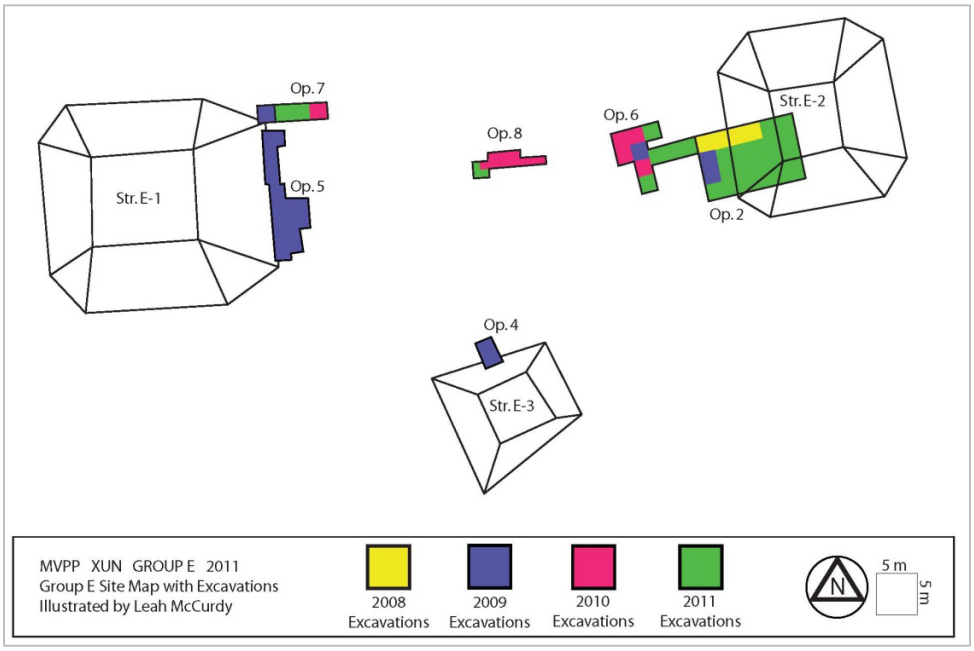

Figure 7. Group E Site Map Showing Excavations

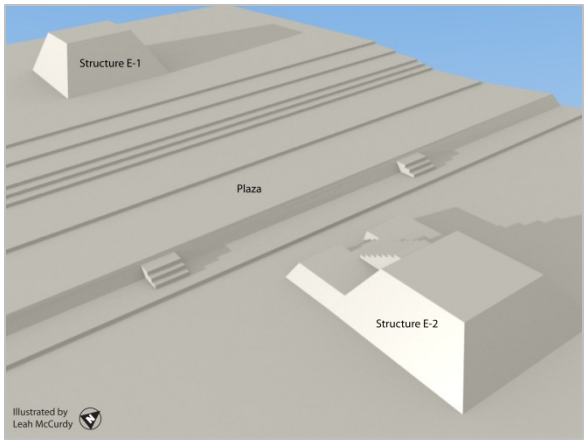

Figure 8. Isometric Drawing of Structure E-1, E-2, and Terraced Platform in Plaza E (Illustrated by Leah McCurdy).

Figure 9. Photograph of Circular Burned Feature in front of Structure E-2.

Aguacate Orange mammiform tetrapod dishes, partial Aguacate Orange jars, ring based vessels, and several partial Sierra Red vessels were encountered smashed on the terraces of the platform in the plaza. It is interesting to note that many of these vessels appeared to have been intentionally halved and quartered, in a manner evoking the halved and quartered vessels found in Middle Preclassic feasting deposits at the site of Blackman Eddy (Brown 2007, 2008). This deposit contained other materials including obsidian blades, worked slate pieces, quartz fragments, a large crystal flake, and numerous animal remains including deer bone and antler. We have interpreted this deposit as the remains of a ritual feasting event, perhaps associated with the Late-to-Terminal Preclassic abandonment of this location. Alternatively, it is quite possible that this event represents ritual re-use shortly after this location was abandoned. Whatever the timing of the event, it does illustrate the ritual importance of this eastern location within Group E's built landscape. In 2011, we encountered a circular burned feature that is similar in size and composition to the burned remains of the modern Maya offering discussed in detail above. The scorch mark was roughly circular in form and measured approximately 30 by 40 centimeters (Figure 9). The feature was encountered in a layer of natural sediment that had built up between Structure E-2 and the associated terraced platform located to the west. This indicates that the small burning event occurred sometime after both structures were abandoned, likely after the Protoclassic ritual feasting event. Group E was re-occupied during the Late Classic period, but the remains of this later occupation were much higher in their stratigraphic position, found within 20 centimeters of the modern ground surface. The circular burned feature was located almost one meter beneath the Late Classic occupation, indicating that it dates to a much earlier period, perhaps the Early Classic. Furthermore, the scorch mark was placed directly on the center-line of the eastern pyramid, Structure E-2, strongly suggesting an intentional placement. Additionally, it must be noted that no other evidence of burning was encountered in this location, despite extensive excavation of the area between the terraced platform and Structure E-2.

I have interpreted this feature as the remains of a burned offering placed in front of the eastern pyramid when it was no longer in formal use. As detailed above, there is a striking parallel in form between the excavated circular burned feature and the remains of the modern burned offering. Additionally, both were placed

Figure 10. Plan Map and Images of Early Postclassic Altar.

in front of eastern pyramids along their axial center-lines.

After I had observed the modern ritual on the summer solstice, I began to think about the material components of the burned offering. As discussed above, the ceremony was quite elaborate, took approximately three hours, and involved burning numerous offerings including candles, incense, rum, grains, chocolate, cigars, and wood chips. All that remained, however, was a modest circular burned feature on the plaza surface. This, of course, was a sobering realization that challenged me to think of how we can uncover more details of ritual activity in the archaeological record. With this in mind, we collected numerous soil samples from the burned feature in Group E and plan to conduct phytolith analysis. I hope that this will provide some evidence of burned plant remains, which could include both cultigens and non-cultigens if this offering in anyway resembles the complexity of the modern ritual event. Additionally, I plan to collect soil samples from the remains of the modern burned ritual offering this upcoming field season. It will be interesting to document what phytoliths or charred plant remains are recoverable after a year of exposure to the elements. Since we know what types of plants were used in the offering, it will be noteworthy to see the results of this analysis.

The periodic ritual use of Group E's abandoned eastern pyramid continued after the Xunantunich was abandoned during the Terminal Classic. As discussed in detail elsewhere (Brown 2010, 2011), a small, crudely constructed Early Postclassic altar was placed directly on the center-line of Structure E-2 (Figure 10). It seems very unlikely to be a coincidence that this altar was placed approximately a meter above and almost directly over the circular burned feature, separated by centuries of gradually accumulated sediment. The eastern focus of rituals, especially related to ancestor veneration, appears to have great time depth in the Maya Lowlands. Abandoned sacred places on the landscape continued to be places of consequence and had meaning to the ancient Maya, and moreover, continue to be places of ritual significance today.

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XX THE LAST WALTZ AT MINANHA: EXPLORING GRADUAL ABANDONMENT IN THE NORTH VACA PLATEAU

Maxime Lamoureux-St-Hilaire and Gyles Iannone

Towards the end of the Classic Maya period, many southern lowland city-states were abandoned. It is now well known that abandonment played itself out in many different ways across this region. This paper addresses the abandonment of the ancient Maya center of Minanha, west-central Belize, and argues that the best markers for studying abandonment are on-floor assemblages, which represent the very last occupation of sites. At Minanha, twelve on-floor assemblages were recovered, representing contexts spanning the entire social spectrum, from commoners to royal elites, and spanning roughly three centuries (ca. AD 810-1100). The contextual-behavioral analysis of these assemblages indicates that the different segments of the community of Minanha were abandoned at different times, and in different ways. The nature of these on-floor assemblages ranges from secondary refuse to exposed offerings, representing termination rituals. This paper argues that abandonment, even if gradual, provides us with the opportunity to glimpse at a very critical moment of ancient Maya culture-history, where many aspects of their ideology and social structure played themselves out.

Introduction

Belize is literally covered with archaeological sites. One of the easiest observations one can make about these sites, or at least the vast majority, is that they were abandoned at some point in the past. In the case of Classic Maya sites, it is generally agreed that the majority of sites were abandoned during the Terminal Classic, which spans the time between AD 750 and 1050 (Rice et al. 2004:10). A widespread idea concerning this infamous 'collapse' is the idea that it was an apocalyptical end to the whole Maya civilization, one which was caused by endemic warfare, severe droughts, terrible diseases, or environmental and resource mismanagement. There are some excellent examples where such dramatic collapse did take place. Indeed, one of the best examples is probably the site of Aguateca, located in the Pétexbatun region of Guatémala, which was abandoned catastrophically in a context of endemic warfare (Inomata 1997, 2003, 2008; Inomata and Triadan 2010). However, this case represents an exception, and indications are that most classic Maya sites were abandoned in a gradual and organized fashion.

Catastrophic abandonment leaves a very rich artifactual record, due to the fact the fleeing Maya did not have time to carry their belongings away, or were even killed within their houses, with all their belongings remaining where they were generally used (Chase and Chase 2000:69; Iannone 1993:100; Inomata 2003:58-60, 2008:288-89; Inomata and Webb 2003:9; McKee 2002:69; McKee and Sheets 2003). On the other hand, gradual abandonment tends to leave a more "subtle" archaeological signature (Chase and Chase 2000:69; Joyce and Johannessen 1993:138, 151). It appears that in non-catastrophic abandonment scenarios, the Maya did not leave much material behind, and that the materials that were left were deposited in an unsealed context, and were therefore exposed to the elements; both factors ultimately contributing to the poor preservation of these assemblages (Chase and Chase 2000:69-70).

Nevertheless, if carefully excavated, gradually abandoned sites may reveal discrete "on-floor assemblages" which can inform us as to the nature of the very last occupation of these sites, and their abandonment processes. The term "on-floor assemblage" refers to materials excavated in direct association with the terminal occupational surface of architectural structures (following Iannone 2000). On-floor assemblages represent the best marker for studying settlement abandonment chronology, and if they are carefully contextually analyzed, they may allow for the reconstruction of the behaviors responsible for their deposition, or in other words, they inform us as to how the abandonment occurred.

This paper focuses on the gradual abandonment of the ancient Maya community of Minanha, situated in the North Vaca Plateau of Belize's Cayo District. To begin our discussion

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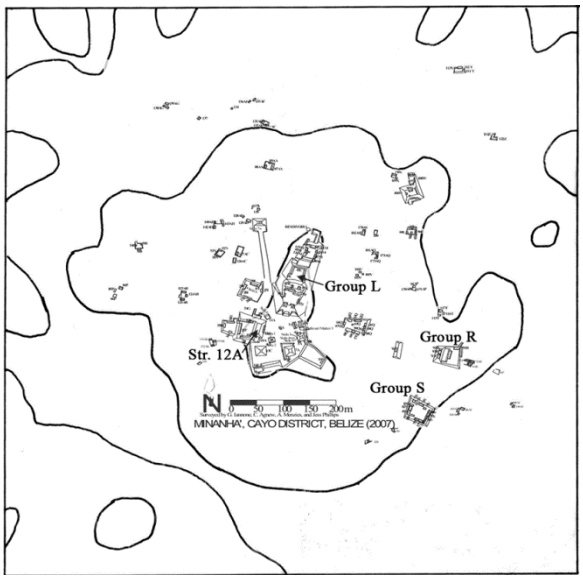

Figure 1. The Site-Core Zone of Minanha, showing the four groups which yielded on-floor assemblages (SARP).

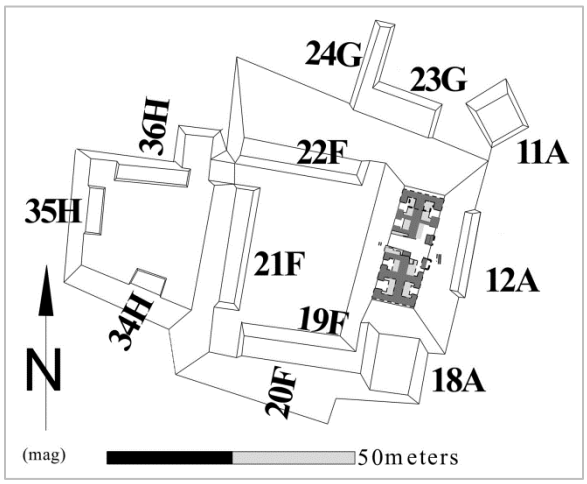

Figure 2. Top-plan of the architectural complex including Structure 12A (SARP).

of the abandonment processes of this community, we will first introduce the sampling strategy used during the 12 years of excavations at the site. This will allow us to present the context from which our on-floor assemblages were recovered. Following this, we will discuss several of those on-floor assemblages, and reconstruct the abandonment scenario of the Minanha greater community.

Archaeology of the Community at Minanha

The main objective of the Social Archaeology Research Program (SARP) at Minanha was to study all segments of the community (Iannone 2006a). The first phase of the research, from 1999 to 2005, focused on the detailed investigation of the epicentral royal court complex (Iannone 2006b:1). The second phase, from 2006-2009, aimed at documenting the surrounding non-elite population. The latter was achieved through a stratified random sample organized in a seven-tiered typology based on the number of structure present, their degree of formal arrangement, and the height of the tallest structure; emulating a strategy previously used at Xunantunich (Ashmore et al. 1994). This approach allowed the archaeological investigation of eight architectural groups in the Site Core Zone, in a square km surrounding the epicenter, and 15 residential groups in the zone consisting of the agricultural suburb of the Contreras Valley (Iannone 2006b:2).

Twelve on-floor assemblages were recovered over the course of those two phases of research. Two groups from the Epicenter, Groups A and L, revealed such assemblages (Figures 1, 2, and 3). Two groups from the Site Core Zone, Groups R and S, also contained on-floor material (Figures 1, 4, and 5). Finally, on-floor assemblages were excavated at three groups from the agricultural, suburban Contreras Zone, Groups MRS4, MRS15, and MRS89 (Figures 6, 7, and 8; Lamoureux-St-Hilaire 2011:49-50). We now turn our attention to the differential, gradual abandonment of each of these community segments by looking at six on-floor assemblages from three different architectural contexts: 1) an elite administrative structure from the Epicenter, Structure 12A; 2) a commoner's perishable structure from the Site-Core Zone, Structure 91R; and 3) two agriculturalists' residential groups from the Contreras Zone, Groups MRS15 and MRS4.

The On-Floor Assemblage of Structure 12A

The 12A range structure borders the western side of the main plaza of the Minanha epicenter, and constitutes the eastern edge of Courtyard F (Figure 1 and 2). Structure 12A is one of the few vaulted masonry structures identified at the site, and has a typical top-plan of two rows of four rooms facing opposite directions (Plaza A and Courtyard F), making it a tandem range structure. Structure 12A also

Figure 3. Top plan of Units 12A-1, 2, 3, 4, 5 and 8, showing Level 3, or the terminal floor occupation, and its seven on-floor features. The units top-plans were superimposed on the reconstruction to provide a clearer architectural context (SARP).

has a central passageway that would have led individuals from Plaza A to Courtyard F. This narrow corridor, which connects with the two central rooms facing Plaza A represent a restricted control point for the courtyard group. The strategic position of this structure, and its layout, has led SARP archaeologists to ascribe it a public and administrative function (Seibert 2000, 2001, 2002). More specifically, following Harrison (1999), this structure, characterized by its passageway corridor, has been assigned to the *passage structure* function-type (Seibert 2002:7).

The on-floor assemblage of Structure 12A was divided into seven features (Features 12A-F/1 to 12A-F/7) which, interestingly, were mainly found lying on the floor of its passageway corridor, and in one of the more public rooms which faced the main plaza of the epicenter, Plaza A (Figure 3). This extensive on-floor assemblage contained 14 partial vessels, including eight jars, three bowls, two dishes, and an unidentified vessel (Lamoureux-St-Hilaire 2011:85-87). The assemblage included three upper portions of jars stacked together (Feature 12A-F/1), and the clustering of five broken

vessels including two fine ware dishes of the Platon Punctated-Incised type variety (Feature 12A-F/7), as well as many other artifacts (Lamoureux-St-Hilaire 2011:85-87).

This on-floor assemblage represents the only special feature recorded for Structure 12A, which did not reveal any caches or burials. Ceramic data, including a partial Cayo Unslipped Jar with a "pie-crust" rim, indicate that this on-floor assemblage was deposited during the early Terminal Classic (AD 810-900). In terms of patterning, Features 12A-F/1 to 12A-F/6 were placed along the central passageway of this structure, which would have effectively blocked, in a symbolic manner, the access to Group F. If the placement of these vessels was accompanied by the purposeful collapsing of the corridor's vault, which is hard to determine with certainty, then the blockage would have been physical as well. A similar case was observed at the site of Hershey, in the Sibun River valley of east-central Belize, where the access-way leading to an elite courtyard was ritually terminated, and then covered by collapse debris (Harrison-Buck et al. 2007, 2008). It also seems that the termination event was focused on the public rooms of Structure 12A (the ones facing Plaza A). In contrast, the excavated rooms facing Courtyard F were devoid of on-floor material (Seibert 2001).

Due to their association with a passageway leading into an elite courtyard, Group F, the potential forced collapsing of its vault, its public, probably administrative function, as well as its lack of association with any ancestral veneration related burial or caches, we suggest that Features 12A-F/1 to 12A-F/7 represent a reverential termination ritual aiming at deactivating its royal-related function (Lamoureux-St-Hilaire 2011:85-87). Also, it is possible that this ritual was aimed at terminating Group F, by blocking access to it. Now, let us look at an example from the Site Core Zone, Group R.

The On-Floor Assemblage of Structure 91R

Group R is situated on a raised platform measuring approximately 50m by 50m, at roughly 300m east of the epicenter. This platform supports a major elongated substructure

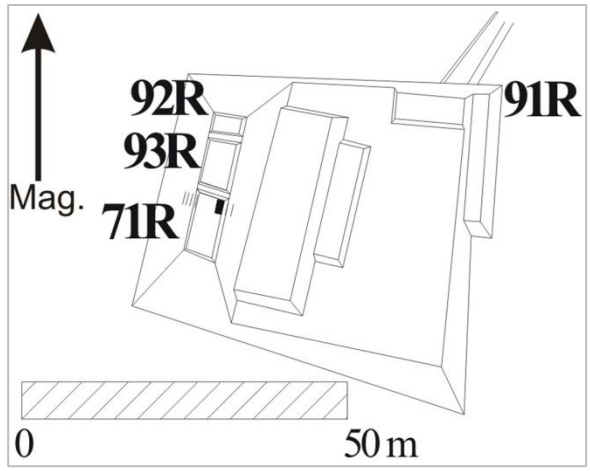

Figure 4. Top plan of Group R (SARP).

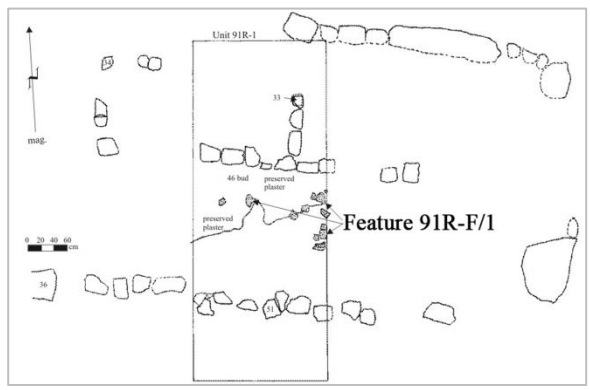

Figure 5. Top plan of Structure 91R, showing Level 3, or the terminal architecture, and its on-floor feature, 91R-F/1 (SARP).

which supported three perishable structures (71R, 92R, and 93R) on its western side, as well as a smaller structure, Structure 91R, on its north-eastern corner (Figure 5). Structure 91R faces south, and is a low, but wide (12m in width), substructure which once supported a perishable structure containing a rectangular bench. An on-floor assemblage was found in Structure 91R (Figure 5; Prince 2000).

The on-floor assemblage from Structure 91R was found along its central axis, lying on the preserved plastered floor of the room, in front of the bench. The on-floor assemblage included four partial vessels: one Terminal Classic dish of the Platon Punctated-Incised type, one Terminal Classic bowl of the Mount Maloney type, one Alexanders Unslipped jar, as well as non-diagnostic sherds from a second jar (probably of the Cayo Unslipped type).

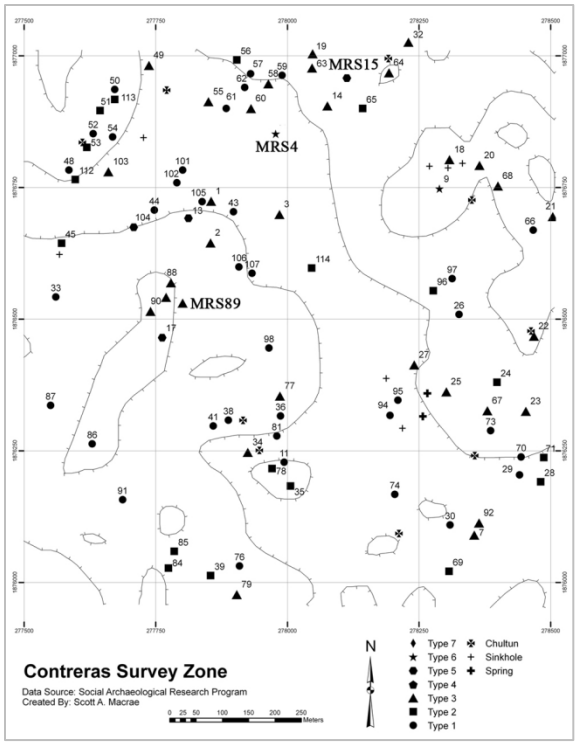

Figure 6. The square km of the Contreras Zone; showing the three groups which yielded on-floor assemblages (SARP).

The vessels were found in a fragmentary state and lacked any particular organization. This on-floor feature was not associated with any clear ritual feature, and Structure 91R does not seem to have served a special function. It is believed that this on-floor assemblage simply represents abandonment refuse of probably primary or secondary deposition (Lamoureux-St-Hilaire 2011:93-95). In other words, it appears that this on-floor assemblage represents material that was left behind at the time of abandonment of the structure, during the Terminal Classic (AD 810-900). Let us now turn our attention to on-floor assemblages from the Contreras Zone.

The On-Floor Assemblages of Group MRS15

Group MRS15 is among the few larger groups of the Contreras Valley (Figure 6), and is composed of two distinct patios, which is unusual at Minanha (Figure 7). These two patio groups are situated close to one another, on two adjacent terraces. Both groups consist of three domestic structures, with the largest one situated on the eastern edge of both patios. These patios are open on their western side, and oriented towards their relatively close neighbor, Group MRS4, which was the most prominent architectural group in the Contreras Valley (McCane et al. 2009:15). Group MRS15 has the particularity of having revealed on-floor assemblages on three of its structures, which we will now discuss, starting with Structure MRS15-M2.

Structure MRS15-M2. Structure MRS15-M2 is the largest and earliest building of the group (McCane et al. 2009:18). Its first phase of construction is associated with a dedication burial lying on the bedrock, which dated to the Middle Classic period (AD 550-675). Being the only structure with an associated burial, and located on the eastern edge of the group, Structure MRS15-M2 was likely the ancestral focus of the group (McAnany 1998:279). This structure yielded the most important on-floor assemblage of the group, with seven partial and complete vessels, and other associated materials (Figure 8). Among the ceramics was a Portable Composite Ceramic Brazier (Figure 9; Ball and Taschek 2007). Its large effigy base was found shattered, and almost complete (Feature MRS15-M2-F/1). Its bowl, which had a blackened base due to intense heating, was found complete, just beside the base, while its Chiquibul Scored-Incised censer lid was found in partial state nearby (Feature MRS15-M2-F/2; Awe 1985:311-316).

Additionally, a large, partial Chiquibul Scored-Incised censer and a complete Daylight Orange bowl were found in direct association with this brazier (Feature MRS15-M2-F/2). Three other interesting finds were also found onto the terminal floor of this structure, but further away from these concentrations. These materials consist of an intact roller-stamp, of probable Terminal Preclassic date (Smith 2009; personal communication 2011), a complete and intact ink/poison pot, and a broken, partial metate. In association with all this material, the above floor-levels' (consisting of the humus and slump levels) ceramic assemblage, composed of 164 diagnostics, contained almost 30% ash-ware dishes and 10% censers, including several fragmentary vessels (Lamoureux-St-Hilaire 2011:103-109). These quantities suggest a highly ritualized context with regard to the behaviors associated with the abandonment of

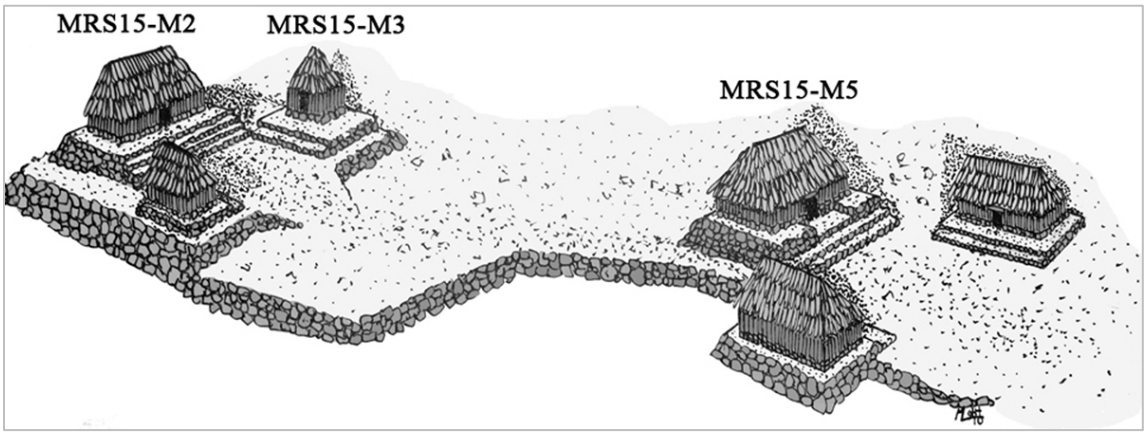

Figure 7. Artistic architectural reconstruction of Group MRS15, facing south-east (illustration by Lamoureux St-Hilaire).

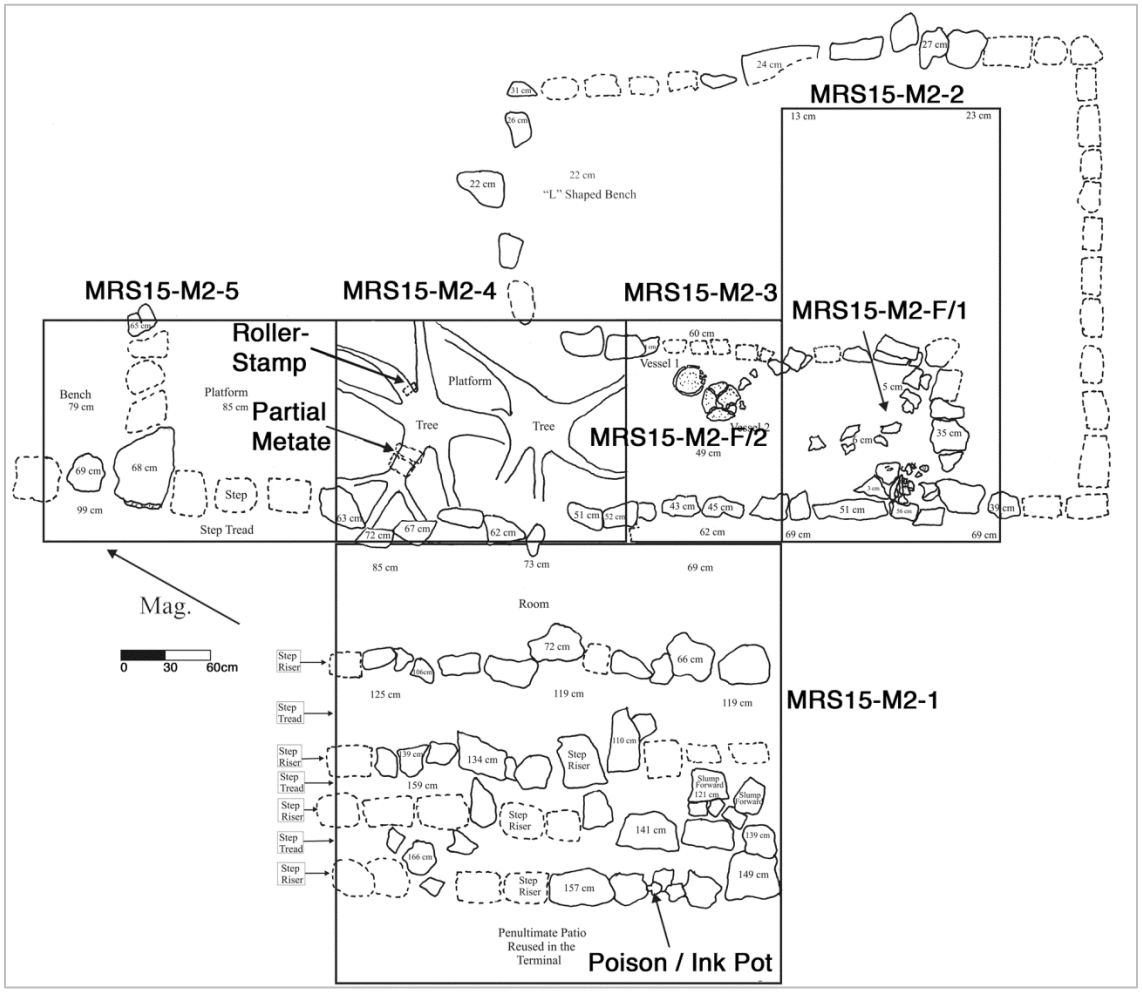

Figure 8. Top plan of Structure MRS15-M2, showing Level 3, or the terminal architecture, and its two on-floor features, MRS15-M2-F/1 and MRS15-M2-F/2 (SARP).

this structure. It is believed that this extensive on-floor assemblage, concentrated in the entrance of room of the structure, represents its reverential termination. Based on the ceramics, the assemblage is dated to the early Postclassic period (AD 900-1200). Let us now turn our attention to Structure MRS15-M5.

Structure MRS15-M5. Structure MRS15-M5 is a large domestic structure, comparable to Structure MRS15-M2 in its elaborateness. It represents the definite focus of the western patio. The on-floor assemblage of this structure consisted of a single, practically complete, Platon-Punctated Incised dish typical of the Terminal Classic (AD 810-900), that had been broken in two halves (Figures 10 and 11). The few missing sherds of the dish were probably removed from their original context through natural formation processes. Even if this on-floor assemblage only included a single vessel, it is significant that its above-floor assemblage contained a great deal of ritual-related material. Unlike Structure MRS15-M2, the above-floor levels of Structure MRS15-M5 contained only about 10% dishes, but more than 15% censer sherds (which is about 40 times the average at Minanha), including at least four partial Chiquibul Scored-Incised censers, out of a total of 226 diagnostics (Lamoureux-St-Hilaire 2011:109-111). It therefore appears that, once more, the abandonment of this structure was highly ritualized. With its centrally aligned dish-offering, and all this ritual paraphernalia, it also seems that this offering was a termination ritual aimed at deactivating the structure in a symbolic fashion. Now, let us turn attention to the last on-floor assemblage from this group, which was found in Structure MRS15-M3.

Structure MRS15-M3. Structure MRS15-M3 is the third largest building of Group MRS15. The top-plan of this structure is unusual, with a large and high, bench-like, square platform on the center of its substructure (Figure 12). In contrast to Structures MRS15-M2 and MRS15-M5, the on-floor assemblage from Structure MRS15-M3 does not appear to be a ritual deposit, and certainly, it did not block access to the room. Indeed, the clustered partial bowl and complete mano placed on the western edge of the platform make it much harder to postulate what behaviors were responsible for

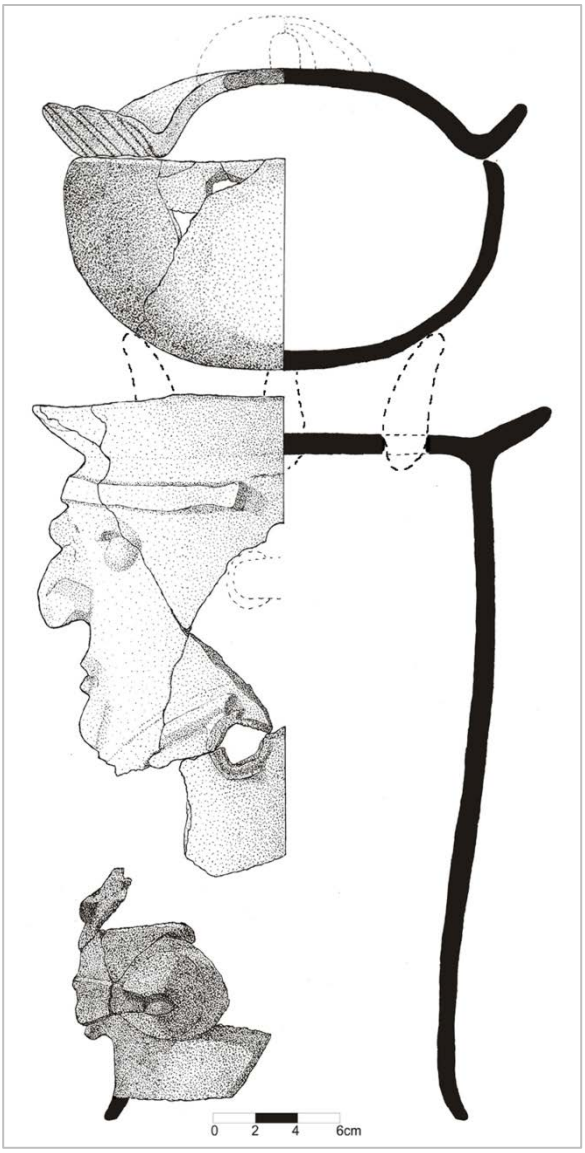

Figure 9. Illustration (profile view) of the Portable Composite Ceramic Brazier found during the excavation of the on-floor assemblage of Structure MRS15-M2 (illustration by Lamoureux St-Hilaire).

this on-floor assemblage (Figure 12). It is possible that this on-floor material was placed at the same time as the termination rituals for Structures MRS15-M2 and MRS15-M5 were being conducted. However, we suspect that the on-floor assemblage of Structure MRS15-M3 was not the result of a ritual.

In contrast to Structures MRS15-M2 and MRS15-M5, the near absence of ritual paraphernalia in its above-floor levels, combined with the domestic nature of the on-floor assemblage, suggests that it consisted of

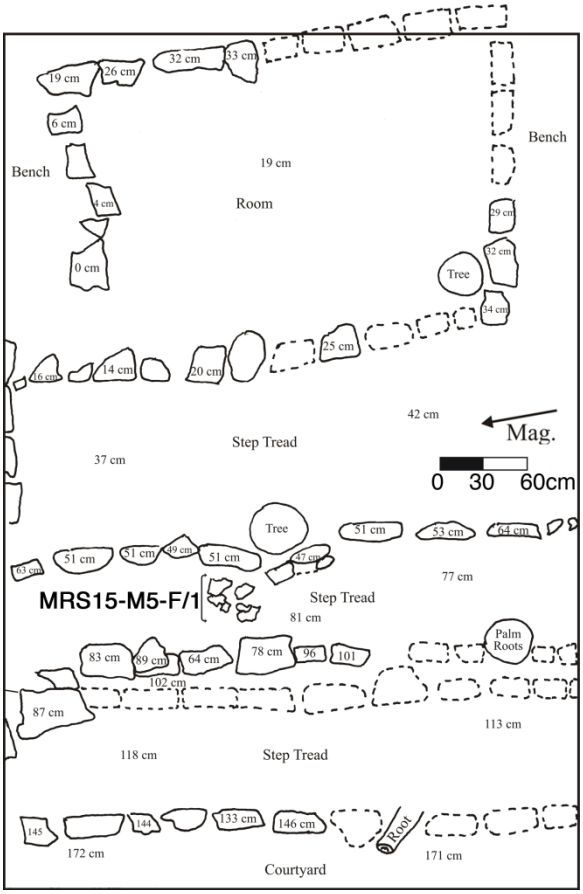

Figure 10. Top plan of Structure MRS15-M5, showing Level 3, or the terminal architecture, and its on-floor feature, MRS15-M5-F/1 (SARP).

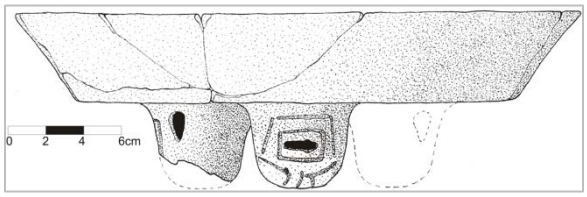

Figure 11. Illustration of a partial Platon-Punctated Incised dish typical of the Terminal Classic (part of the MRS15-M5-F/1). Notice the linear incisions around the hole in their rattle-feet (illustration by Lamoureux St-Hilaire).

abandonment refuse of either *de facto*, primary, or secondary deposition (Lamoureux-St-Hilaire 2011:111-112). However, at the group-context level, its association with the two termination rituals cannot be ignored.

The Abandonment of Group MRS15. It appears that sometime during the late Terminal Classic to early Postclassic transition (ca. AD 900-950), a complex termination ritual was performed at Group MRS15. During this event the former inhabitants of the group performed a ceremony which likely involved a great deal of incense burning and a feast. Subsequently, they ritually smashed the Chiquibul Scored-Incised censers and other vessels used during the ceremony and laid them on the floor of Structure MRS15-M2 and MRS15-M5. Then they placed a Three Prong Brazier, and at least three more vessels used during the ceremony on the floor of the same buildings. These serving vessels potentially contained some sort of food offerings at the time of their deposition. The inhabitants then abandoned their households while leaving on the floor of Structure MRS15-M3 some material which they did not wish to carry away with them (Lamoureux-St-Hilaire 2011:111-112).

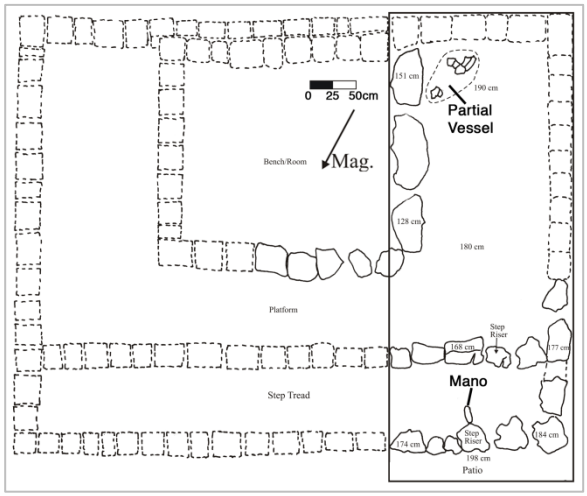

Figure 12. Top plan of Structure MRS15-M3, showing Level 3, or the terminal architecture, and its on-floor materials (SARP).

The On-Floor Assemblage of Structure MRS4-M1

Group MRS4 (Figure 13) is the largest of the architectural groups in the Contreras Zone, and is orthogonally organized in the Plaza-Plan Two layout (Becker 1999). The structures of Group MRS4 were built atop a large sustaining platform (measuring ca. 40m by 45m), and include three large domestic structures, as well as three smaller ones. The eastern side of Group MRS4 was occupied by a small pyramidal temple, Structure MRS4-M3, which was the only formal ancestral shrine in the Contreras

Zone. This small temple contained a complex ritual program, composed of four features including a dedication burial and two rededication caches.

The important structure for this paper is the largest residence of the group, Structure MRS4-M1. The excavation unit set on Structure MRS4-M1 was laid along its primary axis, and this is where the five ceramic clusters (Clusters C/1 to C/5) representing its on-floor feature were located (Figure 14; McCormick 2008:50-53). The entire assemblage was found along the primary axis of the structure, on four of its "steps": on the patio floor, on the second step of the substructure, on the small outset step leading to the house, and on the floor of the room. The patterning of these clusters – representing six fragmentary vessels: four coarse-paste jars, one Yalbac Smudged Brown bowl and a Chiquibul Scored-Incised censer – is very well defined (Lamoureux St-Hilaire 2011:101-103). These six partial vessels, individually clustered, occupied almost every step leading into the room, and would have effectively hindered, in a symbolic way, access to the building.

While this on-floor assemblage represents the only ritual features associated with Structure MRS4-M1, it seems likely that is was put there as a "final complement" to the ritual program from Structure MRS4-M3 (Lamoureux St-Hilaire 2011:101-103). In terms of dating, the ceramic data indicate a Terminal Classic date (AD 810-900) for the assemblage. However, the last burial placed within the ancestral shrine, Structure MRS4-M3, was radiocarbon-dated (conventional date [B.P.]: 1050 ± 40; 1 Sigma cal AD: [980-1020]; 2 sigma cal AD: [900-1030]), and indicates an Early Postclassic occupation. Consequently, this termination event likely represents the very last abandonment date for the greater Minanha community.

Finally, it appears that at least six vessels were used during a ceremony, perhaps in the patio of the group, at some point during the Early Postclassic period (AD 900-1050), and then ritually broken. Subsequently, in a gesture aimed at ritually blocking access to Structure MRS4-M1, several large sherds of each of these vessels were laid on the central axis of the building.

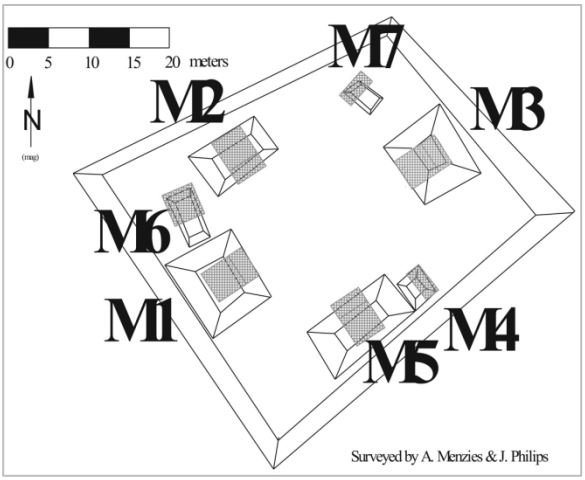

Figure 13. Top plan of Group MRS4, indicating the loci of the excavation units (SARP).

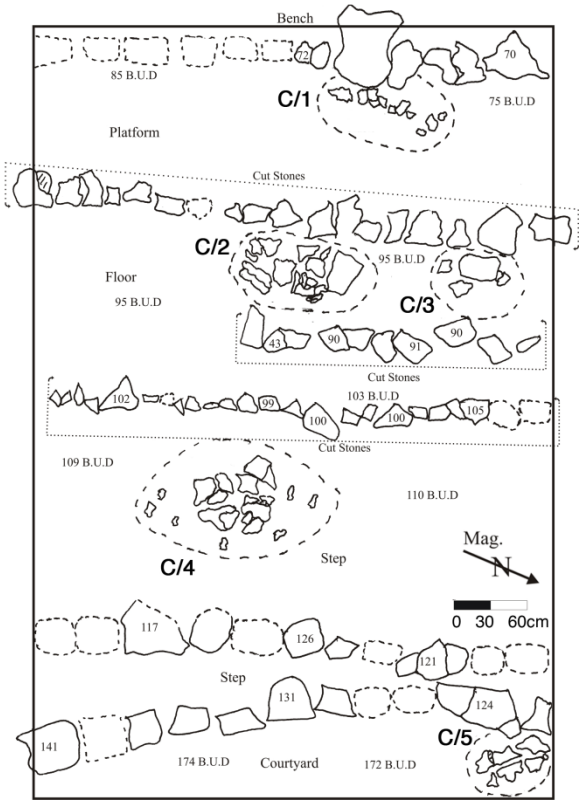

Figure 14. Top plan of Structure MRS4-M1, showing Level 3, or the terminal architecture, and the five clusters of its on-floor feature, MRS4-M1-F/1 (SARP).

Summary

We have now discussed how the abandonment played itself out in the three different segments of the Minanha community. In summary, after the demise of Minanha's royal

court, early on during the Terminal Classic, epicentral, royal-related structures, including Structure 12A, were soon abandoned. In the next century or so, before the onset of the Early Postclassic, surrounding settlements within the Site-Core Zone, including Group R, were also abandoned. Around the same time, small groups situated in the Contreras Valley began to be abandoned. Subsequently, during the Terminal Classic to Early Postclassic transition, residential groups from the Contreras Zone, including Group MRS15, were abandoned. Finally, the most prominent group of the Contreras Valley, Group MRS4, was ritually abandoned well into the Early Postclassic period (Lamoureux St-Hilaire 2011:121-122).

The abandonment of the greater Minanha community played itself out over a period of nearly three centuries, and was definitely gradual. While in some cases, such as Structure 91R, abandonment seems to have been mundane, in many other cases, abandonment appears to have involved termination rituals. But why exactly did these ancient Maya commoners perform such rituals before abandoning the homes?

The Social Function of Termination Ritual

The traditional approach to termination rituals is to associate them with the philosophy of the regeneration of life. According to this view, termination rituals are aimed at releasing the ancestral *k'ulel*, or energy, infused within the structure at the time of its dedication ritual (McGee 1998:41; Mock 1998:10; Pagliaro et al. 2008:76-77; Stanton et al. 2008:237; Walker 1998:96-97). This ritual component of the ancient Maya is very well documented, and we believe it does apply to many termination ritual cases. However, we believe that a different approach to termination rituals, one that is more intimately related to abandonment itself, may yield significant interpretative value.

A crucial aspect of ancient Maya society is the degree of attachment to their land. Indeed, the ancient Maya inhabited the same locales for centuries, and their land was where their ancestors had been living forever (Gillespie 2000:137). This is expressed by the tradition of burying important individuals – thus transforming them into venerated ancestors – within architectural structures, as previously discussed in the case of Structure MRS15-M2 (Ashmore and Geller 2005; McAnany 1995). At the time of abandonment, the ancient Maya would have been leaving behind them their houses, farmlands, and sacred ancestors, and all the prestige associated with these physical and symbolic elements.

Given the incredible value of their settlements, it is quite obvious that abandonment would have signified a very important "social trauma" for ancient Maya communities, who had to abandon both the socio-economic and sacred basis of their group identity (Stanton and Magnoni 2008a:13). It is well documented that in every culture, communities use various sets of rituals for dealing with traumatic events, which often take the form of "rites of passage" (Van Gennep 1960). The best example is probably mortuary rituals, such as the displaying the body "in state" in Judeo-Christian traditions. These rituals serve as a moment of transition, where people gather, share their sorrow, comfort each others, and consolidate their social unity. We suggest that at the time of abandonment, the termination rituals that took place in the public areas of domestic groups would have served this very function. In other words, facing the social catastrophe that abandonment represents, termination rituals could have served as communal rites that were aimed at celebrating their vital landscape one last time (Lamoureux-St-Hilaire 2011:141). Termination rituals, by releasing the *k'ulel* of structures, and ceremonially blocking their access, would have brought an end to the existence of their social landscape.

It is likely that it is this type of community-binding, or "unbinding", ritual that took place at Group MRS15. There, the three coordinated on-floor assemblages were deposited after a sizable ritual which would have involved communal feasting and other ritual activities that would have taken place within the two patios of the group. Moreover, it appears that the two termination offerings, placed along the central axis of the two most important structures of the group – which were also filled with broken pottery – were aimed at removing these structures from the existence of the former inhabitants of this residential group.

The same idea may be applied to the functional termination of royal-related buildings. In such cases, the individuals associated with the function of these structures would have been compelled to signify, by a termination ritual, their transition into oblivion (Lamoureux-St-Hilaire 2011:143). During this liminal stage, the *k'ulel* associated with the role of those structures would have been released, therefore "killing" their existence and function. Obviously, such a termination, as it was not associated with the basis of group identity, may not have been as sorrowful as was the case for household groups. In the context of the royal court-related Structure 12A, its termination may even have been led by "disgruntled community members" who were gladly signifying the end of the usage of these structures (Iannone 2007). This brings to light the importance of evaluating the degree of *valence* (or banishment) involved in the performance of termination rituals (Canuto and Andrews 2008:265).

Conclusions

The ancient community of Minanha was gradually abandoned over the course of roughly three centuries following the collapse of its royal court at the onset of the Terminal Classic (Iannone 2005, 2007). This abandonment was a top-to-bottom process, with the Epicenter of the site being abandoned early on during the Terminal Classic, the Site-Core Zone being abandoned by the end of the Terminal Classic, while the agricultural suburb of the Contreras valley was only fully abandoned in the Early Postclassic. The collection of on-floor assemblages from Minanha has thus enabled us to understand the chronology of the gradual abandonment of the site. Furthermore, the qualitative and contextual analysis of the on-floor assemblages also allows us to identify which behaviors were responsible for their deposition. Nine contextual and artifactual traits were found to be useful for identifying the behaviors responsible for the deposition of the assemblages, these are: 1) The presence of partial and/or fragmentary vessels in the assemblages, which indicates that material broken elsewhere was brought to the locus of the deposition; 2) The presence of complete vessels, which indicates that whole vessels were either left on the floor of structures, or were shattered at that specific locus; 3) The presence of ritual and/or feast related artifactual assemblages, which supports the performance of a ritual; 4) The dominance of domestic types in the artifactual assemblages; 5) The symbolic blocking off of the doorways or passageway leading to structures or groups, which reinforces the termination hypothesis; 6) The physical blocking of structures, which also indicates a ritual termination behavior; 7) Direct association with dedication rituals, which indicates a termination ritual associated with ancestral veneration, and the releasing of *k'ulel* from structures; 8) Association with other structures yielding such dedication rituals, which indicates the same thing, but at the broader, group context; and, 9) Royal-related function for the structures and/or group, which is consistently associated with a lack of ancestral veneration related rituals (Lamoureux-St-Hilaire 2011:116-122).

In conclusion, Minanha was abandoned gradually and in differential ways: 1) In the case of non-epicentral domestic architectural groups, it appears that at the time of abandonment, the structures were reverentially ritually terminated, in a way aiming at releasing the ancestral *k'ulel* infused within them.; 2) In the case of royal-related, epicentral groups, it seems that the structures were ritually terminated in a way aiming at deactivating their royal-related functions; and, 3) In the case of Structure 91R, it appears that it was not ritually terminated, and that its on-floor assemblage is the result of abandonment refuse, which is not *de-facto* refuse, but rather relates to primary or secondary refuse disposal patterns (Lamoureux-St-Hilaire 2011:124-125).

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XX BETTER LATE THAN NEVER: PRELIMINARY INVESTIGATIONS AT LAS CUEVAS

Holley Moyes, Laura Kosakowsky, Mark Robinson, and Barbara Voorhies

Research at Las Cuevas, a mid-sized site located at the Las Cuevas Research Station in the Chiquibul Reserve in western Belize, began in 2011.The site is of interest because it consists of both surface architecture and a massive cave ceremonial complex. It is also one of the closest centers to the mammoth polity of Caracol, yet, very little is known about it or its relationship to its larger neighbor. During the summer field season, the Las Cuevas Archaeological Reconnaissance (LCAR) began mapping and conducted test excavations. Based on ceramic cross-dating, our preliminary results suggest that both the cave and surface architecture investigated were constructed in the later part of the Late Classic period (700-900 AD).

Introduction

The Las Cuevas Archaeological Reconnaissance (LCAR) began investigations of the ancient Maya archaeological site of Las Cuevas, located in the Chiquibul Reserve in western Belize, Central America (Figure 1) during a four-week field season in 2011. Originally referred to as "Awe Caves," Las Cuevas has received little investigation, with the exception of one notable project. In 1957, working for the British Museum, Adrian Digby (1958) and then Commissioner of the Belize Department of Archaeology A. H. Anderson conducted excavations at the site and produced a sketch map. Digby wrote a brief article for the *London News* describing the site and reporting his excavations, and Anderson mentions a 1938 visit to Las Cuevas in his 1962 paper for the Americanists' Congress, but no other reports have been found. Some of Digby's correspondence and excavation notes are on file at the British museum, and his artifact collections are housed there, but have not been accessioned (Marieka Arksey, British Museum, personal communication 2010).

The current investigations by the LCAR address cultural dynamics during the Late to Terminal Classic periods, a time of severe stress in the ancient Maya world, by examining the ritual life of a Maya community on the eve of collapse. Recent studies (Aimers 2007; Demarest et al. 2004:546) question the usage of terms such as "collapse" or "fall" because they are colorful but misleading, but Demarest and his colleagues suggest that the events of the late 9th century do represent changing political systems and ideologies. In other words, instead of representing the total failure of an entire civilization, the "collapse" has been redefined as the decline of the elite class and the abandonment of the institution of kingship in the Maya Lowlands. Most Mayanists' agree that there was in fact a major change in both population and social organization, and it is clear that many sites were abandoned during the mid to late 9th century.

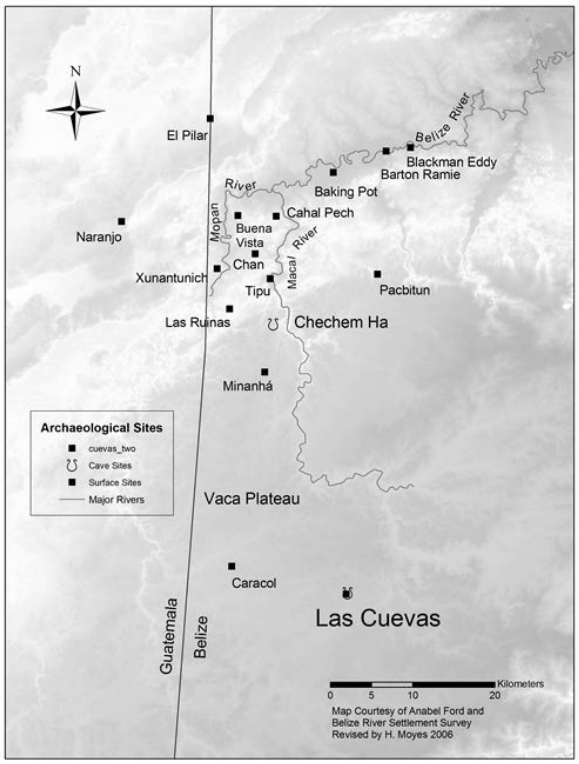

Figure 1. Regional map showing Las Cuevas site.

Agency theories remind us that it is not the event per se but the human response to adverse conditions that causes changes in the social order. What is now of interest for archaeologists is not *if* there was a collapse, but

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how the system collapsed. In this project we take on this question in our investigations at the site of Las Cuevas. Our goal is to articulate our findings within the historical contexts of the 9th century. We specifically want to shed light on elite strategies and ritual responses that mitigate social and environmental stresses, and the success or failure of these strategies.

Las Cuevas offers an excellent venue for exploring this issue. It is a medium-sized minor administrative/ceremonial center whose nearest neighbor is the mammoth site of Caracol, located approximately 14km to the east as the crow flies. On the surface Cuevas seems to be typical of many Late Classic sites found in Belize such as Baking Pot, Floral Park, Blackman Eddy or Minanha (Iannone 2004). However, this site has something that these other sites do not—a large cave system that runs directly beneath the main plaza. The cave entrance is situated below the eastern pyramid or "shrine," that as noted at both Caracol and Tikal, are the foci of ancestral burials (Chase and Chase 1994:53, Becker 2003:258-262). The cave entrance itself is massive, cathedral-like, and architecturally modified, suggesting that it was used for large public performances. The LCAR aims to articulate constructions in the cave with those of the surface site to produce a picture of the ritual life of the community, and contextualize ritual practice within the sociopolitical as well as the natural environments.

In this paper we will begin by discussing our understanding of the function and meaning of ancient Maya caves, and the cosmological implications of the site's layout. We will go on to discuss our findings from the first field season of the LCAR, which focused on mapping and test excavations for chronology building. Finally, we will contextualize our findings within the greater Maya area.

Caves as Contexts

The ancient Maya considered caves to be entrances to the Underworld and the home of deities associated with fertility, rain, and the sacred earth. This helps explain why natural caves were used exclusively as ritual spaces in the past and continue to be used in a variety of rites today (Christenson 2008, Prufer and Brady 2005, Moyes and Brady 2012). Caves also served as fundamental anchoring points for Maya communities and played an important role in settlement. Work by ethnohistorian Angel García-Zambrano (1994) demonstrated that caves and waterholes functioned as salient geopolitical entities. In his study of the mid-16th century land titles, he discussed models of ideal landscapes that figured prominently into immigrant's decisions regarding where to settle. The ideal location was based on a quincuncial model of the cosmos of four cardinal directions and a central point. The model was reified in the natural environment by a group of four mountains, which functioned as the peripheries of the community with a fifth centrally located mountain representing the center point or axis mundi. In the ideal world, the central mountain was dotted with caves and springs. Caves with water emitting from their interiors were favored, but man-made substitutes or modified crevices could be created to fit the model. A chosen cave would then function as the mythological place of origin of the people and the sacred core of the community providing the "cosmogonic referents that legitimized the settler's rights for occupying that space and for the ruler's authority over that site" (García-Zambrano 1994:217-218). The leader or ruler of the group conducted rituals in the cave to petition the local deities. If the local topography failed to naturally mimic the ideological model, modifications could be undertaken. For instance, pyramids could be constructed to represent mountains. In the absence of a natural cave, an artificial cave could be excavated or a large clay water jar could be interred in the town plaza to represent the cave.

These ideal landscapes were at the heart of ancient Maya cosmology. The landscape was sacred and animate and had to be acknowledged and honored (Brady and Ashmore 1999:126). In many of their constructions, ancient Maya people referred to and replicated the sacred landscape, building temples to represent sacred mountains and constructing rooms at their summits to replicate sacred caves (Vogt and Stuart 2005). Natural caves are the most sacred of cosmological features, particularly those that contain life-giving water (Brady and Veni 1997). Noting their importance in settlement and the

salient cosmological forces associated with them, it is not surprising that in the Classic period, caves became highly politicized spaces (Brady 1989; Brady and Colas 2005; Moyes 2006; Stone 1995) and sacred rites conducted within caves became important political tools that could be manipulated by kings and elites. Therefore control of these spaces also represented control over the natural environment, the earth itself, and its indwelling deities (Moyes 2006; Moyes and Prufer 2009; Moyes et. al. 2009).

Las Cuevas

Understanding the importance of Maya sacred landscape helps us to appreciate the cosmological salience of the Las Cuevas site. The surface site core consists of 19 buildings including temples, a range structure, a ball court, and linear structures arranged around a large dry sinkhole or *cenote* (Figure 2). The structures are arranged on an east/west orientation around two open plazas-- A and B (Figure 3). A small *plazuela* group with an additional five structures arranged in a U-shape, sits on a constructed platform about 85m west of Plaza A.

Plaza A, located to the west of the cenote, consists of Structures 1-4. The eastern structure measures 23m on its N/S axis and 19.5m E/W, and stands 8m in height. An apron and possible stairway measuring 11m x 4.5m extends from the west side into the plaza. Its western counterpart, Structure 4, measures 23m x 23m, and stands 10.6m in height, with a central staircase facing the plaza. Structure 3, the northern range structure, measures 21.6m E/W and 10.4m N/S with a height of 5m., and also has a central staircase that facing into the plaza. Immediately to the east of Structure 3, is Structure 2--a small square 8m x 8m mound and 1.4m in height. The mound adjoins the range structure by what appears on the surface to be a cut stone walkway. The mound, constructed of dry-laid medium-sized boulders, was previously excavated by A. H. Anderson who described it as "unusual" (Digby 1958: 276). It is unclear as to whether he discovered any artifacts within the structure, but he did note that atop it was a four-stone hearth and sherds from an unslipped "spiked" vessel, that we assume was an incensario. Anderson's excavation remained open so we were able to clear profile the north wall, but found no artifacts that allowed us to date the structure or aid in establishing its function.

Bounding the south side of the plaza is a long, low, linear structure that stands approximately 0.7m in height that Digby (1958) referred to as a "low bank." There are a total of 10 of these structures at the site, over half of which ring the south side of the cenote and enclose Plaza B. Digby argued that these had a step that faced the plaza suggesting that they were used as "viewing stands" for spectators watching events that occurred there. A trench placed across the north end of Linear Structure 11, did in fact reveal a step on the southwest side facing toward the ballcourt. Arlen Chase (2011 personal communication) suggests that these structures may have been associated with market activities, and also notes that in the Caracol site core, similar constructions may have been platforms used to support perishable structures, possibly for housing soldiers.

The ballcourt sits to the west of the cenote dividing Plaza A and Plaza B. It was built atop a constructed platform that appears to level out the undulating natural landscape. The platform measures approximately 50m x 50m and stands roughly 1 meter in height. The two ballcourt structures, Structures 5 and 6, are orientated at 209˚ along the north-south axis with a 5m wide alley separating them. Structure 5 measures 17.5m N/S x 9.3m E/W and 3m in height. Structure 6, the eastern structure serves as the western boundary of Plaza B. It measures 17.5m N/S x 12.9m E/W and 3m in height. A trench excavated across the ballcourt revealed an inset staircase on the east side of Structure 6 that faces onto Plaza B.

Plaza B is bounded on the north by 6 linear structures that follow the curvature of the cenote, and terminate to the east of Structure 1, on the surface above the cave's mouth. Three additional linear structures set parallel to these bound the south side of the plaza. Two 7m-10m gaps between these 3 structures provide access to the site from the south and an aguada is situated south of Linear Structure 18. Structure 7, a pyramidal construction measuring 29m N/S x 16m E/W and standing 4m in height, bounds the eastern side of the plaza.

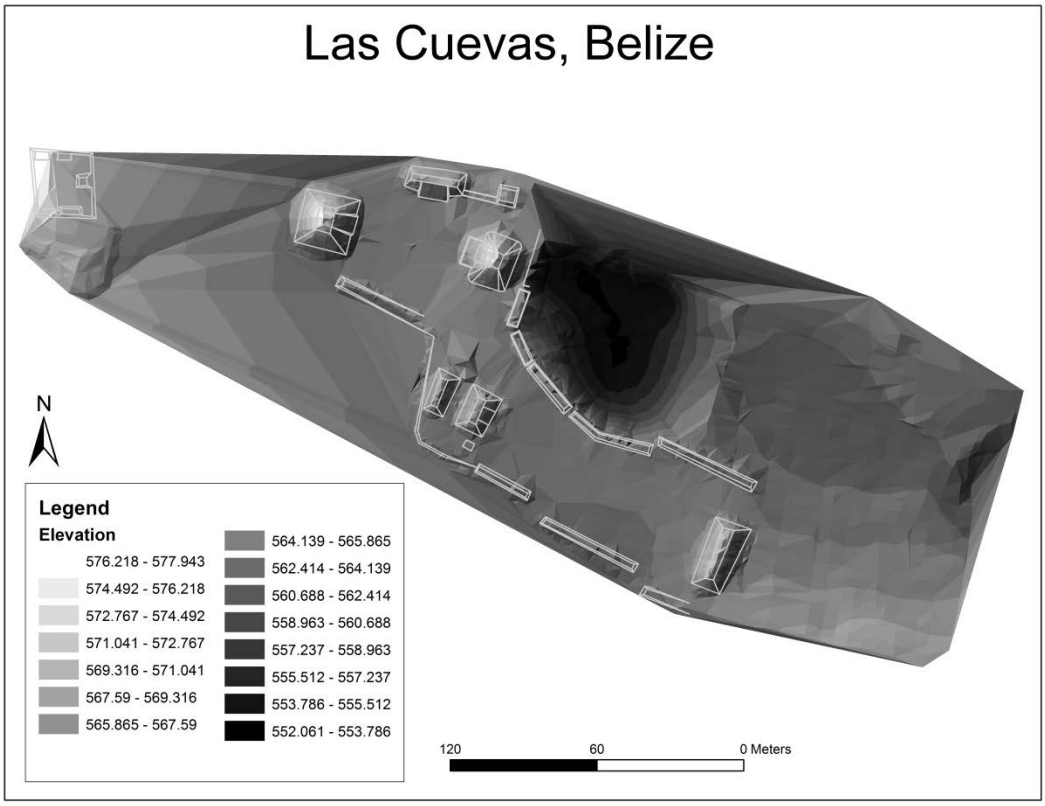

Figure 2. Digital Elevation Model of Las Cuevas site core and plazuela group.

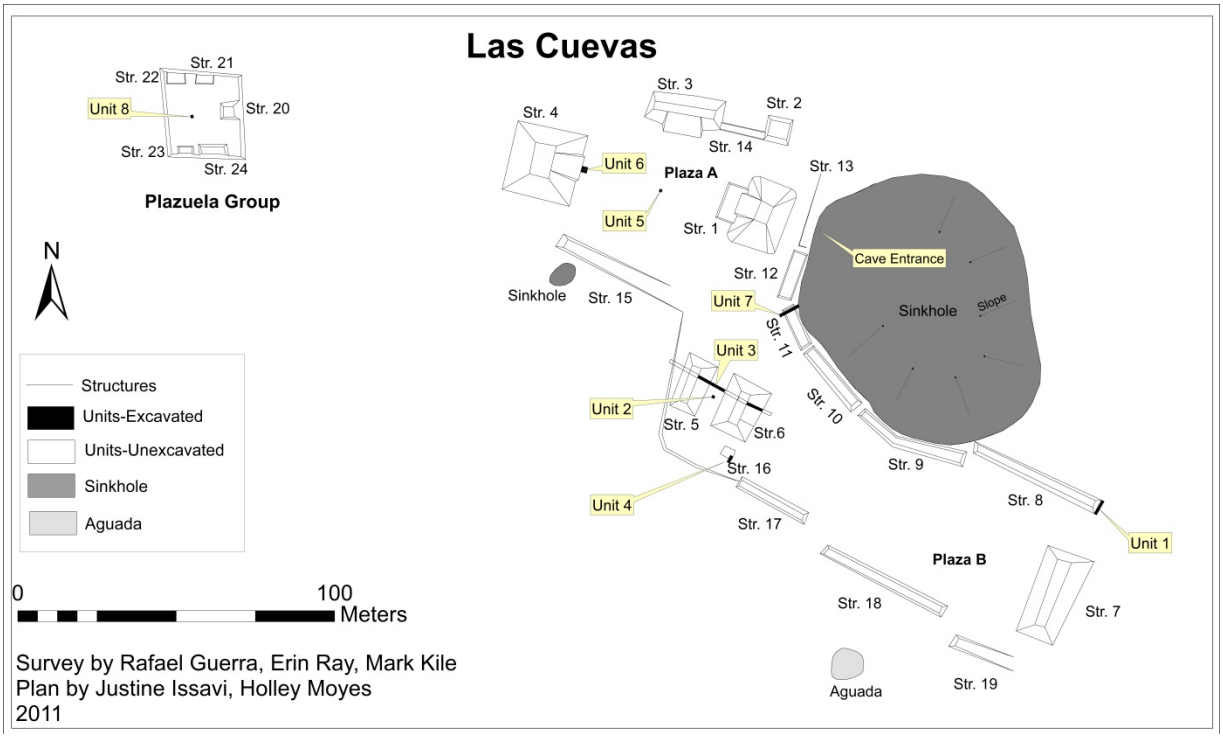

Figure 3. Map of Las Cuevas structures.

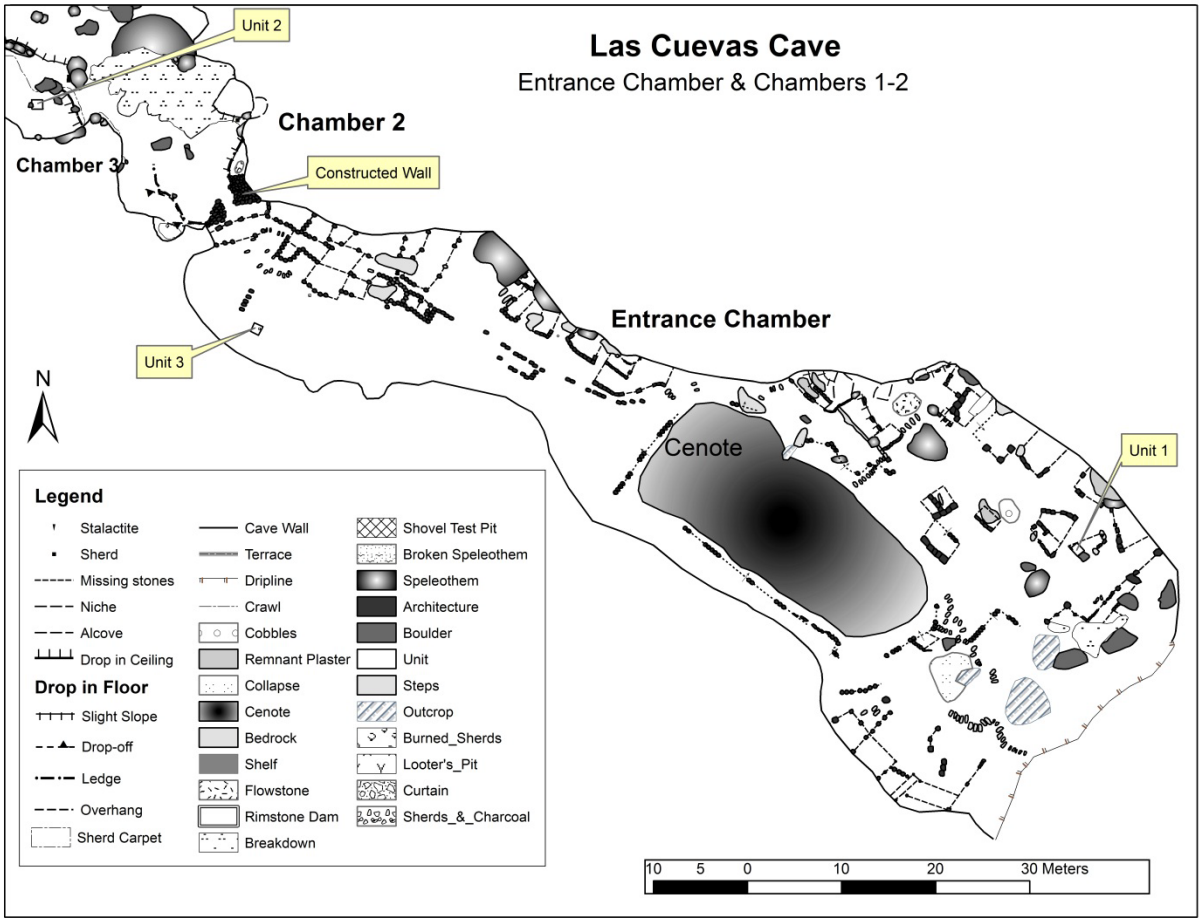

Figure 4. Partial map of Las Cuevas cave showing Entrance, Chambers 1 and 2.

A large cave with an extensive dark zone tunnel system resides directly beneath Structure 1, and runs directly beneath Plaza A. The opening of the cave is at the base of the cenote located in the center of the site. While it is not unusual for Maya sites to be associated with caves, we rarely see such a direct connection or such an extensive tunnel system beneath a site core (Moyes and Brady 2012). Not only this, but located directly inside the cave's cathedral-like entrance is an additional cenote with a natural spring at its base (Figure 4).

The cave mouth is massive, measuring 28m width, opens into a cathedral-like entrance chamber measuring 108m in length and 40m in width that is heavily modified with monumental architectural constructions such as terraces, retaining walls, stairs and platforms covered with thick plaster. The cave's cenote, measuring 32.4m length x13m in width, is ringed by a rectagular, cut stone retaining wall and stairs that lead down to the water. A system of stairs and platforms ascend upward from the retaining wall to the inner cave walls creating a raked amphitheater-like space. A total of 52 separate platforms, many of which still have intact plaster floors, have been noted thus far in the entrance. One eroded platform clearly exhibits two stages of plastering and in our excavations we encountered additional constructions. The extensive constructions suggest that the cave was used for large and well-organized ceremonies and that could be viewed by many participants.

At the rear of the Entrance Chamber a dry-laid wall with a constructed entryway restrict the entrance to the cave's tunnel system (See Figure 4 map). The tunnels form a loop that comes back into the Entrance Chamber, opening into a window high on the southwest wall approximately 15m above the cave floor. Charcoal covers the floor at the lip of the

window suggesting that ceremonies or burnings occurred there in antiquity that would have been viewed from the chamber below.

Excavations and Mapping

The first field season of the LCAR focused on mapping the site and conducting test excavations for chronology building. The site was surveyed by Rafael Guerra, Erin Ray, and Mark Kile, using a Sokkia 650X 6" reflectorless total station on loan from the University of California, Merced and a Topcon 3" total station on loan from Lisa Lucero. Data were displayed and organized using a Geographic Information System. Maps were produced by Justine Issavi, Lauren Phillips, Rafael Guerra, and Holley Moyes. We created a digital elevation model (DEM) of the site (See Figure 2), a plan view map of the constructions in the site core and plazuela group (See Figure 3), a partial map of the cave (See Figure 4).

We conducted test excavations both in surface contexts and within the cave to begin to establish the site's chronology. Surface excavations were supervised by Mark Robinson and cave investigations by Barbara Voorhies. Laura Kosakowsky, assisted by Jenny Smedra, analyzed the ceramics for chronology using standard type variety designations largely in line with the Belize Valley (Gifford 1976).

In this paper we often refer to the Late Classic Spanish Lookout Complex (AD 700-900) as defined by Gifford at Barton Ramie. Elsewhere it is referred to as "late Late Classic to Terminal Classic" or "Spanish Lookout/Tepeu II/III." At Las Cuevas, our interest is to clearly distinguish between Tepeu I, II, and III—so to the Late Classic, late Late Classic and Terminal Classic periods. For our designations, we rely on recent work that identifies Terminal Classic ceramics, particularly that of Lisa Lecount (1999) who classified TC ceramics at Xunantunich and dated the beginning of the period to A.D. 790. Other markers of the TC exist as well, such as molded-carved vessels often found in caves (Helmke and Reents-Budet 2008).

Eight test units were placed in surface contexts. A trench (Unit 3) designed to define the final architectural phase, spanned the ballcourt and was partially excavated. From this trench we were able to define positions of the playing alley, bench, playing walls and range structures (Figure 5). A total of 141 sherds were recovered, of which only 14 are identifiable to type. Although we found few diagnostic sherds, all dated to the Late Classic Spanish Lookout/Tepeu II period (AD700-900), suggesting that the ballcourt was constructed during this time.

Additionally, Unit 2, a 1m x 1m unit placed in the center of the ballcourt alley and dug to bedrock revealed a single major phase of construction in which gradated fill, from small boulders to small pebbles, were laid atop the natural bedrock to form a flat playing alley. The surface of the alley appears to have been plastered. Few artifacts were recovered during excavation, but a single sherd in the basal level can be attributed to the Cayo Unslipped ceramic group, dating the alley construction to the Late Classic Spanish Lookout/Tepeu II complex. No cache or ballcourt marker was found.

Unit 4, a 1m x 2.5m unit was laid along a north-south axis on the southern end of the ballcourt, 4.5m behind Structure 6 at a bearing of 209˚. This unit was placed in an attempt to provide better chronological control for the construction of the platform underlying the ballcourt and the ballcourt itself. Additionally the northern end of the unit (Section A) was placed to date Str. 16, as well as the ballcourt platform's uppermost levels. Section B was intended to date the larger platform on which the ballcourt sits.

Structure 16 (Section A) produced one diagnostic sherd identified as a Late Classic, Spanish Lookout/Tepeu II, suggesting that it was constructed during that time. The southern portion of the unit (Section B) continued through the platform to the bedrock below. It revealed that the platform was a single construction of medium to large-sized dry laid boulders, but no plaster or facing stones were found. While the majority of the sherds were too eroded to identify the time period, the lowest levels above bedrock included some well-preserved types from the Sierra Red Group suggesting an earlier occupation of the site dating to the Late Preclassic period (300 BC-AD 250). Because the material was located below the boulder fill, it is unlikely that they date the construction. This

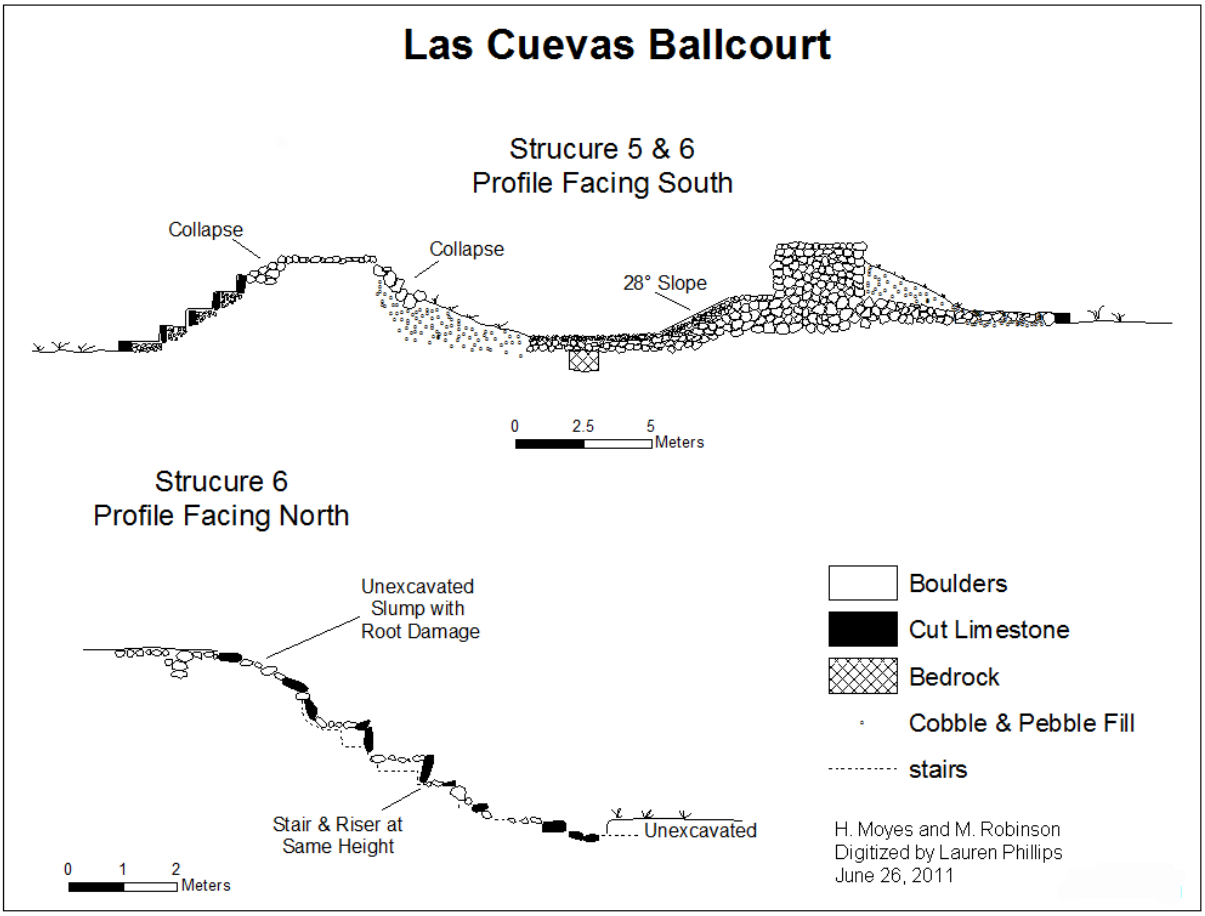

Figure 5. Profile of Las Cuevas ballcourt.

was the only in situ material found during this preliminary season dating earlier than the late Late Classic period.

Two test units were placed in Plaza A, Unit 5 in the center, and Unit 6 abutting the stairway on the east side of Structure 4. Both were excavated to bedrock. Highly eroded remnant plaster was located between 0.2m and 0.3m below the surface, suggesting that the plaza was built in a single construction, but no diagnostic sherds were encountered in either unit. Additionally, a 1m x 1m test unit was placed and in the center of the courtyard of the plazuela group (Unit 8), which produced highly eroded sherds, one of which dated to the Late Classic Spanish Lookout/Tepeu II period.

A second trench (Unit 7) was placed on the north end of Linear Structure 11 to define the architecture and date the structure. The building appears to have been a single phase construction that incorporated a step facing Plaza B and an upper platform. The step is approximately 50cm high and the upper structure 1m in height. The east side of the structure faces the cenote and a platform appears to protrude into the sloping cenote wall. A large number of sherds were encountered on this eastern side but it is unclear as to whether this is a primary trash deposit or fill used to level the platform by filling gaps in the bedrock.

The building's location and association with the other linear structures that ring the top of the depression, suggests that Digby may have been correct in that the structures may have served as a place to view activities that occurred in the cave or in Plaza B. The majority of the ceramics recovered from the structure were Late Classic Spanish Lookout/Tepeu II providing a *terminus post quem* date for that structure.

Three test units and nine shovel test pits placed in the cave. All of the units and two test pits produced datable material and all contained ceramics dating to the Late Classic Spanish Lookout/Tepeu II complex. Unit 1 was of particular interest. This unit was placed in the Entrance Chamber into a partially eroded platform with a plaster floor. A second floor was encountered below suggesting that there was more than one phase of construction within the cave. Initially we thought that this earlier construction may have been quite old, but ceramic analysis clearly demonstrated that this was not the case and that the cave was modified on more than one occasion in the Late Classic period. A total of 316 sherds were excavated within the unit, of which 62 were identifiable to type. Although there were redeposited sherds from the Late Preclassic (Sierra Red Group) and Early Classic period Petén Glosswares, both constructions primarily contained sherds dating to the Spanish Lookout/Tepeu II complex. Additional artifacts encountered including chert flakes, a chert biface, and animal bone, bolster our argument that, rather than representing a unique cave assemblage, the artifacts in the fill of the platform are typical of mixed fills from surface site excavations elsewhere.

Discussion

Based on test excavations conducted in the 2011 field season we tentatively suggest that, as per the ceramic cross-dating, the surface site and cave architecture was erected in the late Late Classic period between AD 700-900, though people were present in the area during the Late Preclassic (300 BC-AD 300). Although we have not excavated into the larger structures, what we have found is that the structures associated with cave use and performance aspects were constructed at this time-- the linear structures surrounding the cenote and bounding the plazas were late Late Classic single constructions coeval with cave modifications. This is an interesting finding because the cave is in such close proximity to the site of Caracol (only 14km from the site core and 4km from its eastern terminus structure). Caracol was one of the largest polities in the Maya lowlands, settled as early as the Middle Preclassic Period (600BC) (Chase and Chase 1987:13 Table 1), yet it does not appear to have incorporated the Las Cuevas cave site early on in its history, nor is it clear to what degree Caracol exerted its influence during the late Late Classic.

In the Late Classic period, Caracol's settlement was at an all-time high and there are indications of its expansion northeast to the site of Mountain Cow (Morris 2004) where a road was constructed connecting the two sites, and a stela was placed bearing Caracol's emblem glyph. Although Las Cuevas is an obvious contender to be incorporated into Caracol's expansion, there is no evidence to suggest that the site was under its authority. Data collected thus far indicate that there were no roads leading from Caracol to Cuevas, no epigraphic or iconographic indications of apical elite use of the cave such as glyphs or cave drawing like those at Naj Tunich, and no stela at all, much less one with the Caracol emblem glyph. Diane and Arlen Chase (Iannone et. al. in press) suggest that, although Caracol is thriving economically at this time, a different form of government replaced the earlier system of divine kings following the death of K'an II in AD 680. The proximity of Cuevas to the Caracol site core may further evidence the weakening of the traditional kingship at Caracol or even political upheaval and fragmentation during this period. This may have opened up an opportunity for lesser nobility or political upstarts to break from Caracol, or possibly even an aspiring elite from further afield to create the ritual complex at Cuevas.

Aside from its regional relationships, Las Cuevas has its own story to tell. There can be little doubt that settlers selected that particular spot because of the location of the cave, and that the eastern structure was deliberately built over the cave entrance. One reason for this choice may have been that there was a constant and reliable water source (the spring in the cave). This may have been a salient issue when we consider that the site was likely constructed in the Late Classic period. Based on paleoenvironmental data, we now know that western Belize suffered a series of droughts beginning around 780AD (Webster et al. 2007). Long-term drought was likely to have been the proximal cause for the political collapse and could explain why the area was depopulated

never to return to its Classic period populations or social organization.

Alternatively or perhaps concomitantly, our models of Maya settlement choice, as outlined by García-Zambrano (1994), suggest that there were cosmological underpinnings for choosing to build over a natural cave. The settlers were most likely not just attracted to a reliable water source, but also wished to establish a cosmological referent, and to create a profoundly sacred landscape for their Late Classic performances and ceremonials. The incorporation of the natural landscape into the site's architecture created a cosmologically-charged space that reified the mountain/cave/water complex at the heart of Maya ideology, and was clearly designed to sanctify the rites and ceremonies that occurred within those precincts. From a Durkheimian perspective, the massive ceremonials at Las Cuevas may well have been an attempt to create social solidarity and a sense of community in a time of stress. As noted by Inomata and Coben (2006:24), it is the co-presence, the gathering of both performer and audience together, that creates these social effects. David Kertzer (1988:76) reminds us that solidarity is produced by people acting together, not thinking together; so during times when social dissent is in the air, performance and spectacle have the ability to reduce social tension, even in dissenters. The ritual elaborations and massive ceremonials at the Las Cuevas site were likely to have served the elite leaders in this capacity.

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XX RITUAL LANDSCAPES OF THE CAVES BRANCH RIVER VALLEY

Gabriel D. Wrobel, Christopher R. Andres, Shawn G. Morton, Rebecca Shelton, Amy Michael, and Christophe Helmke

Recent research in the Caves Branch River Valley (CBRV) has focused on discerning and defining connections between ancient Maya communities and special function sites in Central Belize. During the past three seasons, discoveries and investigations of multiple "new" civic-ceremonial centers and cave sites have advanced our understanding of ways Classic period Maya groups utilized ritually-important natural and constructed elements of the cultural landscape. We are currently considering the possibility that temporal variations in the use of these locations reflect a variety of factors, including demographic, socio-political, and environmental changes that took place in the southern Maya Lowlands between the Late Preclassic and Terminal Classic periods. Our ongoing investigations of landscapes in and around the CBRV are providing us with an improved understanding of how ritual was centrally important in defining and negotiating group and community identities in this part of the Maya area.

Introduction

The scope of the Caves Branch Archaeological Survey project is regional in nature, drawing on a variety of data sets and site types to achieve a relatively holistic reconstruction of ancient Maya communities and population dynamics in the Caves Branch River Valley and adjoining Roaring Creek Works (Figure 1). This approach assumes that individual sites cannot be adequately understood if viewed as isolated entities, and indeed we are finding that the locations of the sites on the landscape, and the cumulative evidence relating to the timing and uses of different sites demonstrate the connections between social, economic, political, and ritual dimensions within the context of the region's culture history. Thus, our discussion focuses on the connections documented between various sites and highlights new data from the 2011 field season.

Spatial Relationships

One of our foci has been the identification of previously unreported sites in the study area. In 2005, the only registered monumental center between the Roaring Creek and Sibun drainages was the Deep Valley site located next to the Hummingbird Highway (Davis 1980). In 2006, working as part of the Belize Valley Archaeological Reconnaissance project, we identified the site's much larger ceremonial core a kilometer away on a hill, which we named Baateelek (Jordan 2008). In 2009, we reported the discovery of what is likely the area's administrative capital, Tipan Chen Uitz (Andres et al. 2010), and the following year we documented another new satellite site, Yaxbe, which is connected to Tipan by a 1.5 km *sacbe* (Andres, Wrobel, González, Morton, and Shelton 2011: 105). Another *sacbe* leading west from Yaxbe appeared to terminate at the escarpment leading down into the Roaring Creek drainage. However, we noticed the presence of numerous cut stones and several large steps during our descent, suggesting the presence of a monumental stair. We were able to re-identify this *sacbe* at the escarpment's base, and followed it directly into Cahal Uitz Na (Andres, Wrobel, González, Morton, and Shelton 2011: 106). Clearly, one of the more exciting features of the sites in this area is the implication of the very tangible connections between them. We documented several new *sacbeob* during the 2011 season and attempted (unsuccessfully) to locate several other large sites reported by individuals from Armenia and Springfield. If these reports are accurate, they suggest the presence of a complex network of interconnected sites in our research area.

Surface Site Investigations

In 2010 and 2011, our surface investigations focused on the large center of Tipan Chen Uitz, which occupies a series of karstic outcrops in a region known as the Roaring Creek Works between the previously documented ancient Maya centers of Deep Valley and Cahal Uitz Na (Andres et al. 2010). Tipan's importance is suggested by its overall size and architectural complexity: the

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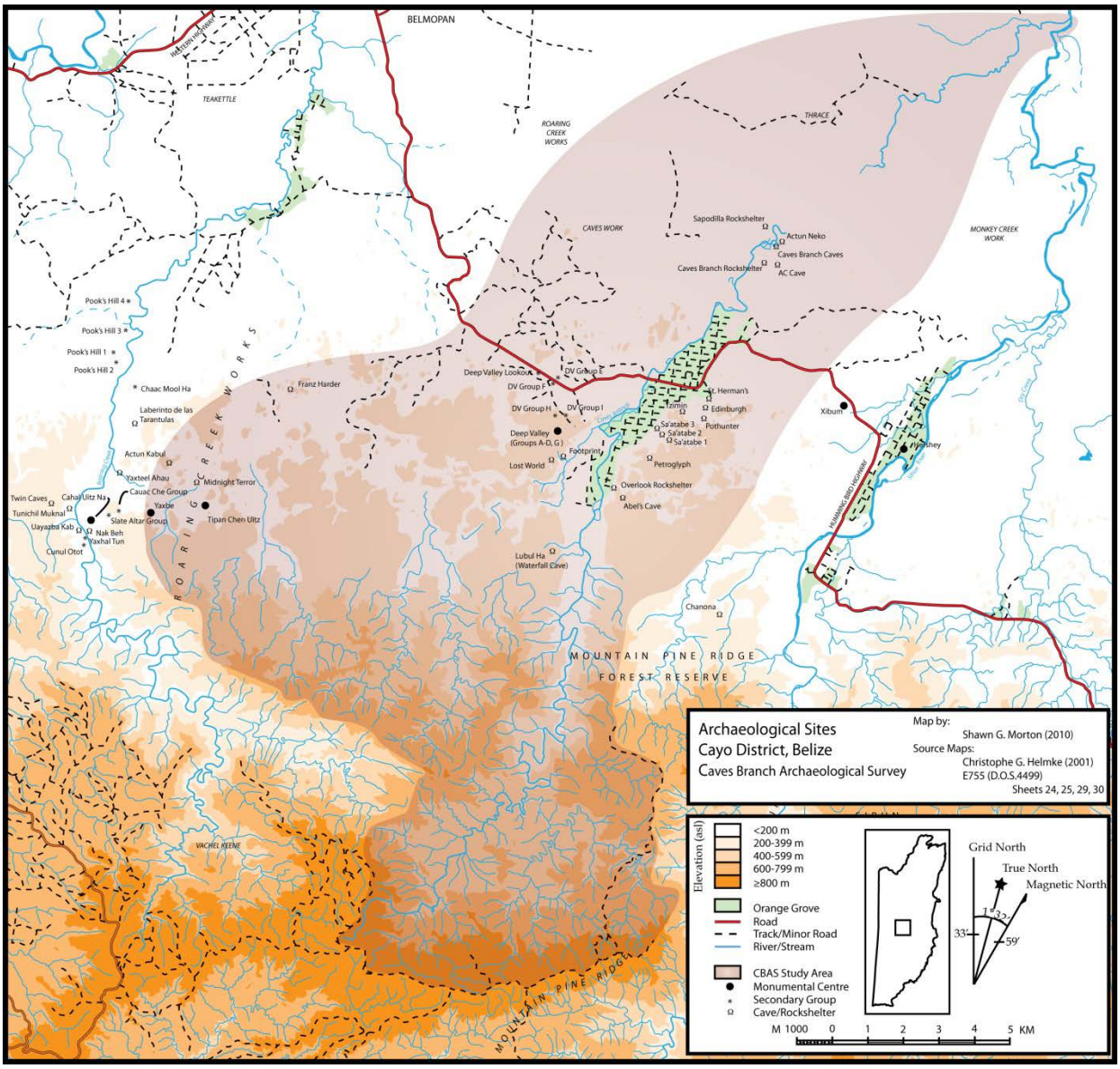

Figure 1. Map showing Caves Branch Archaeological Survey study area, and associated sites.

monumental architecture of the site's epicenter covers about 50,000 m^2; includes a massive palace complex, several temples, a ballcourt, and extensive range structures; has buildings measuring up to 20 m in height; and incorporates a dozen courtyards and plazas. These elements, together with a number of *sacbeob* identified in the area during the past two field seasons (Andres, Morton, González, and Wrobel 2011), suggest that Tipan was an important seat of political power and the likely focus of an ancient polity (Andres et al. 2010; Andres, Wrobel, González, Morton, and Shelton 2011).

Following mapping of Tipan's monumental epicenter in 2010 (González and Howell 2011), the goals of the 2011 season included gaining a better understanding of the center's development and occupational chronology, as well as documenting changes in Tipan's eastern acropolis/primary palace complex. Clearing of a large looters' pit in Plaza A in 2010 showed that the central part of the plaza was raised more than 3 m with dry-laid boulder core during a single event tentatively dated to the Late Classic period (Andres 2011). In 2011, investigation of another looters' trench

at the base of Str. A-1 identified the same construction unit some 50 m to the east, suggesting that the entire plaza represents a single massive construction effort. The presence of such impressive large-scale construction reinforces our impression that the community fluoresced relatively late and expanded rapidly, and that its Late Classic leaders were able to mobilize huge amounts of labor to re-shape the natural landscape (Andres, Wrobel, González, Morton, and Shelton 2011; Morton et al. 2011).

As previously reported (Andres 2011), much of our energy has been focused on Tipan's A Acropolis, which dominates the eastern half of the site center (Figure 2). On the basis of its size, location, and spatial characteristics, we believe that this complex served as the community's palatial residence and administrative focus. Elsewhere (Andres et al. 2010), we have noted similarities to spatial patterns discussed by Awe (2008) at sites in the Belize Valley, where the terrain was re-sculpted to create a series of elevated, spatially restricted, and increasingly exclusive spaces.. Our previous investigations of Tipan's eastern acropolis identified a series of modifications, including the addition of structures around apical courtyard A-12's previously undeveloped margins to create an isolated, insular, and highly inaccessible space (Andres, Wrobel, González, Morton, and Shelton 2011:104) (see Figure 2). Our continued investigations of shifting patterns of access to the palace complex in 2011 revealed that Str. A-1 was originally accessed by way of a Late Classic period outset axial stair. At some point after A.D. 700, a platform, finished with massive limestone slabs measuring as much as 2.5 m in length by 80 cm in height, was constructed over this earlier stair's two bottommost steps (Figure 3) (Andres 2011). While the facing stones used in this construction are vaguely reminiscent of stelae, our investigations demonstrate that these panels functioned as battered facings, which are a typical architectural feature of Tipan and its satellites (also seen at Yaxbe and Cahal Uitz Na; see Awe and Helmke 2007: 31-32; Helmke 2009: 269-270, 273). Because the platform's height would have made it difficult to access from the west, we explored the possibility that it incorporated lateral stairs. However, while clearing of the south stairside revealed the earlier stair subsumed by the later platform, a massive stairside outset, and four platform terraces on Str. A-1's west face, no evidence of lateral access was encountered (Figure 4). This finding is significant, because it indicates that the addition of the Late-to-Terminal Classic platform made it more difficult to access upper levels of the palace via the earlier approach from Plaza A, and that the palace's occupants increasingly came to rely on less conspicuous side entrances. These changes suggest that increasing emphasis was placed on privacy and, while the specific factors that contributed to these changes in the built environment remain unknown, such reorganization of access to the presumed royal court may well signal sociopolitical transformations within the community. These architectural changes, which we are continuing to investigate, appear to have taken place shortly before the palace was vacated – most likely during the ninth century (Andres 2011).

In 2011, our investigations also extended beyond the Tipan site center. At the start of the field season we were aware of two causeways. The first – western – *sacbe* links Tipan to Cahal Uitz Na via the smaller center of Yaxbe (Andres, Morton, González, and Wrobel 2011) (Figure 5). This connection, which we documented in 2010, between what we interpret as "primary" and "secondary" centers suggests a significant degree of social, political, and economic integration in our study area (Andres, Wrobel, González, Morton, and Shelton 2011). The second previously known *sacbe* at Tipan extends to the south, and has resisted multiple efforts to trace its course. While this *sacbe* disappears several hundred meters from Tipan, we suspect that it once provided access to a pathway through the now virtually impassible landscape of sinkholes, canyons, and dissected bedrock formations just south of the site. Ultimately, we believe that another center will be identified within or beyond this zone, and that this causeway provided access to this community. In 2011 we expanded our understanding of this regional network of roads by documenting segments of two additional causeways. The first of these – the "northern" causeway – aligns with the north-south oriented alleyway of Tipan's

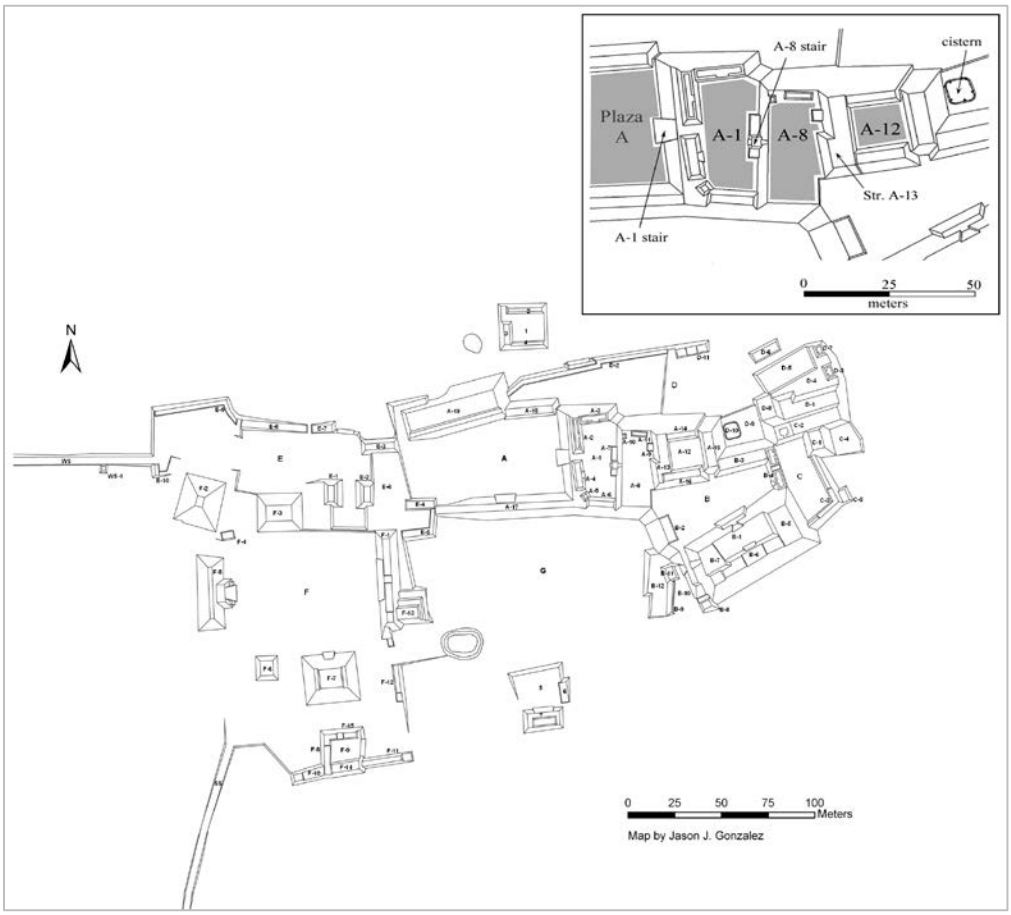

Figure 2. Map of the site center at Tipan showing the eastern acropolis and other locations discussed in the text (map by Jason J. González with additions by Christopher R. Andres).

Figure 3. Photograph of the massive facing stones forming the west face of the platform constructed at the base of Str. A-1's Late Classic period outset axial stair at Tipan (photograph by Christopher R. Andres).

Figure 4. Photograph of Str. A-1's south stairside showing the southernmost facing stone of the secondary platform (in foreground), the southern stairside outset, and the terraces forming the west face of the Str. A-1 platform (photograph by Christopher R. Andres).

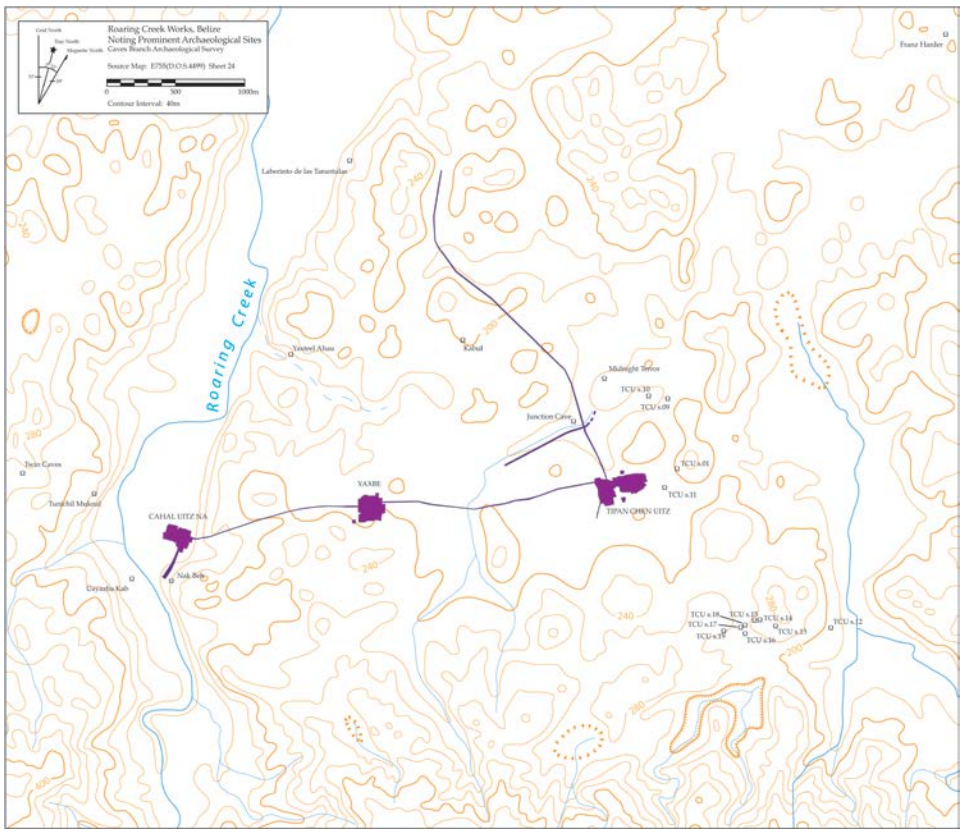

Figure 5. Map of the area around Tipan showing the *sacbeob* documented to date by members of the Caves Branch Archaeological Survey project (map by Shawn G. Morton, Christopher R. Andres, and Jason J. González).

Figure 6. Remains of constructed formal passage within the entrance chambers of Actun Kabul (photograph by Gabriel Wrobel).

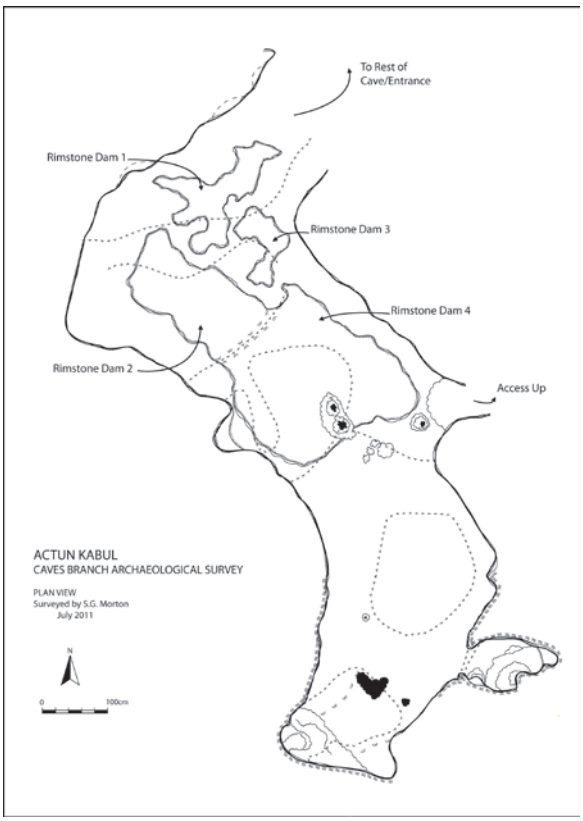

Figure 7. Map of terminal burial chamber of Actun Kabul (by Shawn Morton).

ballcourt, runs north from the central precinct, traverses a bedrock outcrop via a large stair, and continues more than 2.5 km to the north. We were unable to locate its terminus, but identified several house mounds, two uncarved stelae, and a large, masonry-lined cistern lying along its path. Like Tipan's "southern" causeway, we believe that this *sacbe* leads to a previously unrecorded outlying center. This past season we also identified portions of yet another causeway. This *sacbe* follows a northeast-to-southwest course and crosses Tipan's previously mentioned "northern" *sacbe* (see Figure 5). The southwest end of this final road may terminate at a pair of caves identified in the area where we were no longer able to distinguish it in 2011. Alternatively, this causeway may run as far south and west as neighboring Yaxbe. These two new causeways intersect over a small cave, Junction Cave, which contained surprisingly few artifacts.

Subterranean Site Investigations

Actun Kabul

During the 2011 season, CBAS began investigations at Actun Kabul, located along the westernmost fringe of the Roaring Creek Works approximately one kilometer from Midnight Terror Cave. Originally reported to the Institute of Archaeology by Gibbs and Weinberg in 2002, the cave was the focus of a brief reconnaissance during which the authors documented a large, extensively looted burial chamber towards the back of the cave. They reported a minimum number of approximately 15 individuals, most of who seem to have been placed directly on the ground surface. Ceramics in this area date from the Middle to Terminal Classic periods, as do those found in the cave's entrance chambers. Near the entrance of the cave, the area between the large entrance chamber and the next large chamber is a narrow, elevated, formal passage containing an intact wall on one side, surrounded by loose stones from a corresponding wall most likely knocked down by looters (Figure 6). Given the large number of loose stones in the area, it is also likely that this entrance was sealed in antiquity.

A third large chamber is accessed after climbing up a series of short passages past the second entrance chamber and by then squeezing through a small hole. The burial area reported by Gibbs and Weinberg (2002) is a large ledge that is located at the top of this chamber. A survey of this area indicated that the condition is consistent with their description, suggesting little if any subsequent looting activity. A narrow passage through some boulder

Figure 8. Front section of the terminal burial chamber of Actun Kabul with bone clusters. Note the speleothem formation barrier separating the back section (photograph by Gabriel Wrobel).

breakdown at the back of the burial chamber led to another previously uninvestigated area of the cave. A large open chamber contained the remains of at least four individuals scattered on the rocks beneath active drip formations. One of these sets of remains included an articulated leg, the only articulations thus far noted in the cave. At the back of this section of the cave, we discovered a terminal chamber measuring approximately 30 by 10 m (Figure 7). This area also had been thoroughly looted, so any sort of reasonable estimate of the number of individuals present is impossible at this point, but it is certain that the number is in the dozens.

The chamber appears to be naturally divided into two sections by speleothem formations. Within the front section to the northwest were several shallow rimstone dams of different sizes, containing bones generally organized into discrete clusters of completely disarticulated elements (Figure 8). Surface collection and lab analysis of several of these clusters confirmed that each primarily comprised bones belonging to a single individual. Although the looters' activity clearly had moved and mixed these to a degree, the clusters were still obvious. The bone assemblage in the back section of the chamber was completely different in appearance; no such clusters were visible and the remains form a relatively uniform carpet of bone across the floor. The damage from looting here appears to be much more extensive, but even so, this area seems more consistent with the "bone soup" area reported at Midnight Terror than the front of the chamber. Sampling in the back half of the chamber revealed that bones were much more commingled than in the front, suggesting that the two areas represent different mortuary contexts. Among the bones in both areas were occasional piles of ash and heavily burnt and broken pottery.

Unlike caves such as Tunichil Muknal, which contain only a few discrete individual interments, Kabul fits within a developing pattern of mortuary caves in the region, together with Je'reftheel (Wrobel 2011) and Midnight

Terror (see Brady, this volume), in which mortuary contexts seem to demonstrate a wide range of deposition patterns, ranging from fully articulated bodies to completely commingled assemblages of elements. One possible explanation for this range is that the differences represent a series of stages within a prolonged mortuary process, beginning with the initial interment of complete bodies. as seen in Je'reftheel and perhaps in the single partially articulated individual outside the terminal burial chamber at Actun Kabul; the subsequent bundling and movement of bones following decomposition, as represented by the bone clusters; and finally the loss of individual identity through the commingling of elements from multiple individuals, as witnessed at the back of the terminal chamber of Kabul.

Sapodilla Rockshelter

In 2010, we first documented a heavily looted mortuary site – Sapodilla Rockshelter (Figure 9). By examining the looted contexts at the site, we were able to identify differences in the distribution of artifacts and placement of burials within specific areas of the rockshelter, suggesting the presence of different activity areas perhaps related to the morphological features of the cave (Wrobel and Shelton 2011). In 2011, nine operation areas were excavated in the light, liminal, and dark zones of the rockshelter and cave. Burials and a large amount of ceramic material were found in the light and liminal zones. Excavation units in the dark zone ceded minimal material and no burials, suggesting that activity areas extended only to areas reached by natural light. Three test units were placed in front of a solution hole in the light zone, and all contained relatively high frequencies of cultural material (ceramic sherds, quartz, obsidian blades, faunal elements), a pattern not repeated at the site. More ceramic sherds were found in these test units than elsewhere in the rockshelter, though few re-fits of the material were possible. The presence of just one isolated human skull, in association with the abundance of cultural material, suggests that this naturally bounded space was ritually significant and used for purposes other than routine interment practices.

A wide range of ages and both sexes were

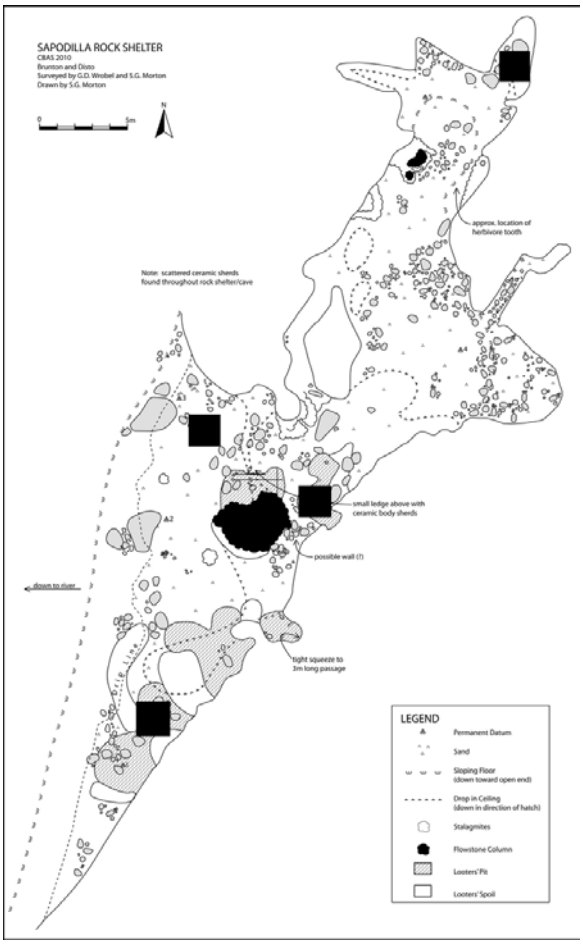

Figure 9. Map of Sapodilla Rockshelter, including 2011 excavation units (by Shawn Morton).

represented in the burial assemblage and nearly all individuals were buried with grave furniture. With the exception of one burial, that of a juvenile found in the liminal zone containing a bead belt and bracelets, grave furnishings were modest and were mostly carved shell ornaments. Of particular interest were several features in which isolated skulls were buried. There is no evidence of decapitation, suggesting that these were likely removed from skeletonized bodies and redeposited. The documentation of this secondary movement and re-interment of elements in a rockshelter likely used by commoners provides an interesting analogy to dissociated elements found in what are considered to be elite ritual settings, such as large dark zone caves and ceremonial architecture.

Small Caves near Tipan Chen Uitz

In addition to investigations at major hinterland caves/rockshelters, this season we focused on a number of small caves/sinkholes in the immediate vicinity of Tipan and its *sacbeob*. Ironically, two of these (TCU s.05 and Mark's Cave) are distinguished by their *lack* of evidence illustrative of utilization by the ancient Maya. TCU s.05, located in Tipan's Plaza E, consisted of a restricted vertical entrance yielding access to a series of navigable chambers (totaling approximately 15m in length and averaging approximately 2m in width by 4m in height) that extended SW toward the rear of structure F-3. Similar to TCU s.08, a restricted cave excavated during the 2010 season that yielded more than a metric ton of ceramics, TCU s.05 had been sealed by architecture beneath the plaza in antiquity. However, two excavations in the relatively open rear chambers of TCU s.05 cave yielded only sterile alluvium. The cave itself shows no evidence of having been exposed to smoke or charcoal from torches or fires in antiquity, nor was there clear evidence of human breakage of speleothems. Similarly, 'Mark's Cave,' encountered during settlement survey operations north of the Tipan site centre and markedly larger/more accessible than TCU s.05 (extending some 80 m) yielded no evidence of human use. Given the near ubiquity of cave use otherwise attested in previous seasons and the relatively close association between both of these caves and architecture, their lack of use is conspicuous.

Two other small caves investigated this season were outwardly promising. TCU s.11 is a small vertical sink located approximately 200 m east of the Tipan site core. This sinkhole, measuring some 8 by 2 m at its maximum depth of approximately 15 m (at the western end) was selected for investigation due to its immediate association with Structure 8. Preliminary reconnaissance in 2009, yielded limited material remains in the form of heavily fragmented/eroded ceramics and daub. It was therefore decided that excavations in both the cave and structure would be employed to attempt to shed light on the associated functions of each of these contexts and their interactions, if any. Excavations in Structure 8 penetrated the south-facing stairway down to bedrock in a trench measuring 2 by 3 m. Only a few, non-diagnostic sherds were encountered in the dry-laid construction core of the stair and no signs of a daubed structure were encountered. Alternatively, facings may have been scavenged during a subsequent occupation of the site. The structure itself may have been abandoned prior to completion as no finished surfaces or cut stones were encountered. Similarly, excavations in the deepest portion of TCU s.11 (the western end), chosen for the tendency of fallen material to gather in this location and its immediate association with Structure 8, yielded few artifacts, none of which were diagnostic. Excavations extended vertically to the choked boulder floor of the sinkhole. The cave itself showed no evidence of burning and no speleothem breakage. Whereas the abundance of burnt daub encountered suggests a close physical relationship with an as-of-yet unidentified burned surface structure, the cave itself does not appear to have been the focus of human activity.

Junction Cave, mentioned above, and so-named for its location beneath the crossing point of the two northern *sacbeob*, is remarkable in its own right. Despite its relatively close proximity to such heavily utilized caves as Midnight Terror and Actun Kabul, and its remarkable topological associations, few material remains were encountered within. Nonetheless, it appears that Junction Cave did serve as a prominent locus of human activity. Surface collection in the cave revealed an assemblage similar in content, if not quantity, to other cave contexts in the region; characterized by discrete deposition of individual sherds from dissimilar vessels. Excavations within the cave's alluvial floor suggested that surface deposits were made directly on the cave's sterile floor and did not exhibit the formation of a cultural stratum. Junction cave is also remarkable as it appears to have been harvested of its many speleothems in antiquity, a pattern noted by Brady et al. (1997), these being removed presumably for use outside the cave context. As speleothems are often found in monumental architecture, this may represent a ritualized investiture drawing parallels between the natural sacred landscape of the cave and the built sacred landscape of the monumental civic-ceremonial core.

The small scale caves investigated this season hint at an avenue of inquiry directed toward gaining a deeper understanding of cave ritual/use; the ancient Maya were making choices concerning the venue of their activities and understanding what made the caves studied this season and previous seasons appropriate venues for the activities that took place within them (or not) is the next step in understanding how the ancient Maya viewed and utilized their natural environment.

Chronology

One of our goals the past two field seasons has been to establish the chronological parameters of our study area. As already discussed, the subterranean sites we have investigated have yielded these data more willingly than the surface sites. Evidence currently suggests that intensive use of cave environments was underway by the Terminal Preclassic period or the Protoclassic-to-Early Classic transition. Once established, these patterns peaked during the Late Classic before abating during the Terminal Classic. The depth of Late Classic construction at Tipan, Deep Valley, and Yaxbe means that we currently know little of the earliest occupations of these settlements. However, we believe we are on firmer ground when considering the later end of these occupations. To date, excavations at Deep Valley, and surface collections from Yaxbe, have yielded no material later than the Late-to-Terminal Classic. Our single most significant and chronologically-relevant finding this season consists of an inscribed monument discovered on Str. A-1 at Tipan. This monument was discovered in the upper levels of the collapse stratum overlying the building's terminal stair late on the last day of fieldwork. The monument was broken in antiquity, and the text is incomplete, but a complete epigraphic treatment is currently in preparation.

However, the project's epigrapher, Christophe Helmke, has provided some preliminary readings. Besides listing several titles, the text includes part of a calendar round date, reading 13 Muwan, conforming to the Period Ending date of 9.14.0.0.0, placing the monument's dedication on the 1st of December, A.D. 711 (Julian date, using the standard GMT correlation). This is particularly noteworthy since Naranjo, Xunantunich and Caracol are the only other sites in this part of the eastern central lowlands with inscribed monuments or glyphic texts dating to this part of the Late Classic period. This monument, together with ceramic and architectural evidence from Tipan, supports our interpretation of the community's late florescence and probable political prominence in the region.

Conclusions

Ultimately, our findings from this year and last have prompted us to reconsider some of our early assumptions about the Caves Branch area. Initially, we approached our study area as peripheral to the Belize Valley and other areas with well-documented levels of early sociopolitical complexity. The Late Classic data from the Caves Branch and Roaring Creek Works have been surprising in that they suggest a quantity of investment that we find incompatible with the idea that these communities simply represent an extension of some other polity to house an expanding population or to create new resource procurement opportunities. The sites we have explored so far – Deep Valley, Tipan Chen Uitz, and Yaxbe – appear to be part of a tightly integrated network, which includes Cahal Uitz Na in the Roaring Creek. Other large sites have been informally reported in the area, and the discovery of a number of new *sacbeob* this season further hints at their presence on the landscape. Intensification of cave use in the area, including the establishment of large mortuary deposits in caves, as well as the surprising variability in the use of caves of different sizes, seem to relate directly to a complex utilization of landscape by these new groups. We would argue that the picture emerging from the presently understudied Caves Branch area suggests that it too was a center of sociopolitical complexity like many other areas of Belize (e.g. Pendergast 1993).

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XX PRELIMINARY OBSERVATIONS ON THE INVESTIGATION OF MIDNIGHT TERROR CAVE, BELIZE

James E. Brady and C. L. Kieffer

California State University, Los Angeles, working as part of the Western Belize Regional Cave Project directed by Dr. Jaime Awe, conducted an archaeological survey of Midnight Terror Cave between 2008 and 2010. The survey documented a ritual circuit within the cave along a system of formally constructed pathways. The pathways connect three areas in the cave that were modified to create broad level spaces that could accommodate large numbers of spectators. The extensive modification suggests a systematic plan of construction that argues for the involvement of a polity in the planning and carrying out of the construction. The authors argue that the creation of such "public" space should be seen as the hallmark of polity appropriation. Analysis of artifacts suggests that the rituals carried out on the three public spaces differed from one another. The last of the three spots visited appears to have been home to a large number of human sacrifices. Most of the individuals are from a dense, commingled watery deposit in the dark zone of the cave.

Introduction

Midnight Terror Cave, located south of Belmopan near the Mennonite community of Springfield in the Cayo District of Belize, was reported to the Institute of Anthropology in 2006 by the residents of Springfield after they rescued a looter who had been badly injured in a fall. A preliminary assessment was made by Institute personnel and large deposits of human remains were noted. The cave was mapped for the Institute by cavers Matt Oliphant and Nancy Pistole. The cave received dubious notoriety by being featured in an episode of a cable television show, *Bone Detective*, of questionable scientific merit.

The California State University, Los Angeles Field Program in Central America completed a three year survey of Midnight Terror Cave in 2010, as part of the Western Belize Regional Cave Project directed by Dr. Jaime Awe. The project was initiated to better understand the deposition of large quantities of human skeletal material in the dark zone of the cave. The scope was almost immediately expanded to document the extensive modification of what has proven to be one of the most complex caves that the senior author has investigated in his 30 years of field research. This paper synthesizes some of the conclusions formed over the last three years about the use of space within the cave.

It is clear that Midnight Terror Cave was a feature of first importance in the ancient sacred landscape. It is also clear that the cave figured prominently in the political landscape as well and had been appropriated by the polity of Tipan Chen Witz which is located a half kilometer from the cave (Andres and Wrobel 2011). The evidence for appropriation has been noted in the form of architecture placed on top of the hill directly over the cave and in an elaborate plaza group at the base hill. A platform that created a broad level space on the otherwise steeply sloping hill had also been constructed at the entrance to the cave.

Cave archaeology has analyzed the use of cave space along a number of parameters such as wet versus dry (Brady 1989:415-416) and high versus low (Stone 2005). Most cave archaeologists have also noted evidence of human traffic in their caves in the form of trails of concave compacted soil that are still clearly visible a millennium after the abandonment of the site. On occasion, issues of space have been integrated with human movement as the two are closely related. Dominique Rissolo (2003:137-139), for instance, traces such paths in several caves in the Yalahau region and found that the paths invariably led to water sources. In addition to being marked by soil compaction, such paths contain stairs and rock art panels marking the route. Polly Peterson (2006), refining earlier work by Kenward (2005), discusses movement within the Sibun caves in relation to walls built in a number of the caves. The most sophisticated work has been produced by Holley Moyes. Using a GIS plotting of artifacts, cave modifications and visible paths, Moyes (2005) reconstructed a complex ritual circuit in the main chamber at Actun Tunichil

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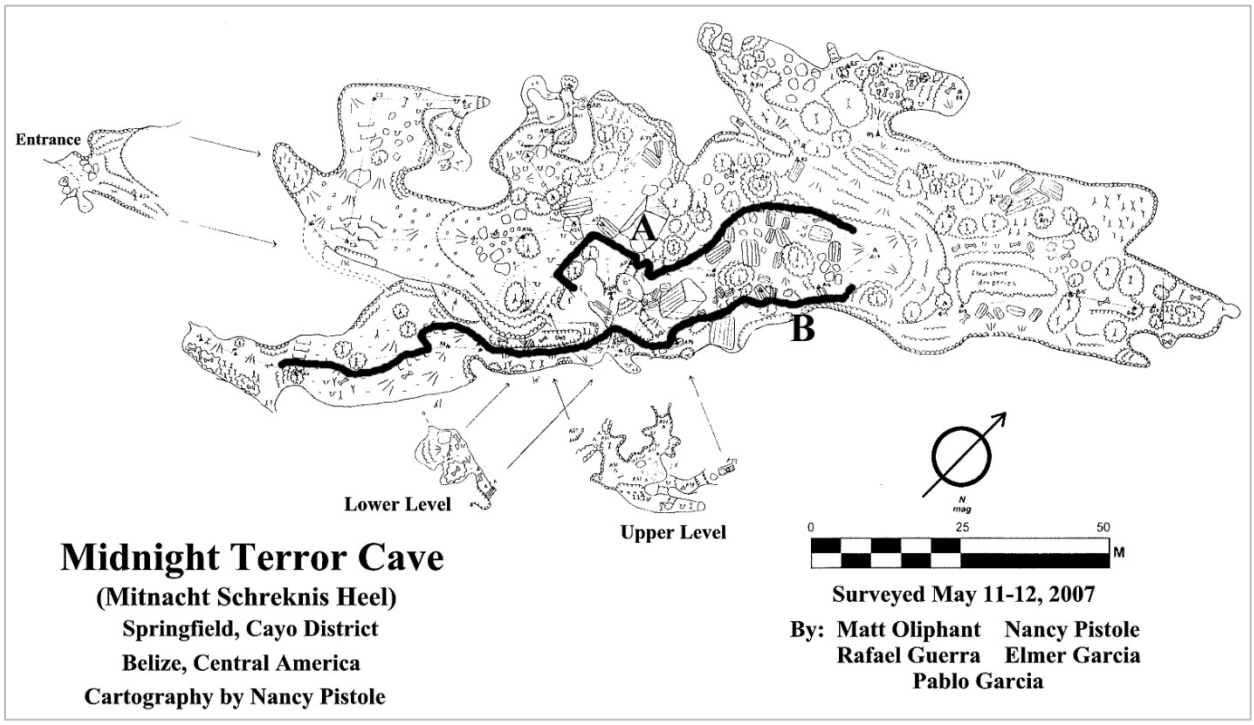

Figure 1. Map of Midnight Terror Cave with pathways indicated by bold lines. Pathway A leads from the plaza in Operation IV to the plaza in Operation VII. Pathway B leads from the plaza in Operation VII to Lot 1 in Operation V.

Muknal. At Actun Chechem Ha, she used microstratigraphy and charcoal densities to measure the intensity of utilization along routes (Moyes 2006).

One of the more useful distinctions has been the recognition that artifacts deposited in physically restricted spaces that could only accommodate one or a few participants were associated with private ritual (Brady 1989:402-404). In contrast, public ritual requires, of necessity, large, open and, hopefully, level space in order to accommodate the number of people implied by the term public ritual (Brady 1989:404-406). Midnight Terror Cave is a very wet, active cave filled with speleothems of impressive size. Interior space is broken and divided by arrays of formations so that large, level areas simply do not naturally occur. Since Midnight Terror Cave does not naturally lend itself to public space, the creation of such areas immediately drew the project's attention.

Within Midnight Terror Cave, three areas show substantial modification designed to create public space. Furthermore, these areas are interconnected by a formal system of pathways (Figure 1). In this paper, we examine the three areas to elucidate what we think was the Maya's plan for the cave and show how the analyses of these spaces aid in the interpretation of human behavior associated with the deposition of both ceramic and human skeletal material. We recognize that the actual use was likely far more complex and, very importantly, changed through time. The most dramatic change occurred as result of an earthquake that did extensive damage to the cave, toppling many of the largest formations and causing chunks of the ceiling to fall. We suspect that it was the same earthquake documented by the Xunantunich project. For this talk, we will focus on the layout before the earthquake struck.

Operation IV

On entering Midnight Terror Cave, the Maya would have descended along a series of ledges to the cave floor about 20 m below. Here they would have encountered a stone pathway that proceeded westward for about five meters

before turning northward and extending 10.5 meters into a room that is now bounded by active and fallen cave formations. The stone pavement ends abruptly as one leaves the room and enters a second. Before the earthquake, the two rooms would have formed a single, comparatively open, chamber perhaps 20 m long by 7-8 m wide and paved with yellow clay (Figure 2). A looter's pit in Lot 7 cut through the floor and allowed us to examine this construction in greater detail. The floor had been refurbished at least once and there was a substantial buildup of charcoal and ceramics on the floor suggesting heavy utilization (Figure 3). The ceramic analysis documented the highest density of ceramics in this area for the entire cave.

Interestingly the only human skeletal material discovered in this operation was located approximately 20 meters from the pathways but still in the twilight zone of the cave. This deposit contained the remains of two adult individuals, one male and one female, who were placed in a wet niche, tucked between large boulders. The bones were placed in an area too small to allow the placement of a fleshed individual, let alone two people. Neither individual was complete further suggesting a secondary deposit.

Operation VII

Leaving the eastern side of the chamber by a pathway, one descends along clay trail with the descent facilitated by a number of clay steps. The trail then continues fairly straight for some 16 m with evidence of filling and leveling along this entire section (see Figure 1: Pathway A). Broken formations and other debris had been cleared from the path or buried beneath the clay. The path now terminates at a huge block of ceiling collapse but at one time it extended to the southern cave wall where it met another pathway.

Approaching the breakdown, the trail veers to the left and ascends a bank of clay via three cut steps. At the top of the bank the path originally passed between a natural doorway formed by massive stalagmites on either side onto a large, flat clay platform, 24 m long by 8½ m wide. A 1 m high retaining wall at one end of rough unshaped stones indicates that the

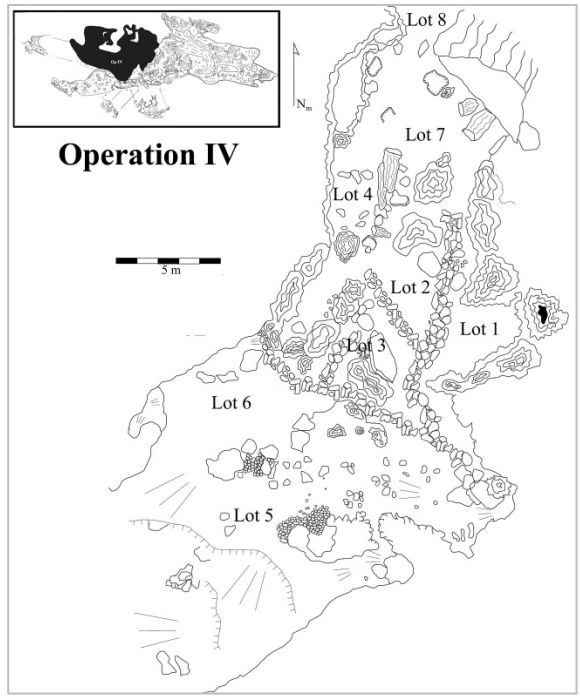

Figure 2. Detailed map of area in Operation IV with the rectangle showing the extent of the plaza before the earthquake

Figure 3. The clay floor in Operation IV is outlined in this looter's pit.

platform was built up by leveling behind the walls. Around the margins of the platform are clay banks, the faces of which show tool marks indicative of mining. The clay was most likely used in the construction of the level plaza. There is abundant evidence of the platform's ritual utilization in the form of charcoal, broken pottery and artifacts. In one area, the platform has been torn up by looters. An examination the sidewall of the platform revealed that ceramics

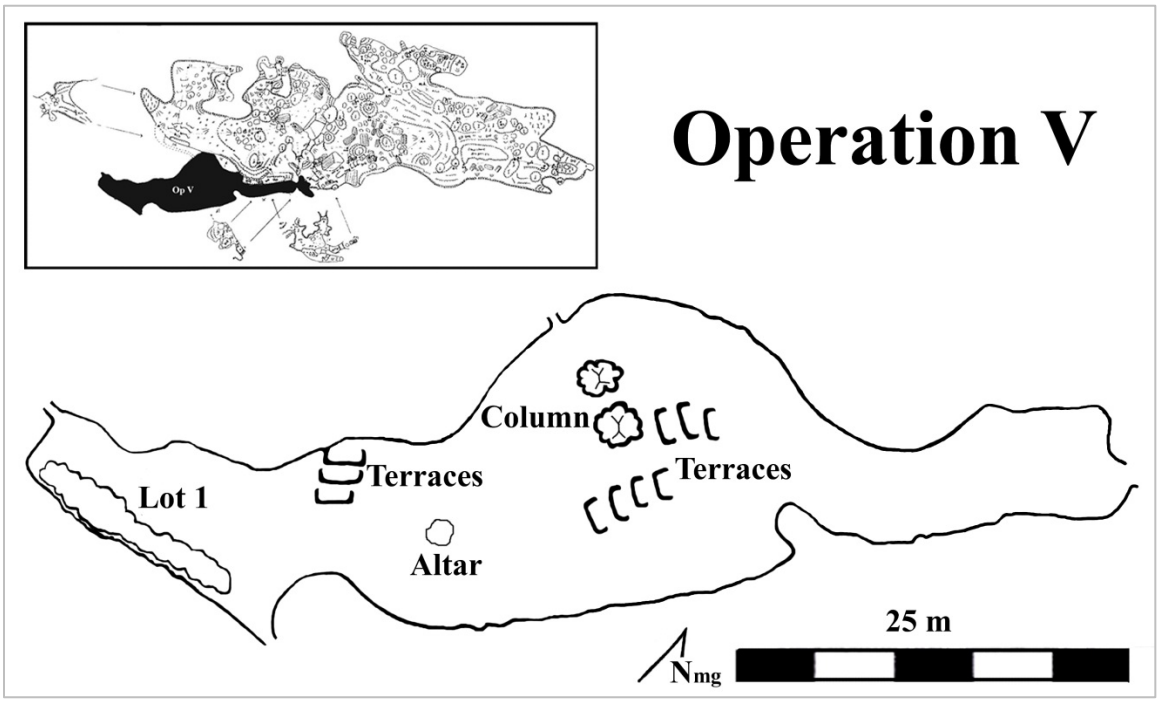

Figure 4. Map of Operation V showing the location of the speleothem column, terraces, altar and Lot 1.

were embedded in the clay to a depth of 30-40 cm.

Operation V

From the northern end of the plaza in Operation VII, an artifact lined pathway descends along the southern cave wall. A well defined trail paved with fist sized stones and cleared of larger debris descends steeply to Operation V, the least extensively modified area of public space. A concave path of compacted clay created by foot traffic is easily followed down the center of Operation V. The path leads to a modified area in the upper part of the chamber before connecting to a second use area near the bottom of the chamber (Figure 4). The northeastern portion of this chamber is dominated by a large speleothem column, 5.5 meters high (Figure 5). The floor around the column has been leveled to create a flat platform, 4.3 m north-south by 3.2 m east - west. The area has been badly trampled, but heavy concentrations of human bone fragments and pottery sherds were recovered here. A set of four terraces have been dug out of the clay on the eastern slope above the platform. Another set of terraces were carved along the southern border of the platform. The terraces appear to have been created to provide a level area for spectators to stand, a suggestion first made by Jaime Awe and supported by this project's investigations. It is interesting that no clay from the excavation of the terraces is present so we suspect that this material was used in creating a level platform at the base of the column.

At a lower level in the chamber, the path leads to another activity area focused on an alcove in the cave wall with smaller terraces cut just below the entrance (Figure 6). The area also contains a fairly flat piece of ceiling collapse that was set level on a number of stones to make an altar. Human bone, much of it cemented in place by calcite, was documented to one side of the altar.

The chamber ends in a final room, approximately 18 m long that is separated by a curtain of formations. The floor slopes sharply downward from north to south into a muddy depression that may seasonally fill with water. The ceiling is low and there is little level floor space so this area could never have entertained more than a few visitors at any given time. Additionally, one cannot see into the room from the outer chamber so that activities occurring in

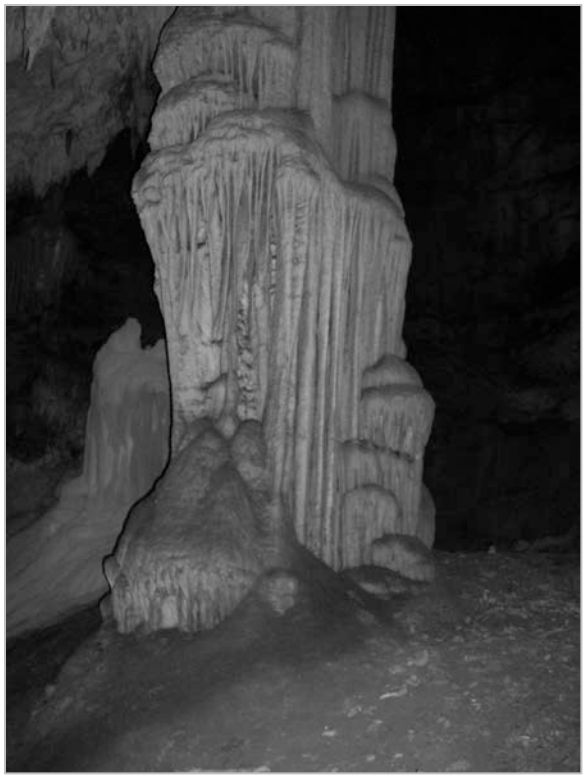

Figure 5. The speleothem column located in upper part of Operation V has a leveled platform visible in the right hand side of the photo. The complex was a focus of activity in Operations V as indicated by the artifacts, ceramics and human remains scattered at the base.

this area were private or at least semi-private. Nevertheless, the depression, designated Lot 1, contains the heaviest concentration of human bone found in the cave (Figure 7).

Discussion and Conclusions

The distinction between public and private space has been employed in a number of caves. The concept of private space has been particularly useful in calling attention the social implications of restricted space. The implications of the creation of public space in caves have not received the same attention. While broad, level spaces can occur naturally, such as with the broad alluvial floor in the entrance chamber at Naj Tunich, more often they are constructed. At Naj Tunich, for instance, the natural alluvial floor forms a basal level above which the heavily modified two tiered balcony rises. These spaces are important archaeologically because the heaviest artifact density and the bulk of the polychrome pottery were associated with this area of Naj Tunich.

Construction is an important aspect of public space because in many cases the modifications would have required the recruitment of labor on a large scale. This should immediately alert archaeologists to the possibility that the site had been appropriated by a polity. At Midnight Terror Cave, the plazas in both Operations IV and VII are clearly on the scale that bespeaks appropriation on the level of the polity. The formality of the layout is important in allowing us to document with a high degree of precision the larger plan of the modifications so that the intent of the modifications becomes clear. At its most basic, the system was designed to move people from the point where they stepped onto the floor of the cave to the artificially leveled plaza in Operation IV. Judging from the amount of broken ceramic and other artifacts collected here, it appears that this was the first stop on the circuit. From here, visitors moved along the path already described to the large plaza at the back of the cave where they paused once again at Operation VII. Finally the pathway took them down to Operation V. After these stops were completed, the pathways led visitors back out of cave.

The formality of the pathways is critical in allowing us to document an actual ritual circuit within the cave. While ritual circuits have been reported ethnographically (Vogt 1961, 1969), they generally involve the movement between a series of sites rather than the movement within a site. The evidence suggests that visits to Midnight Terror Cave involved a series of rituals. Furthermore, an examination of the artifact assemblages in the front of the cave (Operation IV), at the great plaza (Operation VII), and the lower chamber (Operation V) suggests that these rituals differed from each other. The heavy concentration of ceramics associated with the plaza in Operation IV suggests that rituals involved the burning of incense and perhaps the offering of food. Rituals in Operation VII also emphasize similar offerings. It appears, however, that many of the rituals in Operation V involved human sacrifice and there are only minimal amounts of ceramics. Here, as elsewhere in the cave, the deposit of

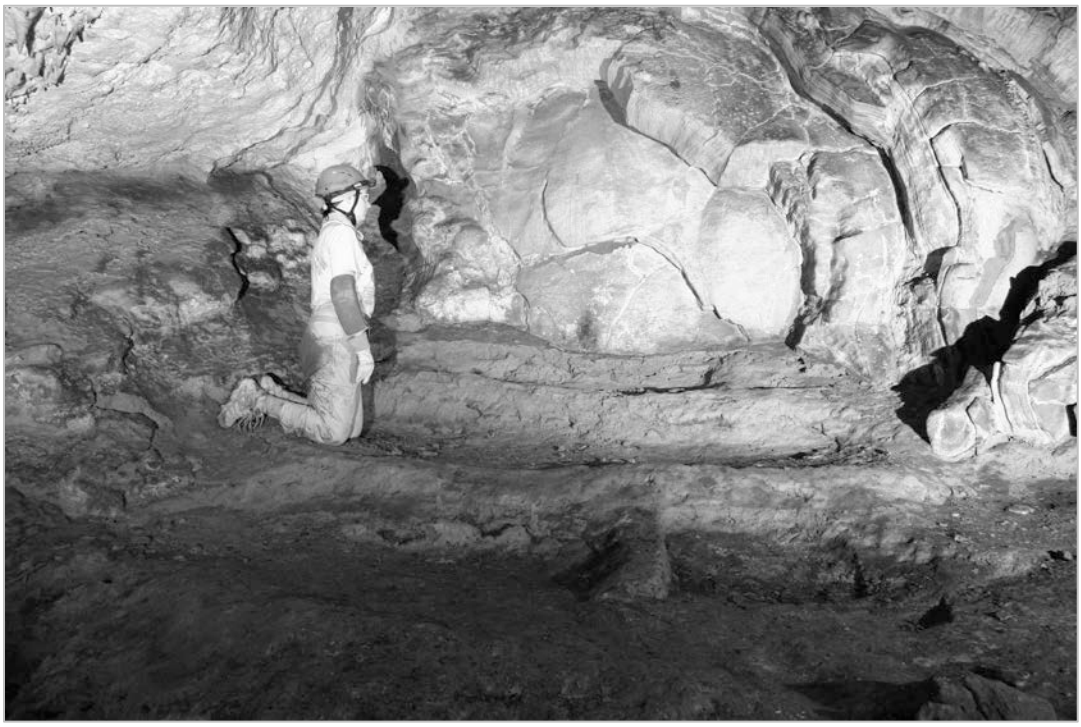

Figure 6. View of the smaller terraces at the lower end of Operation V.

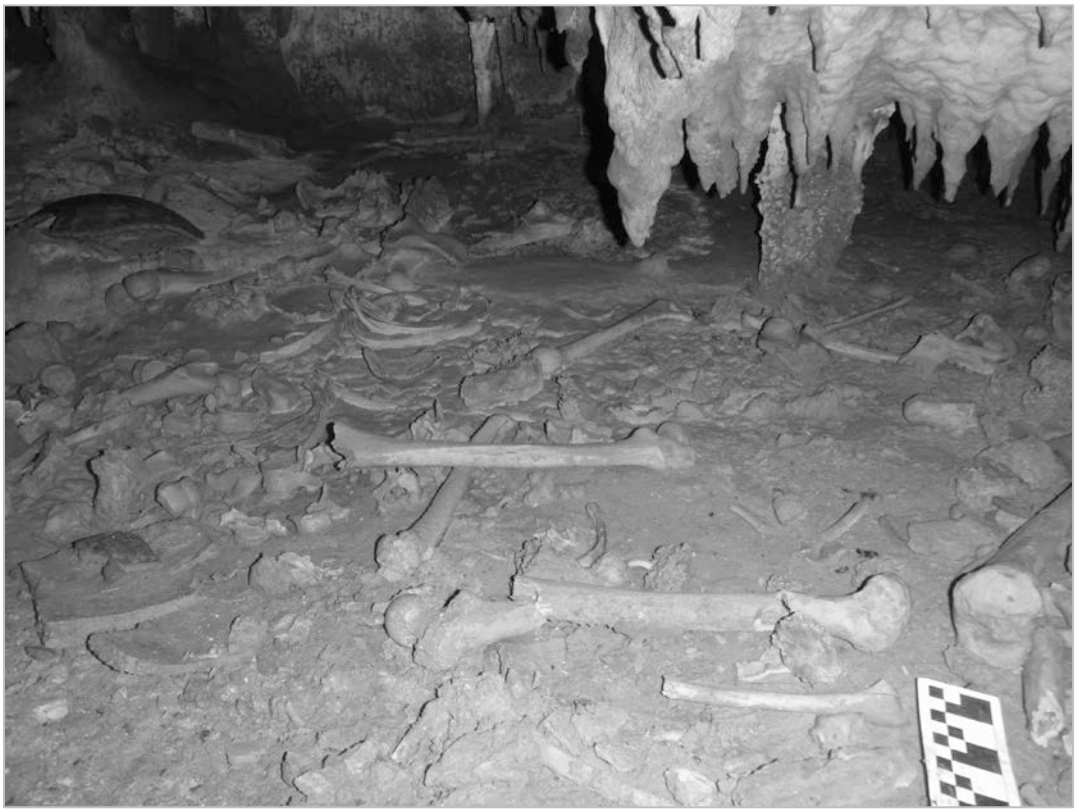

Figure 7. Part of the commingled deposit of human remains located in Lot 1 of Operation V.

skeletal material is locate in the dark zone in a watery context. The bones also contain numerous indications of sacrifice, including: prone body positioning, perimortem cut marks and blunt force trauma, use of blue pigment, and lack of grave goods. The bone associated with the first two areas in Operation V would appear to represent human sacrifice as a public ritual. There are several possible interpretations of the bone in the final chamber. In some cases, the bone appears to be a secondary placement, perhaps as part of the well documented practice of cleaning an area of debris left from a previous ceremony before beginning a new one. In that case the bone in the final chamber would also be associated with public sacrifice in the larger chamber. Evidence for articulated bones has also been found. This may mean that articulated bodies were disposed of in the final chamber or that the actual sacrifice occurred there which would make the sacrifice a private act. Scott (2009) documents a similar behavior during a modern Maya ritual conducted in a public place. During the ceremony, the ritual specialist went off to a private place to sacrifice a chicken and dispose of the body before returning to the group.

This is not the first proposal of a ritual circuit in a cave. Moyes (2005) used GIS within the main chamber at Actun Tunichil Muknal to lay out a ritual circuit. Hints of elaborate types of rituals were also found in the Cueva de Sangre at Dos Pilas where the ceramic analysis found pieces of individual vessels being deposited in widely separated lots (Urquizú 1997). Additionally, the junior author documented a ritual circuit involving numerous caves in a barranca at the site of Quen Santo (Kieffer 2009). Finally, Garza collected evidence for the movement between three different altars in contemporary rituals at the Yalan Na' in Santa Eulalia (Brady and Garza 2009). What is interesting is that a map drawn in 1800 when authorities entered and removed "idols" from the cave showed 13 different points on the map, at least seven of which were associated with altars. This suggests that an even more elaborate system existed in the past which has eroded due to outside persecution.

The circuit discussed above for Midnight Terror Cave was certainly more complex than we have outlined here. Scott (2009) note that a universal feature of contemporary Maya folk rituals is the initial invocations asking for permission to enter and present the petitions. A logical place for this to have occurred was on the still unexplored platform at the entrance to the cave. Several altars have also been noted along the route for climbing down to the floor of the cave which may have represented additional stops. In addition, Eden Chavez (2009) and Idi Okilo (2009) have discussed the archaeological evidence for the utilization of restricted spaces for private rituals in close proximity to the Midnight Terror Cave's pathways. We suspect that the movement between public and private space may have been a common feature of ancient ritual which provides a much more complex picture than the simple three stop circuit that we have outlined. Nevertheless, the circuit would have formed the frame around which that elaboration would have been developed.

In light of the above considerations, cave archaeologists should expect that ritual was highly elaborated during the Classic Period at elite caves such as Midnight Terror Cave where such matters were in the hands of a full time priesthood. As Inomata (2006:810) notes, "Theatrical performances in Classic Maya society most likely took place in various spatial contexts, including small residential complexes and sacred locations outside of centers such as caves." Where we have reservations with Inomata's characterization is in his contrasting of rituals in caves with rituals in centers based on scale. Clearly he sees rituals in centers as different in his statement, "Yet many of the mass spectacles involving a large audience were probably held in plazas—large open spaces surrounded by temples and other symbolically charged buildings that marked the core of every Maya city" (Inomata 2006:810). What we are emphasizing in our discussion of public ritual is that caves in many cases were the scenes of precisely such mass spectacles. The entrance chambers of both Naj Tunich and the Cueva de las Pinturas (Brady et al. 1998) are comparable in size to a central plaza while being far more "symbolically charged" than any site core.

Although the public spaces in Midnight Terror Cave were not as large as most plazas at

surface sites, they could nevertheless have accommodated several hundred people. The theatrical layout of space in Midnight Terror Cave is easily appreciated by anyone who has visited the cave. After performing rituals in the two constructed plazas, the Maya would have descended to the deepest and wettest part of the cave where rituals of the greatest gravity – the taking of a human life – were performed.

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XX RECENT RESULTS OF SETTLEMENT SURVEY AND HINTERLAND HOUSEHOLD EXCAVATIONS AT THE CLASSIC PERIOD SITE OF UXBENKÁ, TOLEDO DISTRICT, BELIZE

Ethan K. Kalosky and Keith M. Prufer

In 2008, the Uxbenká Archaeological Project (UAP) initiated an extensive survey program to identify and document the remains of residential domiciles associated with occupation of the Classic Period (ca AD 250-900) Maya center of Uxbenká located in the Toledo District of Belize. Several field seasons of survey and household excavations are shedding light on the nature of the Uxbenká settlement system. In this paper, we present the results of our ongoing survey, along with the questions and hypotheses that are guiding our research.

Introduction

In 2008, the Uxbenká Archaeological Project (UAP) initiated a survey program to identify and document the distribution of residential domiciles associated with the Classic Period (ca. AD 250-900) Maya polity of Uxbenká, located in the Toledo District of southern Belize (Figure 1). In this paper, we present an updated synthesis of our ongoing work, along with preliminary observations about the Uxbenká settlement system, and some hypotheses that we intend to explore and test through future fieldwork.

The site of Uxbenká was first identified by Hammond in the 1970s as part of his regional survey of southern Belize (Hammond 1975). While Hammond made some general observations about the site, no detailed maps were produced and no excavations were undertaken. In the early 1990s, Richard Leventhal returned to Uxbenká to conduct preliminary excavation in the site core (Leventhal 1990, 1992). His work primarily focused on the stela plaza, also known as Group A. These excavations, along with the decipherment of hieroglyphic texts preserved on the stela, aided in situating Uxbenká within broader sociopolitical and economic developments throughout the Classic Period Lowlands.

In 2006, Drs. Keith Prufer, Andy Kindon, and Phil Wanyerka returned to Uxbenká to expand on the preliminary work initiated by Leventhal. Their work focused on more detailed mapping of the site core (Groups A, B, C, D, E, F, G, K, and L) and test excavations in the Stela Plaza (Group A), and nearby settlements to develop a higher resolution chronology of Uxbenká's initial founding, growth, and abandonment (Prufer 2007, 2008). These investigations, along with those of several other members of the UAP, have demonstrated that Uxbenká was the earliest and longest occupied site in southern Belize, with evidence of buried soils containing cultural materials dating to the Middle Preclassic (Culleton 2009, 2010; Kalosky and Prufer 2010). Ongoing work has also revealed that architectural components in the Uxbenká site core experienced periodic episodes of reorganization throughout its Classic Period history, including substantial modifications to the natural landscape and restructuring of civic-ceremonial architecture and the built environment (Prufer et al. 2011).

Survey Methodology and Results

In 2008, we initiated an extensive survey program to identify and document the household remains of Uxbenká's rural populous. Our survey methodology is largely opportunistic. Each year Mopan Maya farmers from the nearby village of Santa Cruz slash and burn tracts of land for the planting of their annual *milpas*. In doing so, they remove the dense vegetation that is often problematic for surveying in a subtropical environment. This provides us with an opportunity to explore previously unexamined portions of the landscape with great ease and ample surface visibility, facilitating the identification of ancient house mounds and surface collection of their associated artifacts. Furthermore, the farmers of Santa Cruz rotate their fields each year, leaving older tracts fallow, and exposing new portions of the landscape.

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Figure 1. Location of Uxbenká.

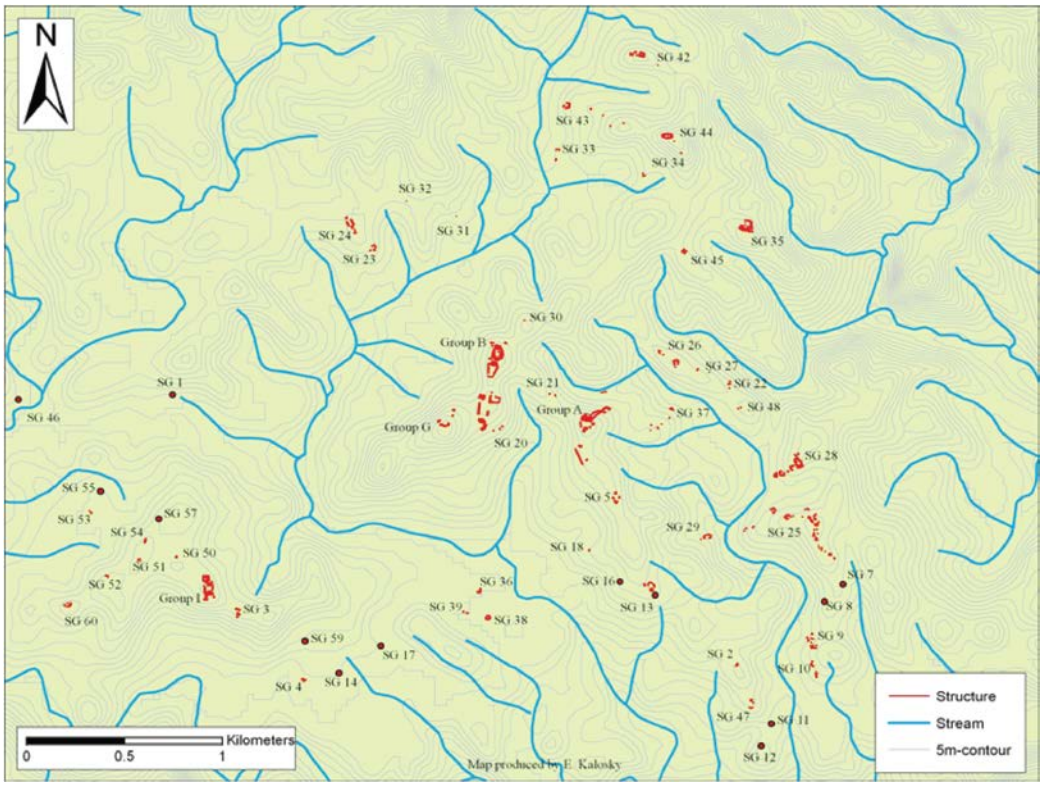

Figure 2. Distribution of all Settlement Groups identified at Uxbenká by the end of the 2011 UAP field season.

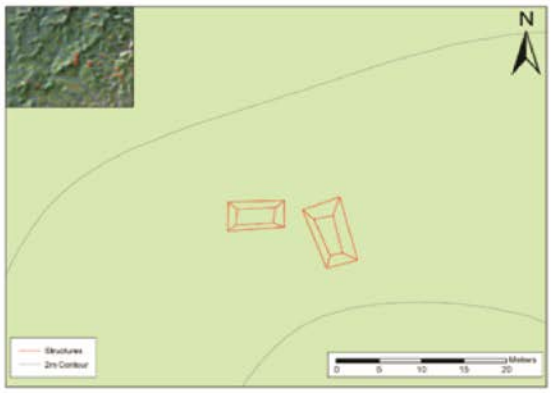

Figure 3a: SG-52 - a Type 2 Settlement Group.

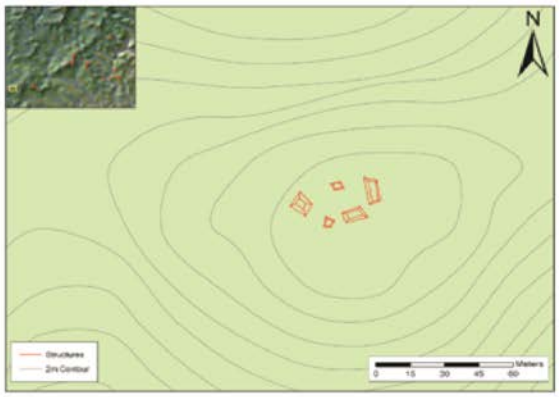

Figure 3b: SG-60 - a Type 3 Settlement Group

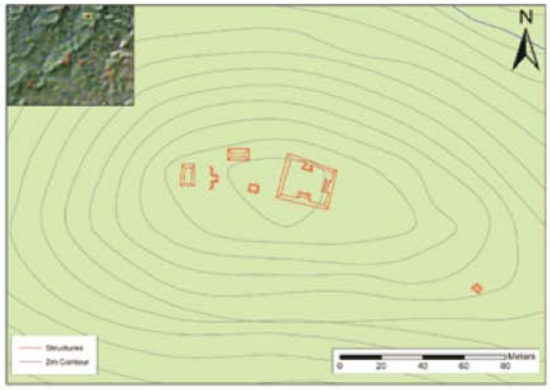

Figure 3c: SG-42 - a Type 4 Settlement Group

Figure 3d: SG-28 - a Type 5 Settlement Group

Our survey attempts to target as many of these areas as possible in a given field season. Employing this methodology, we had identified over 450 structures distributed within 57 household groups by the end of the 2011 field season (Figure 2). In conjunction with ongoing survey, we have shifted the primary focus of excavations away from the site core to rural mound groups. This paper focuses on the results of our ongoing analysis of Uxbenká's settlement system.

One of the first observations we have made is that there is substantial diversity between the settlement groups we've identified across the landscape. These range from single isolated mounds, to groups containing 2-3 structures with no formal arrangement, to small groups of structures arranged around open spaces, to more formal groups containing raised platforms with multiple structures and multiple plaza spaces (Figures 3a-3d). These observations have allowed us to construct a *preliminary* and *tentative* typology of Uxbenká's settlement groups. (We emphasize the words "preliminary" and "tentative", since the results of future survey and household excavations are likely to reveal inconsistencies that will require further refining this typology.) We have organized our preliminary typology into 5 types, based on similar typologies used elsewhere in the Lowlands (Ashmore 1995; Robin et al. 2004, Webster 1999). The proposed typology does not include the architectural components of the Uxbenká site core, as it is meant to only reflect the range of architectural variability seen in the hinterlands of the site. We are also working off the assumption that these different Types represent functional and/or status differences between hinterland households.

Type 1 groups consist of single isolated structures. These may represent the remains of residential domiciles, or may be field houses such as corn huts. Type 2 Groups feature 2-3 structures without any apparent formal

arrangement (Figure 3a). These likely represent the residential structures and ancillary buildings of a single nuclear family (Ashmore 1981). Type 3 groups consist of 4-7 structures typically arranged to form an open plaza space (Figure 3b). Again, these probably represent the remains of a domestic compound for a single nuclear family. However, the greater number of buildings and the formality of arrangement may be indicative of greater access to wealth in the form of labor. Type 4 Groups feature 7-9 structures arranged upon raised platforms, or situated on hilltops with faced stone slopes that would have visually enhanced the apparent size of a settlement group (Figure 3c). Likely, these represent the remains of one or more nuclear households. Type 5 groups feature over 10 structures arranged into two or more plazas (Figure 3d). The structures themselves possess features such as double platform mounds, superstructures, walls, etc. These groups likely expanded over time as descendant kin built new family compounds in close proximity to their progenators. Additionally, these reflect the most substantial labor investment, particularly raised platforms, double platforms, and masonry superstructures. Consequently, we feel that Type 5 groups exhibit the greatest degree of status and wealth evident among hinterland settlement groups at Uxbenká.

Employing this typology, we have identified five Type 1 Groups at Uxbenká, ten Type 2 Groups, sixteen Type 3 Groups, four Type 4 Groups, and four Type 5 Groups at Uxbenká (Figure 4). The distribution is fairly normal, though slightly skewed to the right. Perhaps not surprisingly, Type 3 Groups, those featuring small plazuela style arrangements, dominate the distribution. (Groups not fully surveyed, as well as groups identified in the 2011 field season, are not included in this distribution.)

Figure 5 shows the distribution of the settlement group types we have thus far identified at Uxbenká. Note how the distribution of Type 2 and Type 3 Groups is fairly ubiquitous across the surveyed landscape, whereas Type 4 and Type 5 groups primarily occur north and east of the site core. Interestingly, this area represents a divide between two watersheds. Based on this observation, we intend to explore the hypothesis that this area served as a strategic location, and may have provided households with a greater access to control of water resources, and therefore greater access to wealth and status.

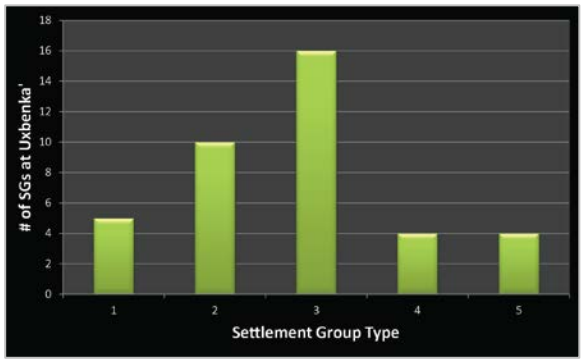

Figure 4. Frequency distribution of Settlement Groups by Type

Research Questions And Theoretical Framework

The observations made from the UAP settlement survey, and the distribution of settlement types across the landscape, have raised several questions that continue to guide our research at this site. First, and most generally: What factors influenced household decisions regarding where to settle on the landscape, and what impact did those decisions have on the emergence of status differentiation between households? Second: How did demographic expansion and infilling of the landscape affect settlement decisions. In other words, what is the temporal variation in settlement patterning at Uxbenká. Third: Why did people choose to settle on some areas and not others? In other words, why are some areas more attractive for settlement than others? And last: did access to and control over higher valued portions of the landscape allow households to acquire greater status and wealth?

These questions will be approached under the theoretical framework of Human Behavioral Ecology (HBE), which seeks to understand human behavioral adaptations in the context of environmental constraints and changing social circumstances (Winterhalder and Smith 2000). HBE focuses on behavioral patterns as they are manifested in the decisions made by individuals, households, and cooperative groups such as

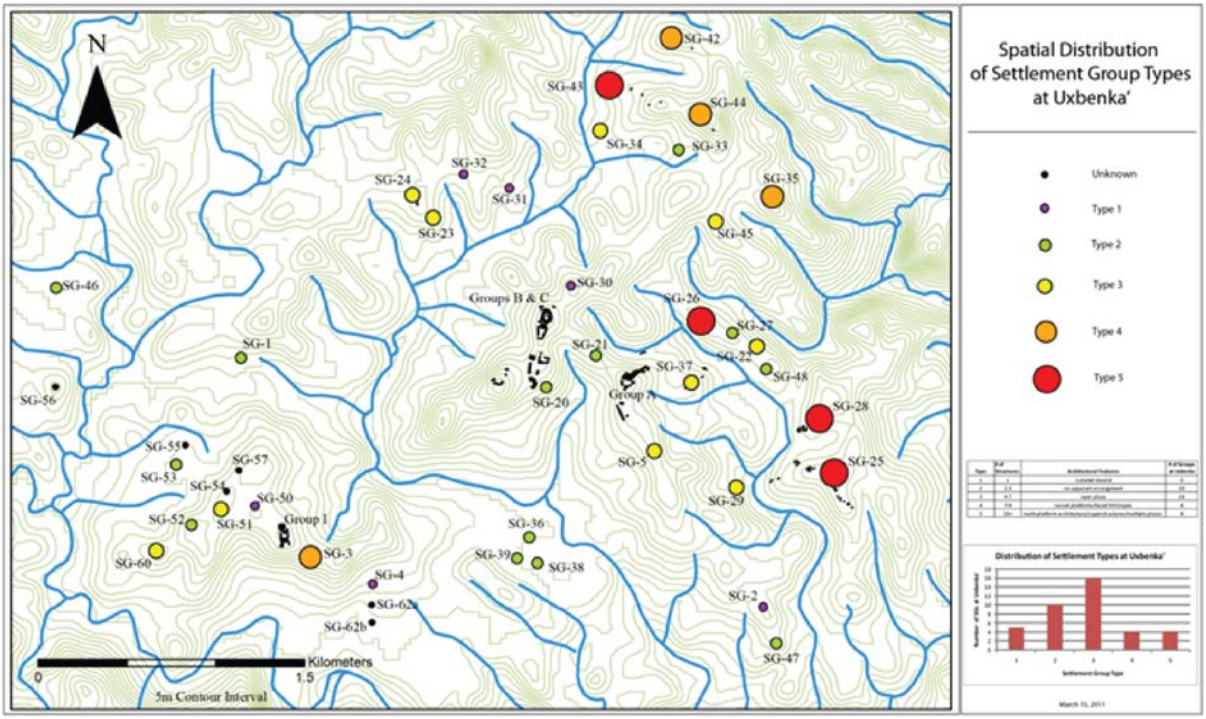

Figure 5. Horizontal distribution of Settlement Groups by Type

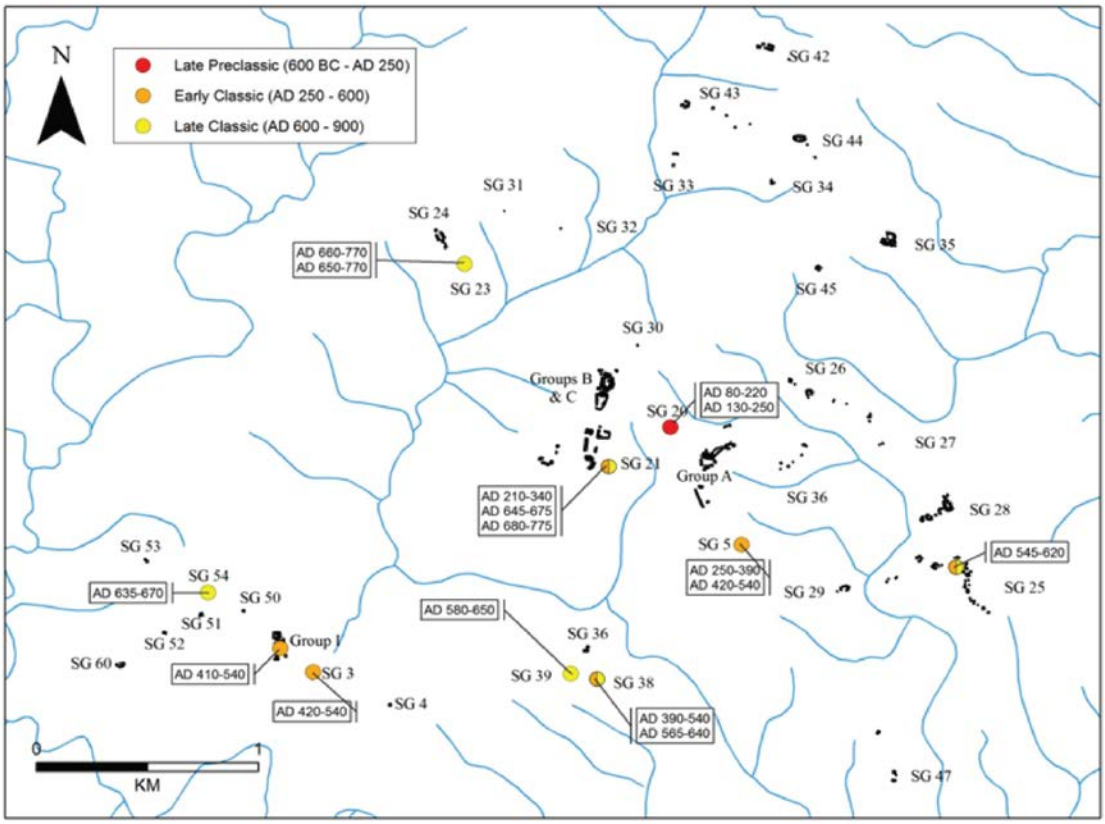

Figure 6. Known 2σ AMS date ranges for Settlement Groups (calibrated in OxCal)

extended kin. As such, this framework is well-suited to a study which examines changes in spatial patterning and social organization that result from household-level decision making structures.

In particular, this study will employ parameters outlined under the Ideal Free and Ideal Despotic Distribution models to examine a set of ecological and social variables that may have influenced the decisions made by ancient Maya households regarding where to settle on the landscape. Under a specific set of assumptions, these models allow for a more detailed understanding of decision-making structures and their concomitant influence on changes in societal organization, such as the emergence of status differentiation between household groups.

Adapted from studies of population ecology (Fretwell and Lucas 1970; Sutherland 1996), these behavioral models allow for the formulation of empirically testable hypotheses within the archaeological record. At its most basic level, the IFD model states that when colonizing groups establish themselves on a previously unoccupied landscape, they initially settle within the most suitable resource zones. Suitability may be defined according to ecologically defined parameters (e.g., agricultural productivity or access to natural resources) and/or socially perceived values (distance from other groups). Over time, as the most favorable portions of the landscape are occupied, demographic growth forces newer households to settle in less suitable areas. Importantly, the model possesses a "despotic" variant (the IDD) which allows households to limit access to resource zones through defense or some other means of social control. This results in the establishment of incipient dominance hierarchies between the occupants of different zones, which in turn can manifest as wealth inequalities between households (Kennett and Winterhalder 2008; Boone 1992). The despotic variant is well-suited to kin-based systems such as that of the ancient Maya (Gillespie 2000; McAnany 1995; Robin 2001), where related individuals and households favor each other over non-kin. Archaeologists have employed the IFD and IDD to examine changes in social organization within hunter-gatherer-forager and middle-range societies (Kennett et al. 2006, 2007, 2009; Kennett and Winterhalder 2008; Winterhalder et al. 2010). These models, however, have not yet been applied to examine the influence of specific variables on settlement location and social inequalities in sedentary agrarian systems.

Uxbenká is an ideal site to undertake this study for several reasons. First of all, the region in is geophysically circumscribed, meaning that the areas suitable for human habitation and agricultural production are limited. Secondly, Uxbenká is the earliest and longest continuously occupied site in the Southern Belize, and is situated along the periphery of Lowland Maya interaction spheres. Lastly, its sociopolitical relationships with other larger sites are not well understood, and southern Belize in general is one of the most poorly studied regions throughout the Maya Lowlands. Research in this area is likely to produce a better understanding of how polities in the region were situated relative to broader social trends that existed during the Classic period.

Variables

We propose to examine several variables in order to address our proposed research questions. The first of these is soil quality. Soil quality was (and still is) an important consideration, especially in terms of its affects on agricultural productivity, likely a key concern of ancient Maya farmers who comprised the majority of household groups.

We have defined three soil classes across the Uxbenká landscape based on indigenous soil taxonomy. *Box Lum* (black soil) is considered to be the most productive soil for agriculture; *K'un Lum* (yellow soil) is considered to be secondary to *Box Lum* in terms of soil quality; and *Chic Lum* (red soil) is considered the least desirable soil for farming. These soils are derived from localized parent material consisting of interbedded sandstones and mudstones known as the Toledo Beds.

The next variable we will examine is defensibility and/or accessibility: the defensibility or accessibility of certain locations may have made them more favored than other locations. For instance, elevation has been recognized as being an important consideration

in Maya settlement locations, with hilltop locations being favored over slopes and bottom lands. This is certainly the pattern we are seeing so far at Uxbenká. Other factors could involve slope, aspect, and view-shed over the landscape – either in terms of general visibility, and maybe even visibility towards ideologically significant portions of the landscape, such as the civic ceremonial complexes in the site core. It is important to recognize, however, that there may have been trade-offs between these different sub-variables. For instance, a hilltop of higher elevation, but with steeper slopes, may have been *less* favorable than hilltops of lower elevation, with shallower slopes, since steeper slope would require greater energetic expenditure in daily activities. Along with that, distance to the architectural complexes in the site core may also have been a consideration – as well as distance to or from other kin groups living on the landscape.

The variable that we think may have been the *most* influential in terms of settlement location is distance to permanent water. Annually, Belize experiences both a wet "monsoon" season and a dry season. In southern Belize, the dry season extends approximately from November through April. At this time, rainfall becomes infrequent and unpredictable. Ephemeral streams dry up, and fresh water becomes scarce. Settlement locations close to permanent water sources clearly would be advantageous during the dry season. We are therefore interested in identifying permanent water sources and their spatial relationships to settlements of varying size and complexity at Uxbenká.

By examining all of these variables across locations that were settled at different points in Uxbenká's history, we will develop an index for the comparative influence of each variable at any particular settlement location to explore if and how these variables impacted where household groups settled over time at Uxbenká.

Household Excavations

Excavations have been conducted in 32 of the 57 settlement groups we have thus far identified. There are several goals behind these excavations. First, we aim to identify functional differences between structures within household groups. For this, we are primarily relying upon distributions of artifact types. Second, we are using these excavations to examine artifactual and architectural differences within and between settlement groups that may provide some indication of differential access to status and wealth. Lastly, we are striving to recover carbonized organic remains from reliable context to use in AMS radiocarbon dating.

Figure 6 depicts the AMS date ranges we have thus far acquired from settlement excavations conducted during 2007-2010. In addition to these, we have several samples from other settlement groups that have not yet been submitted from analysis. Unfortunately, in some cases we have not been able to acquire reliable samples, as structures are too shallow and ephemeral to provide the sealed contexts that are most ideal for extracting datable materials. However, reliable samples were recovered from all 8 settlement groups that were excavated during the 2011 field season. Furthermore, several samples were retrieved from stratigraphically distinct contexts in each of these groups, which will allow us to phase-model depositional events, thereby constraining the AMS date-ranges we acquire. Currently, the AMS sample we have for Uxbenká's settlement system is still too small to generate a robust model of growth and/or decline over time, but we are confident that after this past season, we will have a large enough sample size to begin generating preliminary hypotheses about Uxbenká's settlement chronology.

C'ux Lin Ha'

Earlier, we mentioned that water was one of the variables we feel may have most critically impacted settlement decisions. UAP field seasons typically bracket the transition from dry season to wet season conditions. One observation we have noted is that (not surprisingly) during the dry season most of the streams across landscape surrounding Uxbenká are dry. Obviously coping with a paucity of water during the dry season is an issue that the Classic Maya had to deal with. And we know from well-documented investigations and specific case studies that the Maya dealt with this issue successfully for a number of generations (Adams 1980; Dunning 1992;

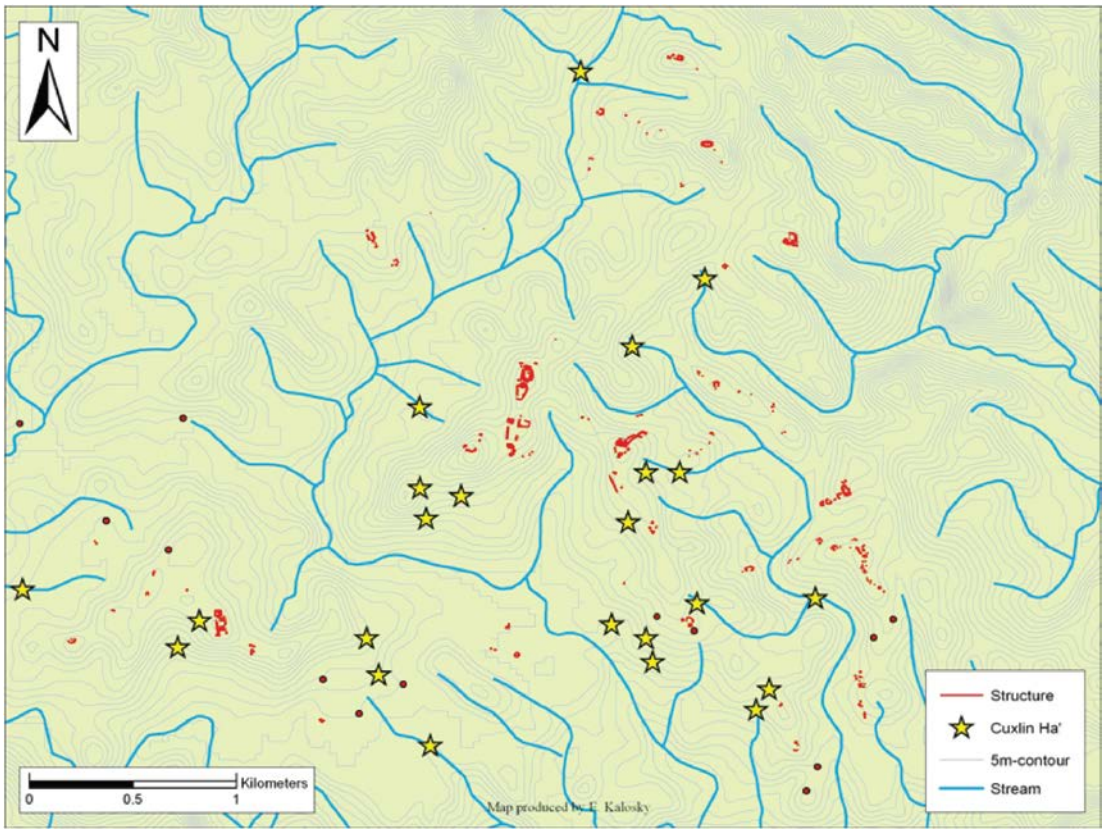

Figure 7. Horizontal distribution of all *c'ux lin ha'* identified by the end of the 2011 UAP field season.

Figure 8. Culturally constructed prehistoric *c'ux lin ha'*.

McAnany 1990; Scarborough 1996; Scarborough et al. 1995).

At Uxbenká, we have no reservoirs, nor have we identified any *aguadas* or *bajos* or other similar features that are frequently found in other parts of Belize. (We are also confident that if such features existed at Uxbenká, they would have been identified during survey.) We have, however, identified a number of perennial streams that have water flowing intermittently along their courses during the dry season, and are exploring the hypothesis that locations along these streams may have been favored areas for settlement. More importantly, however, we have identified what the Mopan Maya of Santa Cruz refer to as *c'ux lin ha'*, which roughly translates to "living water". Many of these are natural seeps where the local topography intersects the water table. The local Maya have informed us that the *Cuxlin Ha* never run dry, even during the hardest and longest droughts. As such, the presence of these features on the Classic Period landscape of Uxbenká was likely

an important consideration among households regarding where to settle.

A portion of the 2011 survey involved identifying and documenting the *c'ux lin ha'* so that we can examine the distribution of settlement relative to these features. Our survey of the *c'ux lin ha'*is by no means complete yet, as we have only identified 23 *c'ux lin ha'*, and most of these are located close to the village of Santa Cruz (Figure 7). This is basically a result of sampling bias. Most of the *c'ux lin ha'* we have identified are close to the village, because people are more familiar with these ones and continue to use them today as sources of fresh water. Future survey will continue to identify other *c'ux lin ha'* farther from the village and farther from the site core to more accurately document their distribution across the landscape.

Interestingly, not all of the *c'ux lin ha'* we have identified are natural. Some of these seeps are culturally-constructed holes excavated into the mudstone bedrock. The largest of these measures 85 cm across and is over a meter deep (roughly the size of a 55 gallon drum) (Figure 8). So far we have only identified three culturally-constructed *c'ux lin ha'*, and still need to examine the hilltops near two of these features to determine if there are nearby settlements associated with them.

In our opinion, the most interesting of the culturally constructed *c'ux lin ha'* is located 135 m South of the Group A Stela Plaza. It measures 90 cm in diameter, 20 cm deep, and holds approximately 24 gallons of water (Figure 9). From this seep, water flows downstream from west to east. What is most interesting about this feature, however, are other prehistoric cultural modifications made to it. Above the well, along the north bank of the drainage, we identified a largely intact wall extending approximately 5 m downstream from the well. Flat paving stones extend outward from the base of the wall and bank, into the drainage (Figure 10). A similar wall exists on the opposite side of the drainage as well, but all that is left of it is a linear arrangement of stones 2-3 courses tall. More rocks may be found several meters downstream in the main channel of the drainage, suggesting that the majority of this feature has been destroyed by post-abandonment water

Figure 9. *C'ux lin ha'* located approximately 150 m South of Group A (Stela Plaza).

Figure 10. Water impoundment feature / wall associated with Group A *c'ux lin ha'*.

movement. It seems likely that a third wall ran perpendicular to the two walled banks, creating a large water impoundment feature whose use was restricted to the elite occupants of the site core. Furthermore, this feature may have served some currently unidentified ritual function associated with activities in the Stela Plaza.

Regardless of its specific function, the presence of this *c'ux lin ha'* demonstrates two things. First, that the occupants of Uxbenká did, in fact, construct water management features. And second, that nearly 1300 years of erosion, bioturbation, and water movement have left little intact of these features. Other water management features, such as a check dam and a another impoundment feature, have been identified elsewhere at Uxbenká in association with rural settlements (Culleton 2011). Future survey will continue to seek evidence for similar features elsewhere at Uxbenká.

The identification of *c'ux lin ha'* and other water management features at Uxbenká was an unexpected but fortuitous event. Their presence in some locations (and their absence in others) will aid in exploring how access to permanent water may have influenced settlement decisions. Furthermore, such features also aid in generating hypotheses about cooperation, collective action, and systems of management, as the construction and maintenance of these features may have required labor organization above the household level.

Conclusion

Untangling the intricacies of Uxbenká's settlement system has been and continues to be a slow process fraught with difficulties. Many of these difficulties are simply the result of the physical, environmental, and temporal constraints of working in a challenging environment whose ecology and climate are less than ideal for preserving the archaeological record. However, through persistence and perseverance, we have begun to tease out some patterns that were previously unrecognizable. But for each question answered, several new questions emerge.

That being said, we look forward to continuing our work on this unique site, and exploring our hypotheses in greater detail with the added vigor that comes with new discoveries and new possibilities. As the community of archaeological research in Belize expands, it is our hope that we can continue to contribute and integrate our investigations with others in the region, and in the nation as a whole, so that we may all benefit from the hard work and passion that we share for Belizean archaeology.

Acknowledgements: We would like to thank the Belize Institute of Archaeology and all members, past and present, of the UAP for their contributions to this project. We would also like to thank the Uch'Benka K'in Ajaw Association and the village of Santa Cruz for their ongoing assistance and cooperation. Many thanks to Don Owen-Lewis and Bruno Kuppinger who generously provided us with lodgings and other accommodations. We greatly appreciate the Bardalez family and Amelia and Andy Johnston for their continued friendship and for making Big Falls a home away from home. Lastly, financial support for the UAP was made possible through the National Science Foundation and the Alphawood Foundation.

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XX CONSTRUCTING AND USING A GIS FOR FIELDWORK: THE UNDERWATER MAYA PROJECT

Heather McKillop

The Underwater Maya case study argues for use of a GIS from the inception of field research instead of creating a GIS and entering data ex post facto. Before fieldwork, a GIS, Underwater Maya, was created to house the spatial data from the discovery and mapping of wooden architecture at underwater sites in Paynes Creek National Park, southern Belize. Maps, air photos, and satellite imagery in the GIS placed the archaeological finds in the real world. Sites, wooden posts, and artifacts marked by flags at the underwater sites were mapped using a Total Station. The spatial data were downloaded to a laptop and converted to Excel spreadsheets, which were attached to the project GIS using the coordinates of each find. The creation of the "Underwater Maya" GIS, methods for entering spatial data and manipulating the data are described, along with results provide a case study using of the major GIS software. Procedures are given for Geomedia 6.1 by Intergraph, but the general methodology will be similar for other GIS software.

Introduction

The Underwater Maya project on submerged ancient salt works in Paynes Creek National Park, Belize provides a case study of the merits of integrating GIS into research when field research begins. A GIS, Underwater Maya, was created on a laptop to house all of the data from the discovery and mapping of wooden architecture and associated artifacts. Artifacts and posts are mapped using a total station, which provides x, y, z coordinates. The digital data are downloaded to a laptop, converted to UTM coordinates, and linked to the GIS. The GIS automatically updates spatial data added to existing attached excel spreadsheets, which is useful for entering information on the dimensions of building posts, the types of ceramics, and other descriptive data. Using the GIS during field research allows us to visualize patterns, search for missing data, and ask new questions about spatial relationships. Printed site maps from the GIS are useful in examining the patterns of posts and searching for additional posts during fieldwork.

The peat bog below the sea floor provides outstanding preservation of wooden architecture radiocarbon dated to the Early and Late Classic periods (A.D. 300-900). The buildings were structures for the production of salt by evaporating brine in pots over fires. This activity took place indoors because of the significant infrastructure of production—storage space for wood fuel, pots, loose salt and salt cakes, and water jars of brine to evaporate. The short and unpredictable dry season in southern Belize adds to the need for indoor salt production.

The rise and fall of the Paynes Creek salt industry mirrors the population increase and decline of inland cities where salt—a basic biological necessity—was scarce. Diagnostic "unit-stamped" pottery water jars and figurine whistles tie the salt works to inland consumers in southern Belize and adjacent Guatemala—Lubaantun, Seibal, Altar de Sacrificios, and cities in the Petexbatun (McKillop 1995, 2002, 2005a, 2005b, 2007, 2009, 2010a, 2010b, 2011). The discovery of the wooden architecture, along with the only known ancient Maya wooden canoe paddle—at the K'ak' Naab' underwater site—was in 2004 (McKillop 2005a, 2007). Discovery and mapping of some 4000 wooden posts and piece-plotting of temporally distinctive artifacts was carried out between 2005 and 2009 (McKillop 2005a, 2007, 2009, 2010a, 2010b, 2011; Sills 2007; Sills and McKillop 2010; Somers 2007).

Creation of the Underwater Maya GIS

All archaeological material from the Underwater Maya project is recorded as spatial data in a Geographic Information System (GIS) using Geomedia 6.1. Three types of data are part of the GIS, including (1), raster images such as air photos, (2), vector images such as maps we draw using points, lines, and polygons, and (3), information in tables. The UTM (Universal Transverse Mercator) map projection is used for the GIS. A satellite image of Gulf of Honduras region imported to the GIS software and saved

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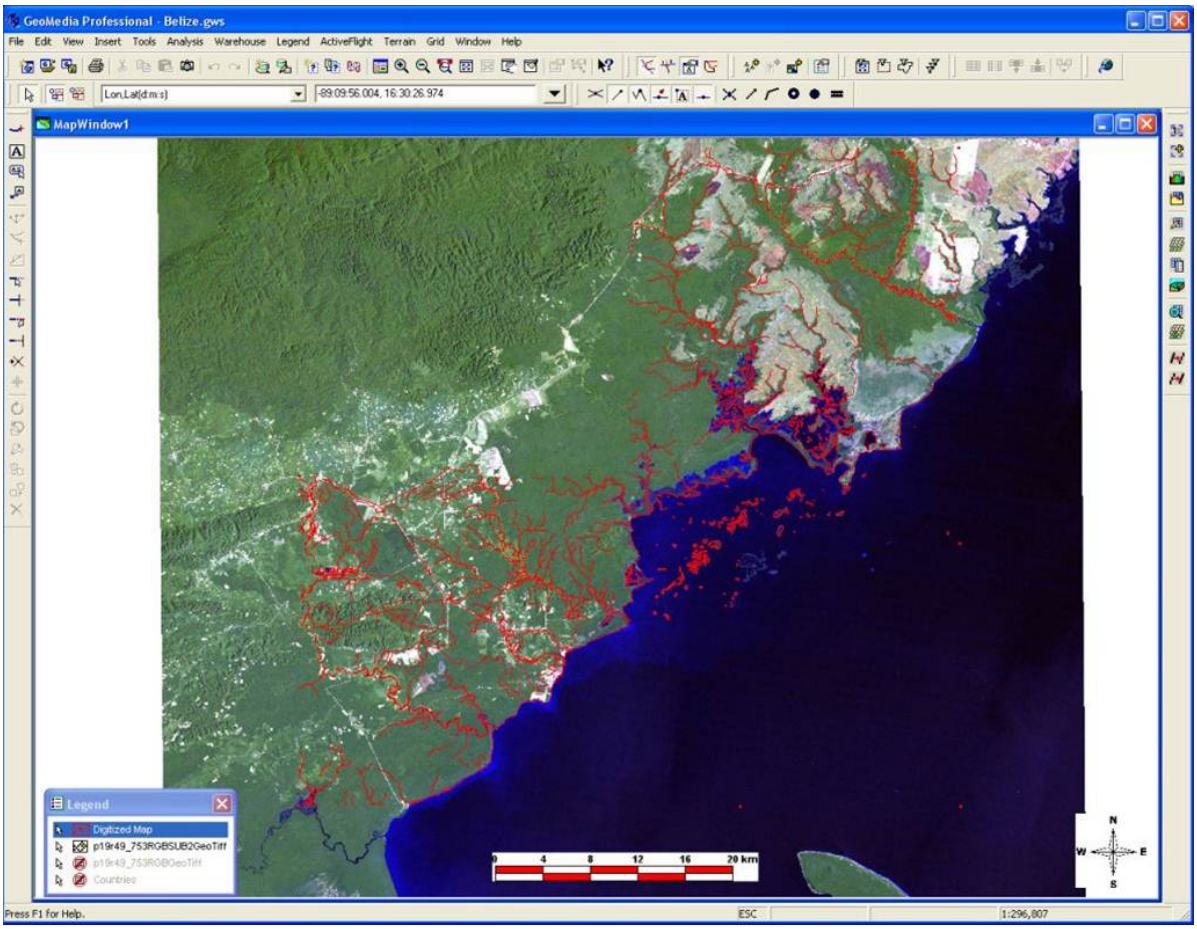


Figure 1. Satellite image of Gulf of Honduras used as a background for the Underwater Maya GIS for housing all spatial data from the archaeological research at the Paynes Creek salt works, Belize (Image courtesy Terrance Winemiller, Carnegie Explorer http://geomaps.aum.edu/).

with the UTM projection in the correct geographic zone--16 for southern Belize--forms the background for the mapped archaeological data (Figure 1). Additional images were scanned and attached to the GIS by "geo-referencing," in which common points were located on the scanned image and the satellite image. Several 1:50,000 scale topographic maps of Belize, as well as government air photos, were geo-referenced to the GIS. The images and maps provide a background that is useful at different scales of viewing because of the resolution of the images (number of pixels per square inch). Satellite imagery is useful at a large scale of the region. Air photos are useful at a medium scale of the lagoon system. Images from a low flying remotely operated plane taken during fieldwork provide the highest resolution for individual sites.

The 1:50,000 Scale topographic maps available for southern Belize that had been scanned and geo-referenced within the Underwater Maya GIS, were "digitized," by tracing the outlines of the shorelines, rivers, and cays with a computer mouse using the GIS software. The vector data are stored as a separate image. The GIS allows stored images to be turned "on" or "off" within the viewing legend, so that the line drawing map was visible on the satellite imagery, for example. When zooming in closer to the lagoon system, the satellite image is turned "off," leaving the vector map. Zooming in closer to individual sites, the vector map is turned off, leaving the site data mapped in the field.

Fieldwork: Discovery and Mapping of the Wooden Architecture

The shallow Punta Ycacos Lagoon system within Paynes Creek National Park is surveyed by a team of archaeologists systematically traversing back and forth across sites, using snorkels and masks on Research Flotation Devices (RFDs). The team travels shoulder to shoulder, marking each post and artifacts of interest by wire flags, or in deeper water, using fish floats tied to fishing line secured to the seafloor by wire. Flags are labeled using a Sharpie marker, with the post or artifact number for later mapping. Some 4000 wooden posts were discovered protruding from the seafloor where the mangrove peat had preserved the wood since the Classic period use of the Paynes Creek salt works. The posts are grouped into separate sites defined by clusters of posts and associated artifacts visible on the seafloor, with areas between sites devoid of visible posts and artifacts.

We create permanent datum makers by pouring cement into a one meter hole with a PVC pipe. To map artifacts, posts, and features underwater, the prism pole person holds the prism pole over the object, levels the pole, and calls on a walkie-talkie to the Total Station person at a datum marker (Figures 2 and 3).

A Topcon 7005 Total Station, with a built-in Windows screen data recorder, is used for mapping. A folder on the Total Station data recorder holds data for each site, with feature records for information on posts, artifacts, artifact boundaries, bathymetry, shoreline, and site markers. Each feature record includes the x, y, and z coordinate data for a named point (post, artifact, shoreline point), as well as any additional information (post diameter, for example) entered into the Total Station during mapping. New feature records are created as needed. The feature record template is copied to folders for new sites instead of recreating the data entry form. The maps are visible on the Windows screen of the total station, which is useful for ensuring mapped data are correctly placed or if there are gaps in coverage of mapped shorelines, for example. Viewing the map as it is created allows the fieldwork to be interactive, by suggesting places to search for additional posts, such as looking for a fourth

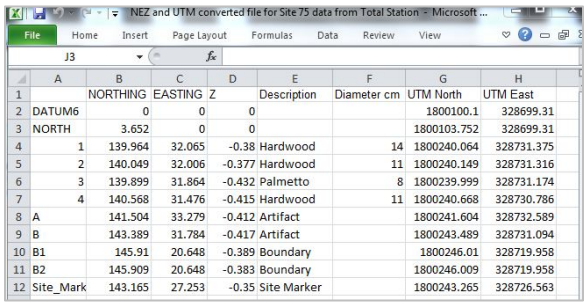
Figure 2. Total station mapping at a permanent datum in Paynes Creek National Park (Photo by H. McKillop).

Figure 3. Student holding a prism pole on a wooden post for mapping (Photo by H. McKillop).

Figure 4. Total Station files are downloaded to a laptop at the Village Farm base camp and transferred to Excel files for attaching to the Project GIS, Underwater Maya (photo by H. McKillop).

post to square off a mapped pattern of three posts.

In the evening at the Village Farm project base camp, the spatial data are downloaded to a laptop as an "NEZ" file, using the Topcon 7005 Total Station transfer that also allows us to convert the NEZ file to an Excel file (Figure 4). The UTM coordinates of the datum marker (obtained from a GPS) are entered into the Excel cells for the datum marker, allowing all mapped coordinates to be converted to UTM coordinates (Figure 5).



	A	B	C	D	E	F	G	H
1		NORTHING	EASTING	Z	Description	Diameter cm	UTM North	UTM East
2	DATUM6	0	0	0			1800100.1	328699.31
3	NORTH	3.652	0	0			1800103.752	328699.31
4	1	139.964	32.065	-0.38	Hardwood	14	1800240.064	328731.375
5	2	140.049	32.006	-0.377	Hardwood	11	1800240.149	328731.316
6	3	139.899	31.864	-0.432	Palmetto	8	1800239.999	328731.174
7	4	140.568	31.476	-0.415	Hardwood	11	1800240.668	328730.786
8	A	141.504	33.279	-0.412	Artifact		1800241.604	328732.589
9	B	143.389	31.784	-0.417	Artifact		1800243.489	328731.094
10	B1	145.91	20.648	-0.389	Boundary		1800246.01	328719.958
11	B2	145.909	20.648	-0.383	Boundary		1800246.009	328719.958
12	Site_Mark	143.165	27.253	-0.35	Site Marker		1800243.265	328726.563

Figure 5. The downloaded NEZ (northing, easting, zenith) data from the Total Station are converted to UTM coordinates in Excel.

The Excel file is then linked to the Underwater Maya GIS by following several steps. First a new Access file connection is created in "Warehouse" called "all post data original." In "View," the "Coordinate System" is selected to choose the same projection system (UTM) as the GIS (Figure 6).

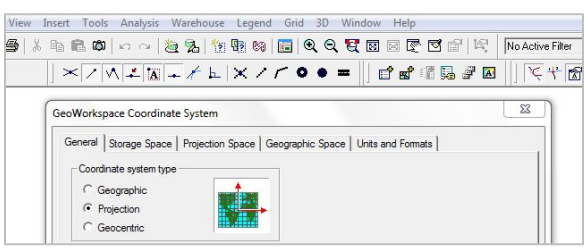


Figure 6. Setting the projection system of the map data as UTM to agree with projection of the GIS.

Under "Projection Space, "Universal Transverse Mercator" is selected under "Projection Algorithm" and under "Projection Parameters, "Northern Hemisphere," and "Zone 16" are selected. After clicking "OK," "Units and Formats" are selected on the "Geoworkspace Coordinate System" screen. When a new screen appears, "distance" is selected under "type," m under "units," and 0.1 under "precision." Clicking "okay" saves the coordinate data (Figure 7).

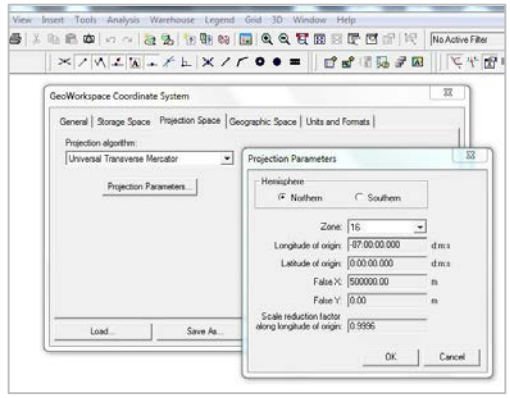


Figure 7. Setting the parameters of the map projection for map data.

The Excel file with mapped data is now linked under "Warehouse." In "Feature Class Definition," Excel 97 is selected as the file type (Figure 8). The excel file to be attached is located under "Browse," in this case "posts all years." The file name is highlighted in "source table" and moved to the "target table." Clicking "okay" completes the attachment of the data file to the GIS. The excel spreadsheet is viewable as map data in the "Map Window" or "Data Window" in the "Windows" category. Data can be entered in the data window while Geomedia is in operation. The scale, legend and legend entries (including symbols on the map), and north arrow can be manipulated under "View."

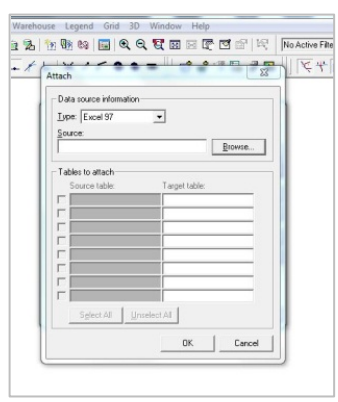


Figure 8. Attaching the Excel map file to the Underwater GiS under Feature Class Definition in the Warehouse category in Geomedia.

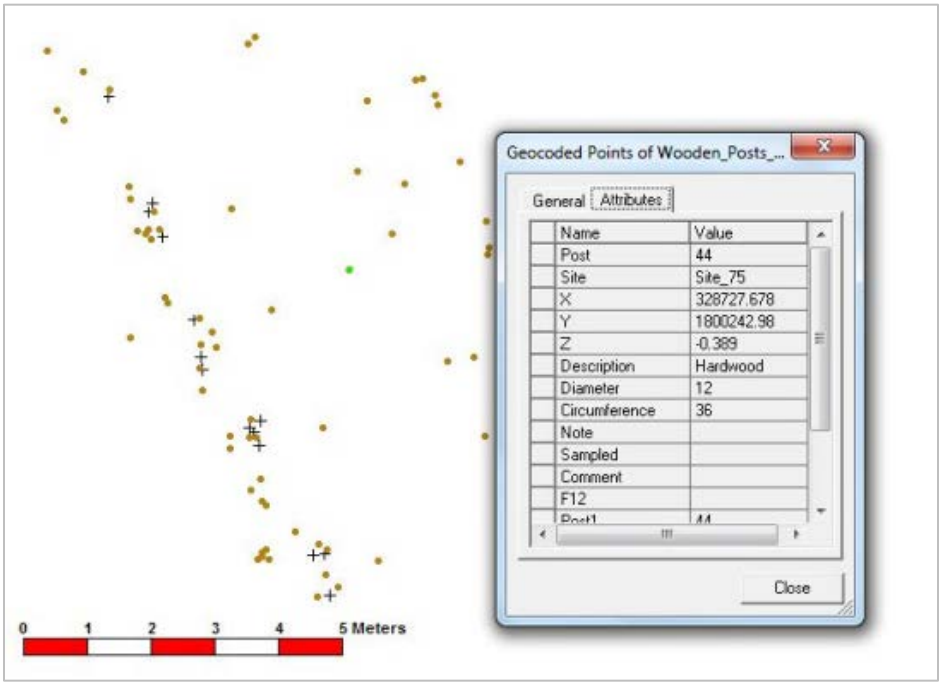


Figure 9. Clicking on a mapped point reveals a data window with the information about the feature from the attached Excel file.

Once the Excel file with data is linked to the GIS, the map is displayed in the Map Window. Clicking on a point, brings opens a window containing all information from the attached Excel spreadsheet about that point (Figure 9).

Each mapped artifact, post, or other feature—as well as any associated information--is referenced to the GIS by its UTM coordinate. As long as the link to the GIS remains the same, the Excel spreadsheet can be updated either in the GIS or separately. Post diameters, measured using a plastic covered cloth sewing tape underwater, are usually recorded in a waterproof notebook, with the data added to the Excel spreadsheet later. It is more time consuming to measure each post and add the diameter information during total station mapping. We usually create and keep the GIS on the C hard drive, so that the GIS and attached files can be easily moved to other computers, with the links to associated files remaining the same. The GIS automatically updates spatial data added to existing attached excel spreadsheets, which is useful for additional information on the dimensions of building posts, the types of ceramics, and other descriptive data. Additional Excel or Access files can be linked. For example, the original data for a potsherd includes the location and artifact label. A new excel file with attribute analysis data can subsequently be linked to the original file.

Incorporating GIS in fieldwork allows us to study the maps created during the day's fieldwork and search the next day for new posts suggested by the spatial patterning. Since the sites are underwater with only the flags showing above water, printed site maps from the GIS were useful in examining the patterns of posts and searching underwater for additional posts. Patterns of wooden posts formed rectangular footprints of wooden buildings at some sites. Lines of palmetto palm posts define yards outside buildings. Printed maps are put in zip lock bags on clip boards for return trips to underwater sites to search for additional posts. This technique is quite successful. At Orlando's Jewfish Site (Site 58), a triangular arrangement of three posts became a square structure with the discovery of a fourth corner post. At the same site, two bracket shaped arrangements of posts facing one another at some distance became a

single large structure by searching the likely location of wall posts, which were discovered. Despite the efforts of a skilled team of surveyors, the wooden posts are difficult to discover since they barely protrude, if at all, above the seafloor where the mangrove peat preserves the wood.

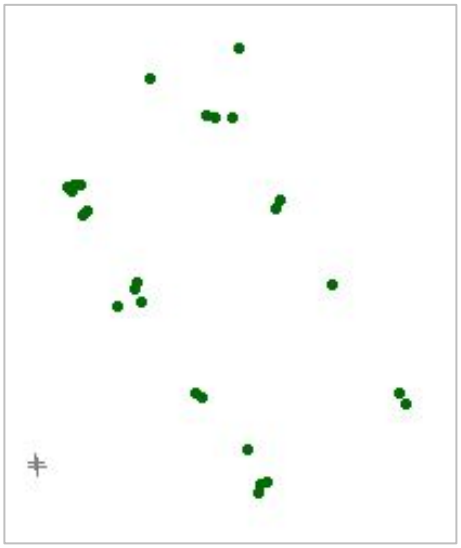


Figure 10. GIS reveals the footprints of a rectangular wooden building as recorded by mapped posts (Map by H. McKillop).

Using the GIS to Explore Architectural Patterns of the Wooden Buildings

The GIS is used to observe patterns, selectively display patterns, and manipulate spatial data. Clicking on a post, artifact, or other feature on the GIS map displays the attached data table. Although data are mapped and stored in one file for each site, all the post data are copied to a single excel file for ease of manipulation of the data. The grouped post data file includes the x, y, and z location as well as post diameter, type of wood (palmetto palm or solid wood), the condition of the wood, and whether a sample was cut for study.

The distribution of posts on the seafloor reveals patterns for individual structures, site patterns, and patterns for the salt works in general. There are rectangular wooden structures at 14 sites and rectilinear patterns of structures at many other sites. Some sites have more than one structure. The distribution of posts at Site 35 in the East Lagoon shows a clear footprint of a rectangular structure with distinct corners (Figure 10). The building measures 3.4m by 7.6m, with an interior area of 24 sq m. The posts are clustered, with open spaces along the walls, suggesting that either that the wall posts were not dug into the ground (Wauchope 1938) or that the structure was open, with posts at the corners and along the sides to support the roof. The Site 35 building is oriented in a northwest to southeast direction, an alignment that is common at the Paynes Creek sites.

I can group post diameters by size ranges in the Underwater Maya GIS to discover patterns of construction. In the GIS Geomedia, under "Legends," I can select the "add thematic legend entry" (Figure 11). Under "input feature," I select "geocoded points of all posts." Under "type," I select "range thematic." In "attribute for classification," I select "diameter," and click "classify." In the new window "classification technique," I select "equal range," and leave the default number of categories as "4." The window displays the minimum and maximum post diameter.

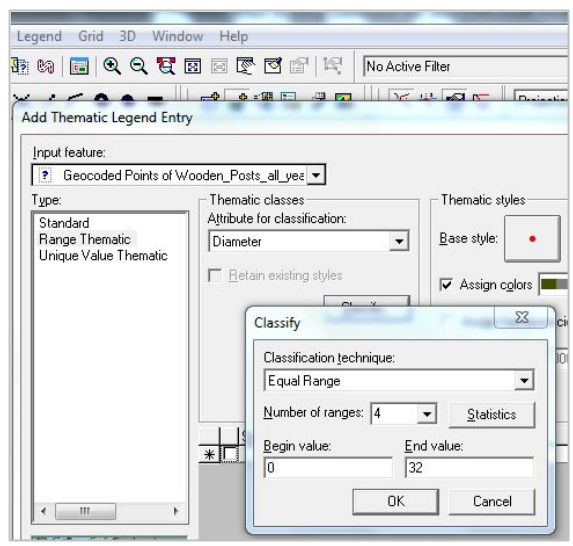


Figure 11. Grouping post dimensions by class intervals using the Thematic option under the Legends category in Geomedia.

When I click "okay," a new window is displayed with the range data, including "style," "begin value," "end value," and "label," which can be modified in the table (Figure 12). For example, size, color, and type of symbol can be changed by clicking the displayed symbol under "base style." In the new window, I select

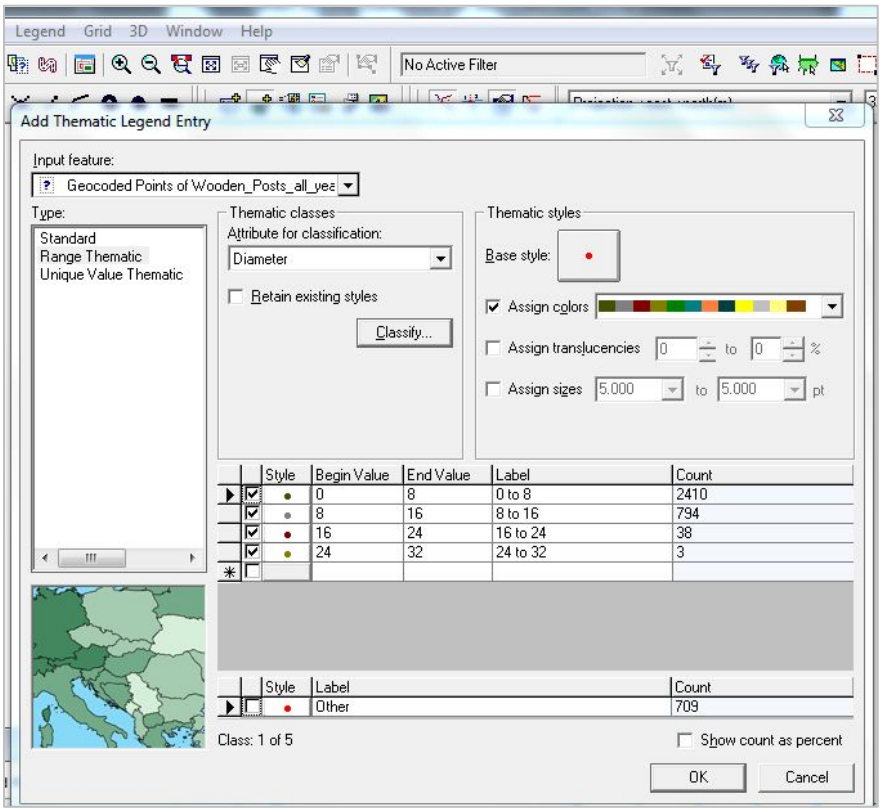


Figure 12. Changing the values of thematic ranges.

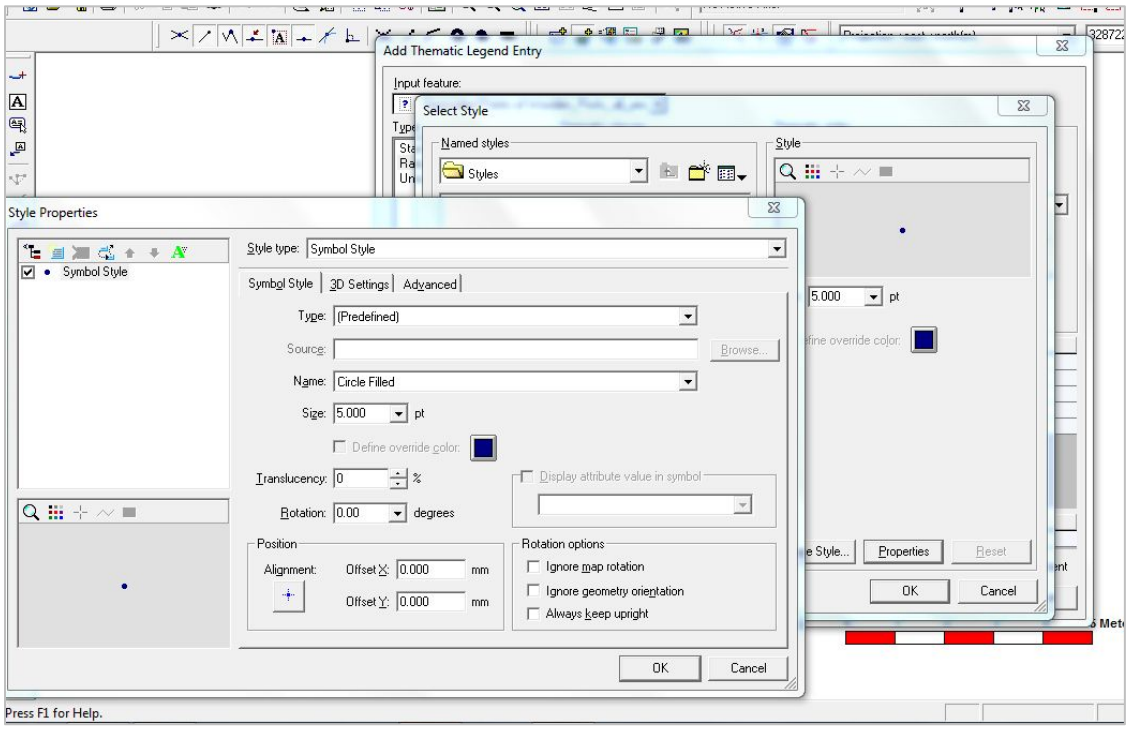


Figure 13. Changing styles and colors of symbols for the map.

"properties" and the "style properties" window appears (Figure 13).

I vary the post diameter ranges from equal numbers to selected ranges, including selecting the size ranges for building posts reported by Robert Wauchope (1938) in Modern Maya Houses. Grouping post diameters by the average size ranges reported by Wauchope (1938) reveals similar patterns between modern and ancient construction techniques. Larger, "load-bearing" posts are located in corners and exterior walls; smaller posts are located along exterior walls and inside structures (Figure 14). The same pattern is evident in the modern house image by Robert West (Figure 15). Some smaller diameter posts along the exterior of structures, such as the western side of the Site 75 structure, may be roof poles that supported the overhang of the thatched roof that extended beyond the exterior walls.

Modern Maya use different wood for various parts of buildings, such as corner posts and roof beams (Redfield and Villa Rojas 1962: 35; Wauchope 1938), so the occurrence of different kinds of wood in construction at the Paynes Creek sites is expected. Species identification of wood posts was begun in 2009 by project wood anatomist Mike Wiemann, continued as a PhD dissertation with a case study of Early Classic site 24 and Late Classic site 35 by Mark Robinson, and ongoing by the author, Robinson, and Wiemann.

Grouping all the wooden posts in one excel file facilitates spatial analysis of the entire lagoon system of 105 sites. The visible patterning of posts in the GIS reveals that there is no evidence at the Paynes Creek sites of plazuela groups--buildings arranged around plazas that were the building blocks of ancient Maya settlements, from public stone architecture in the center of cities down to modest household groups (Figure 16). Individual structures have a northwest to southeast orientation. Structures form lines, instead of grouping to form a central plaza. The linear settlement pattern may reflect structures located along shorelines that were flooded, so new structures were built farther away from the water on higher ground.

Structures closest to the water may have been salt works. Structures farther away may have been residences. Elsewhere, salt workers

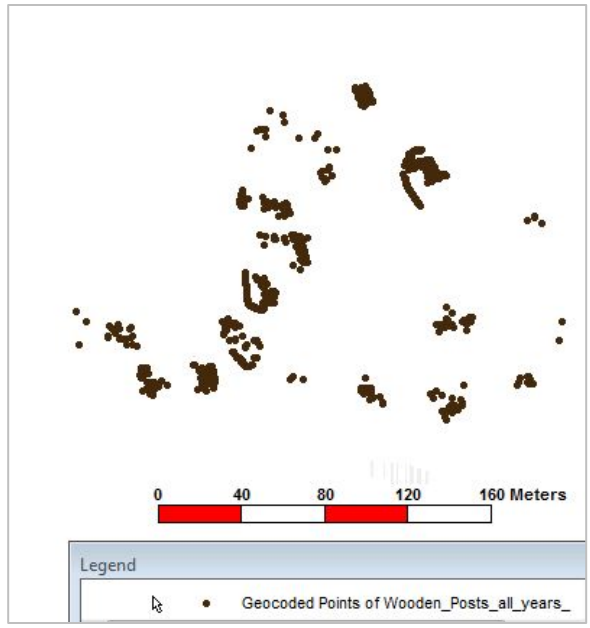


Figure 16. Linear Settlement Pattern of selected underwater sites in Paynes Creek National Park (GIS map by H. McKillop).

do not always reside at the salt works. In central Mexico, Parsons (2001) describes residences at some distance from the salt works. The location of the residences for the salt workers at the Zhongba site in the Three Gorges River area of China was unknown, perhaps flooded after the excavations of the salt works (Flad 2005). Salt workers who extracted salty soil from the salt springs at Sacapulus in the highlands of Guatemala had salt sheds near the salt spring with separate residences farther back (Reina and Monaghen 1981).

Information about the posts collected during underwater survey includes the type of wood, either palmetto palm or "solid wood," and the diameters of the posts. Palmetto palm (Acoelorraphe wrightii) posts are easily identifiable from other "solid wood" posts. Evidently, the waterproof nature of the palmetto palm bark was regarded as making the posts useful for land-retention at the water's edge. I use "range thematic" in "legends" to display palmetto palm posts versus solid wood posts (Figure 17). The lines of palmetto palm posts do not form polygons as would be expected if they were used to define the perimeter of an evaporation pan.

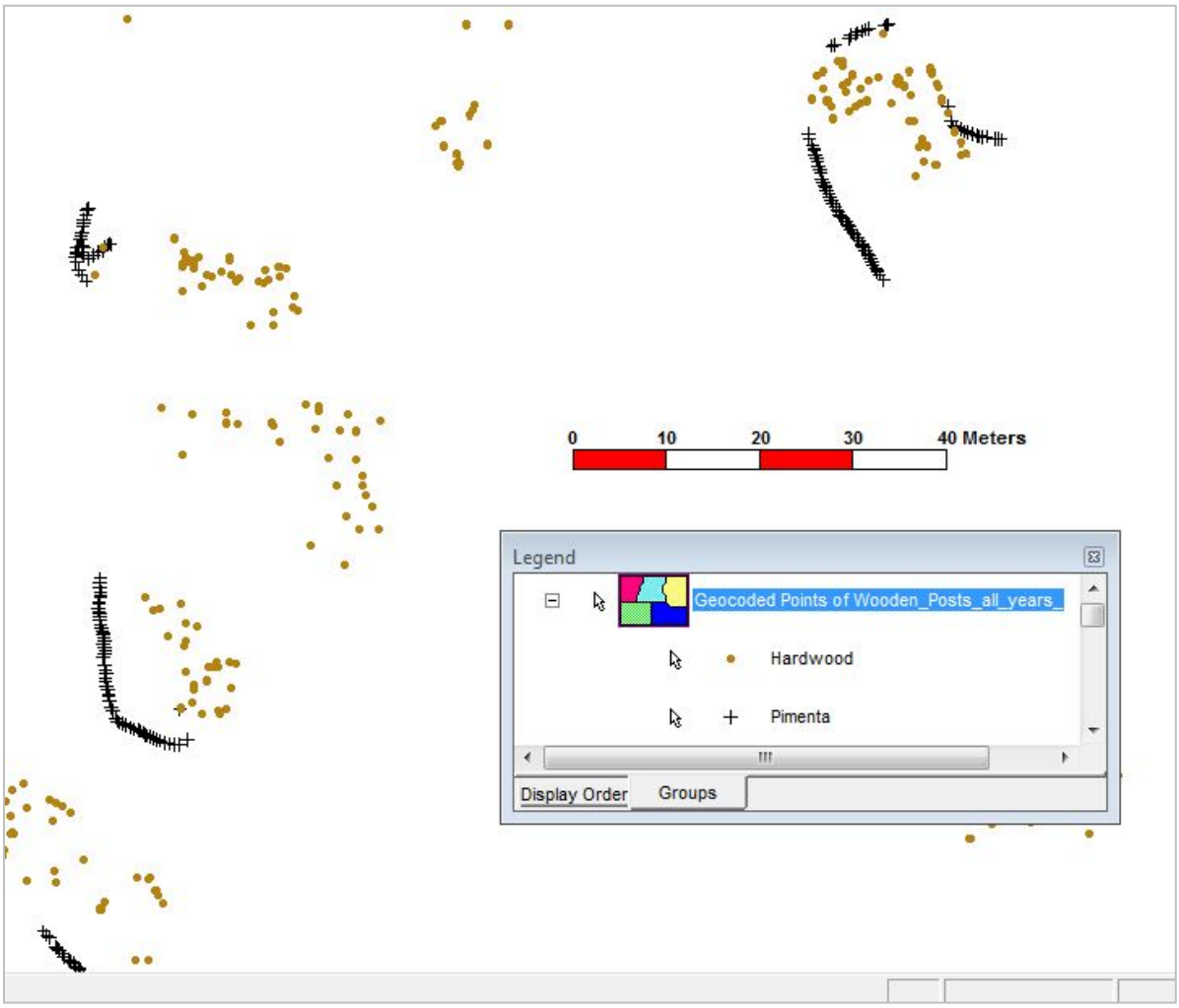


Figure 17. Using the Range Thematic option in Legends in Geomedia to display palmetto palm posts versus solid wood posts (GIS map by H. McKillop).

The spatial patterning of palmetto palm posts suggests they were used in land retention. Individual palmetto palm posts were incorporated into buildings at some sites, but this use was infrequent. Most of the lines of palmetto palm posts form curved lines, although at Site 103 there are four straight lines of posts, each including a corner. Two of the lines have right angle corners.

Ceramic Analysis Within the Underwater Maya GIS

Ceramics that are temporally diagnostic or otherwise informative of the salt industry are flagged and individually mapped using the Total Station. Type-variety and attribute analyses are entered on excel spreadsheets and attached to the GIS: The excel file with the UTM coordinates of each labeled artifact sometimes is linked by using the identical artifact label on an Excel file with descriptive information. Sometimes it is easier to copy and paste the descriptive data into the Excel spreadsheet already attached to the GIS. The type-variety and modal analyses of Maya ceramics thereby becomes part of a spatial database, in which questions about the distribution and patterning of types, modes, vessel shapes or other descriptive data can be answered (Figure 18).

Ongoing GIS Analysis and Future Directions

A second project began in 2010 focusing on large-scale underwater excavations of selected salt works, sediment coring to collect

Figure 18. Underwater excavations yield large amounts of briquetage—pottery sherds, vessel supports, sockets, spacers, and amorphous clay lumps from the salt evaporation process by heating brine in pots over fires (photos by H. McKillop).

environmental data, and remote sensing in the shallow lagoon. Part of the ongoing research includes transforming the two-dimensional GIS into a three-dimensional world by extruding the posts from the ground. This collaborative research with Terrance Winemiller seeks to allow archaeologists to view the Maya salt works from the ground up instead of having artists' reconstructions. Geomedia Grid and Geomedia 3D are software components added to Geomedia that allow the creation of the three-dimensional world of the Paynes Creek salt works.

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XX PALEOENVIRONMENTAL RECONSTRUCTION, FOREST SUCCESSION, AND WEEDS IN THE MAYA MILPA

Anabel Ford, Allison Jaqua, and Ronald Nigh

The paleoenvironmental reconstructions of the prehistoric Maya forest have emphasized that this culture's farming technology, their subsistence and household economy, impacted the environment negatively by ultimately replacing forest with savanna, and assuming that farming inhibits the regrowth of the forest. An examination of weeds typically found in traditional lowland Maya farmlands, or milpas, provides insights into this assumption showing that woody shrubs and trees are a major component of the maize dominated fields and that in fact once the maize cultivation ceases, these shrubs and trees will begin the succession process. While weeds are often characterized as annual herbs and grasses, their common characteristics can be identified in their competitive abilities and tolerance to the open field conditions created by agriculture. The negative value associated with weeds is inconsistent with the ethnobotanical and functional roles the listed weeds play in the Maya milpa. The habits and uses of the identified weeds in the open milpa have implications for understanding the home economy and conservation techniques of traditional Maya farmers that reach back to ancient Maya times and demonstrate that the milpa is an adaptive system in the Maya forest.

Introduction

The paleoenvironmental record for the Maya forest presents data that have been interpreted as demonstrating the forest conversion to grasslands over the course of ancient Maya land use and development. This interpretation, however, does not consider the nature of the agricultural landscape created by traditional Maya milpas and the role of weeds in these fields. Weeds, while typically considered undesirable in a plowed field, serve multiple purposes in a traditional milpa. This paper looks at the weeds of the milpa, their habits, uses, and pollination vector or syndrome (biotic or abiotic) to demonstrate that the predominant presence of wind-transported grass and herb pollens in lowland lake core sediments is indeed the product of an increasing anthropogenic landscape but not a deforested one. We will show that the weeds of the milpa become the foundation of the reforestation cycle that begins with the opening of the agricultural field.

Understanding the Maya Milpa-Forest Garden Cycle

To adequately interpret the signature of herbs and grasses in the pollen cores of the Maya forest it is necessary to understand the milpa-forest garden cycle in a mosaic across the landscape. In other words, at any one time, the landscape will have some proportion of milpa gaps, and other proportions of building succession, and other proportions of closed canopy trees along with the home gardens that would be the true forest garden. Traditional Maya agriculture features *the milpa*: a poly-cultivated plot of as many as 30 domesticated crops in a maize-dominated field (Ford and Nigh 2009). Milpa fields are found year round in a mosaic among reforested and mature forest cover. Each seasonal period is associated with a specific adaptive growing cycle. Maize is expected for the two rainy periods, with June planting providing the highest yields. Maize may be planted in a third dry period, but this will not produce a major crop. A variety of some 30 domesticated crops are selected from more than 70 crops to be intermixed in the open fields (Ford and Nigh 2009:216-218; Teran and Rasmussen 1994, 1998). This purposeful selection is apart from the pioneer weeds and stump sprouts that volunteer within the fields and make up the heritage of reforestation.

The landscape then is a mosaic of the open fields and the forest gardens intricately intertwined with the household economy providing subsistence, medicine, fiber, and foods that maintain the family system. The first stage of cultivation is the opening of the forest for the maize dominated field. Cultivation of maize is then followed by an initial stage of reforestation with selected economic trees and shrubs. Finally, reforestation is completed with the maturation of the closed canopy forest garden (Table 1). These stages match the natural cycle of forest dynamics with gaps, building phases, and maturation of the landscape (Kellman and Tackaberry 1997:146-157). The managed

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Milpa Cycle	**Plants**
Stage 1-2 open field *~ Favoring Sun* 1-3 yrs, 3-7 yrs	Open milpa: ~30 crops of ~ 70 spp; dominated by maize, squash, beans**,** tomato**,** chili, root crops, weeds Palms; Coppiced shrubs and trees; short lived perennials; seedling fruit trees for Stage 3-4
Stage 3-4 reforestation *~ Producing Shade* 7-15 yrs, 15-30 yrs	Long lived Perennials ~ Fruit trees and palms Seedling long lived perennial hardwoods interspersed with fruit trees for Stage 5
Stage 5 closed canopy *~ Favoring Shade* Harvest & ready for Stage 1	Closed Canopy well-managed forest ~ Känan K'aax Tall trees of hardwoods and fruit

Table 1. Representative Milpa –Forest Garden Cycle.

mosaic provides a dynamic of changing forest cover that is variably cycling through the landscape (Downey 2010).

The field cutting, which initiates the milpa cycle, is accomplished with one hot burn occurring at the end of the dry season in May, in preparation for the rains. Coincident with the first rains, the maize is planted in the field. This is the main maize crop of the year with yields from 855 kg/ha (Cowgill 1962) to 1144 kg/ha (Redfield and Villa Rojas 1962) and up to 2800 kg/ha (Nations and Nigh 1980:13). Yields of beans, squash, and squash seeds, as well as many other crops, are reaped from the same fields. A second planting takes place in November and is dependent on the lower precipitation characteristic of the cool northern rains typical for this time of the year. There may be a third dry season crop as well, adding to the annual household economy. A traditional lowland milpa is typically used for maize cultivation for approximately four years. This period of intensive maize cultivation is followed by reforestation stages lasting from 12-20 years. The fields opened for maize cultivation invite the growth of weedy plants, but our questions are: *Do these weeds contribute to overall field management and the household economy and how may this be reflected in the pollen observed in lake core sediments?*

Managing and maintaining fields that build economic value stresses the importance of the labor investments in all aspects of the milpa-to-forest garden cycle. Weedy volunteers themselves may be immediately useful for food, spice, dye, and medicine. They may also provide ecological functions such as land cover for moisture conservation, animal and insect attraction for pollination, plant competition for improved yields, and the acceleration of reforestation for the next stages of the cycle (Lambert and Arnason 1989). These values build into the subsequent reforestation stage with trees for fruit and construction, typical of the forest garden (Ford 2008). This orchestration of species selection, planting, and management has created one of the most diverse domesticated plant systems in the world (Campbell 2007), and it has been facilitated by the fundamental tool of the open maize field, or milpa. We will show that the diversity of the weed communities that flourish in the disturbed agricultural field habitat of the traditional Maya milpa function is an essential platform for the progression to the forest garden. Thus, it is evident that the crop and weed components of the open milpa field contribute to the pollen recorded in the lake cores that form the paleoecological record.

Identifying Milpa Weeds

The data we use come from two areas representing Maya adaptation: the northern Yucatan of Mexico and the western Cayo district of Belize (Figure 1). The northern Yucatan,

with 1000 mm of rain per year, is drier than Western Belize, with c. 2000 mm per year. For both areas, the milpa cycle proceeds in a similar manner based on the distribution of the rain over the year. Both areas are associated with archeological sites (Chichén Itzá in the case of Yucatan and El Pilar in the case of Belize).

To address the nature of weeds, we explore the defined lists of weeds derived from farmers' fields in Piste, Yucatan and in Cayo, Belize (Steggerda 1941; Kellman and Adams 1970). While each researcher had different strategies of data collection, both efforts itemized plants that were not cultivated as crops; these volunteer and pioneer species were considered weeds in the observed active maize milpa fields.

To gain a perspective on the weeds of the researched fields, we created a spreadsheet of the plant inventories with our research on habit, uses, life cycle, and pollination. Our catalog of the weeds reveals considerable diversity of plant habits, an amazing variety of recorded plant uses, the presence of both annuals and perennials, and all types of pollination syndromes. These are anthropogenic plants that withstood, and even required, cutting and burning to thrive (e.g., the corozo/cohune palm: Steinberg 1998; see Anderson et al. 1991). These fields are multifaceted with useful crops and weeds that, together, are an essential indicator of the human-environment relationship.

The Yucatan example dates to the 1930's before WWII and the introduction of commercial fertilizers, pesticides, and hybrids (Steggerda 1941). The ethnographic context for Steggerda's research was under the auspices of the Carnegie Institute of Washington, a major interdisciplinary Maya research program of the time. Steggerda's study examined Maya family size and make-up, health and work habits, and metric measurements of physique. Part of his consideration of health and work included Maya subsistence practices. Rigorously recording all he could, Steggerda documented agricultural field size, planted crops, and crop yields from the fields of his Maya informants. These fields were the source of his itemization of weeds. The data come from a series of 4 sq. meters in the center of five fields and included additional

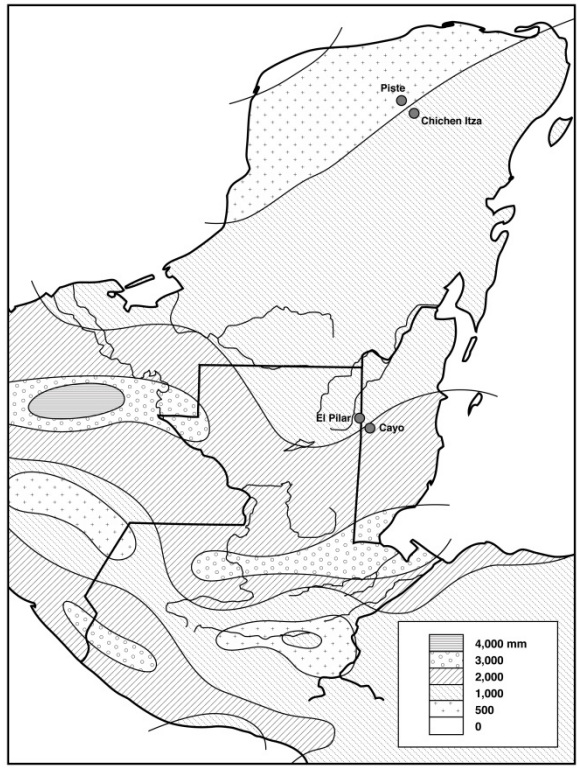

Figure 1. Map of Rain Gradients with Chichén Itza and Cayo locations indicated.

plants noted beyond the sample inventory (Steggerda 1941:100-107). Every weed—any plant that was not a crop—was counted along with the number of times it was represented in the field (Steggerda 1941:99). A total of 49 different plants were recorded by Mayan and scientific names in his sample, with an additional 29 weeds noted outside the sample and itemized across the same fields for a total of 78 plants.

The Belize example incorporates data collected in the late 1960's (Kellman and Adams 1970), well after WWI and within the era when petrochemicals and plant hybrids began to be available. There is no indication that any supplements were used in these fields. Using scientific names and frequency, Kellman and Adams present a methodical itemization of the classified weeds and their distribution (1970:330-333). They identify weed genera and species from 31 fields totaling 196 species.

The weed lists were tabulated and examined separately for habit, economic use, duration, and pollination syndrome to create a new database on weeds of the milpa. Habit was

determined using several sources, most prominently the Unites States Department of Agriculture web site (USDA 2011). Habits were then charted to compare the percentage of herbs, shrubs, trees, vines and grass. The two main sources used for determining economic values were Roys (1976 [1931]), *The Ethno-botany of the Maya*, and Balick et al. (2000), *Checklist of the Vascular Plants of Belize*. Each listed plant was assessed in terms of origin, pollen syndrome, and habit and the uses inventoried and tabulated in our new database. The economic plants are charted based on the type of use including medicine, production, food, and construction, to name a few examples.

The pollination syndrome is important in the interpretation of the herb and grass components in the lake core sediments. We used over 40 authoritative sources to research the difficult question of pollination syndromes (sources available upon request). An effort was made to determine the syndrome at the levels of genus and species whenever possible; where data were unavailable, we resorted to the family level for comparison. Pollination syndromes are evaluated by category: wind, insect, mammal, or self-pollination, as is the case for ferns and some grasses. It is commonly understood that it is the wind pollen that is broadly represented in the lake cores (Kellman and Tackberry 1997).

The results of our research are illuminating. While crop production was the primary function of the field, many other products are derived from the milpa (Steggerda 1941:117-124; Teran and Rasmussen 1994, 1998). Indeed, weed species increase the potential of the milpa to support the home economy, providing significant value during cultivation and contributing value thereafter in the reforestation stages (Ford and Nigh 2010). These are the "good farmers" that Wilken (1987) discusses where the open milpa is only one stage of the land use cycle and the plot evolves into the mature woody plants favored for food and construction (Ford 2008).

Results

Our research began with the habits and economic uses of the weeds of the milpa. Remarkably, all plant habits, including trees and shrubs, are found in the list of weeds (Figure 2) and thus the fields are not simply crops with annual volunteer herbs and grasses, as routinely assumed when considering agricultural field clearings. Interestingly, the majority of the plants have uses that are referenced in economic botanical sources. Clearly, there is more to the fields than solely domesticated crops.

The weeds in the open milpa field have many identifiable uses. Beyond the immediate values and uses recorded in ethnobotanical studies, stumps of the trees and shrubs that were once cut and burned, re-sprout during the period of time in which the maize is the dominant crop. These resources aid in the next phases of reforestation and provide the source of organic matter and ultimately shade that hastens succession and inhibits herbs and grasses (see Figure 2).

Diversity in plant habits is the theme of the milpa fields. The trend in habit in Steggerda's plant list dates to the 1930s (Figure 2). Trees and shrubs represent 49% of the inventory, plant habits of vines and herbs each represent a quarter of the inventory at 25% and 25% respectively, and even though the fields are open to encourage grasses, they represent only the small fraction of 1% of the Yucatecan fields. The data of Kellman and Adams' from the 1960s share many common themes but different trends. Trees and shrubs represent more than a quarter of the inventory at 26% (Figure 2). Combined, herbs and vines are similar to those of the 1930s example, but in different proportions, herbs with 38% and vines with 12%. Grasses on the other hand represent nearly one fifth of the inventory, at 20%. Annuals are not a large component of the weeds in the milpas of either context: perennials make up 88% of Steggerda's and 76% of Kellman and Adams' weeds (Figure 3).

This diversity of weed presents a number of options for household adaptation and succeeding stages of the cycle. In an environment where there is a distinct dry period where evapotranspiration is high and the limestone bedrock is porous, there are advantages to having plant cover to maintain moisture in the system (Torres 2006). Furthermore, weed association may be beneficial in that the crops will compete to supersede the volunteers (Quixchan 2010). Equally important is the role of weeds in the later stages of the

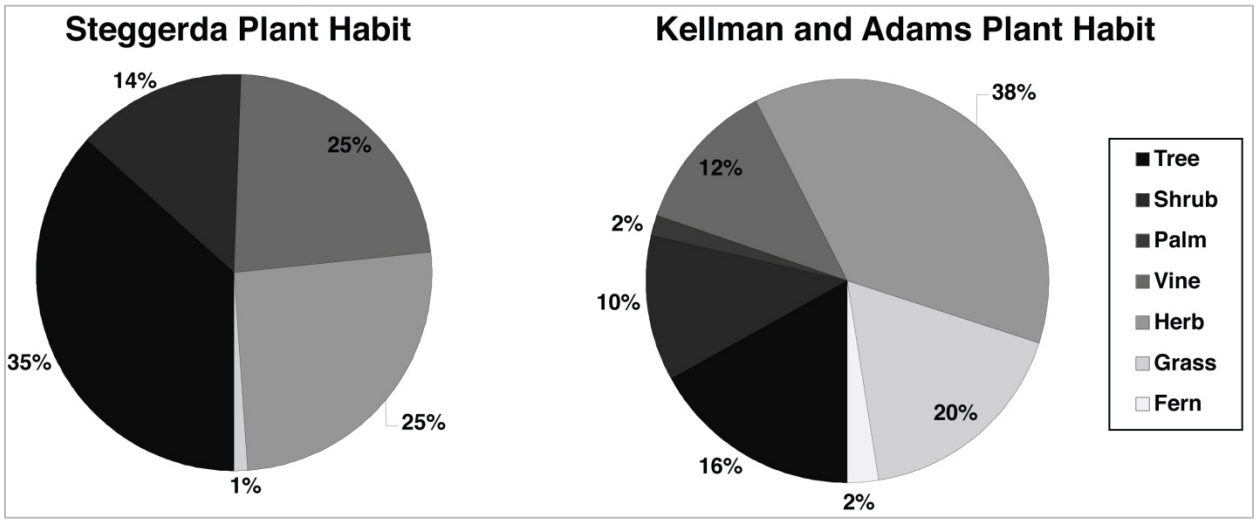

Figure 2. Habits of the Milpa Weeds.

milpa cycle where woody plants promote shade and mulch for ensuing reforestation (see Table 1).

Turning to the ethnobotany of the weed inventories, there is another factor favoring the presence of the weeds. The majority of the inventoried weeds have listed uses in Roys (1976) and Balick (2000): 86% for Steggerda's list and 66% of Kellman and Adams list. These economic uses provide everything from medicine and spice to food and construction (Figure 4). Most plants indicate multiple uses: 69% for Steggerda's and 49% for Kellman and Adam's list.

Considering the weeds with uses, both Steggerda's and Kellman and Adam's lists indicate that the majority of uses fall into the realm of medicines (see Stepp 2004; also Figure 4). Medicinal herbs are routinely related to the areas of disturbance created by human activity and abound near homes and in fields where the sun will favor the sprouting of these pioneering herbs because of exposure. Food and production are the next most important uses of milpa weeds by the lowland Maya. Steggerda's list reveals that 31% were used for food and 22% for production, while Kellman and Adam's list reveals 31% each for food and 33% for production. Other uses for plant lists for the Yucatan and Belize include construction, poison, beverage, dye, fuel, spice, and fiber (see Figure 4).

The potential immediate, as well as future, values among the weeds are numerous. The intimate relationship between the Maya farmers and their landscape is indicative of these utilities. The skill and knowledge that is represented in these known uses reflects a remarkable integration of the Maya forest landscape (Atran 1993) and the farmers' land use.

Another noteworthy variable considered in our catalogue was pollen. It has been assumed by the paleoecologists that annual herbs and grasses dominate the open maize fields favoring a move to savanna as opposed to reforestation, but this is not the case. In addition, it is assumed that the presence of disturbance taxa is indicative of deforestation. The data we have compiled on the weeds from the traditional milpa context demonstrate that this is not the case. The wind pollinated weeds represent less than one third of the weeds, 28% of the total. These are the disturbance taxa reported in the lake core pollen and include these families: Amaranthaceae, Asteraceae, Cyperaceae, Euphorbiaceae, and Poaceae. Interestingly, there are 2 families represented among the herbs that are generally classed as forest taxa, Burseraceae and Moraceae, suggesting that even these generalizations about the Maya forest and disturbance taxa must be considered carefully with respect to land use.

Discussion

To understand the weeds of the Maya milpa it is important to appreciate that, like the butterfly, the milpa cycle has multiple stages. We are visually attracted to the maize field and understand it as an investment in cropland. Just as the first *conquistadors* named the milpa, they propagated the use of the word *milpa* to define the Mesoamerican maize field. The maize field, however, is just one of the stages of a recurring cycle (see Table 1) which begins with the initially cleared maize-dominated plot, is succeeded by the building of the useful woody perennials, and culminates with maturation as a closed canopy forest garden. The long-standing use of this cycle by farmers of the Maya region is, in fact, suggested through an etymological study of the word *milpa*. Traced back to its Nahuatl origin, the word milpa is a combination of the words *millipan*, *milli* meaning to cultivate and *pan* meaning place (Bierhorst 1985: 213, 259). The open field is crowded with plants, representing every plant habit from grasses and herbs to shrubs and trees; it is not merely maize. The milpa harbors a diversity of plants of all habits that are critical to the process of the development of the milpa cycle (Ford and Nigh 2009:217).

The weeds of the maize milpa play a significant role in the short-term management of resources of the open field stage of the cycle (Linares and Bey 2010). As the foundation of the Maya land use system, the milpa is biologically diverse and in sharp contrast with what has become known as "conventional agriculture" founded on the principle of mono-cropping. Not simply made up of the triad of maize-beans-squash, other crops as well as the weeds of the milpa play important roles both biologically and culturally. Immediate uses that make up the weeds are just the beginning—uses that include gum, incense, latex, oil, fiber, spice, ritual, fuel, ornamental, tannin, dye, beverage, poison, construction, food, production, and medicine. Over 90% of the useful plants are classed as medicinal. These are obviously important, but it does not end there.

The multiple economic uses cataloged among these weeds speak to the subtle qualities of the greater groups of plants in the milpa. These weeds set the stage for the long-term land

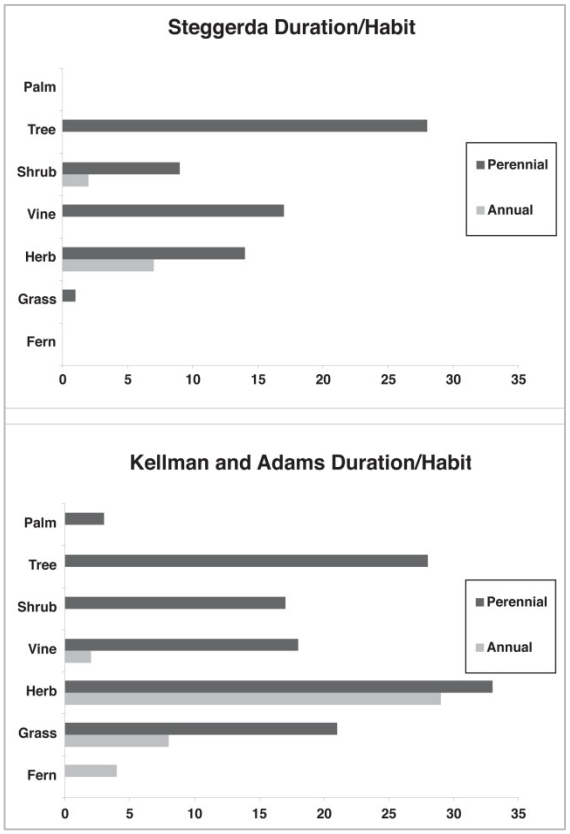

Figure 3. Plant habits and duration of the Milpa Weeds.

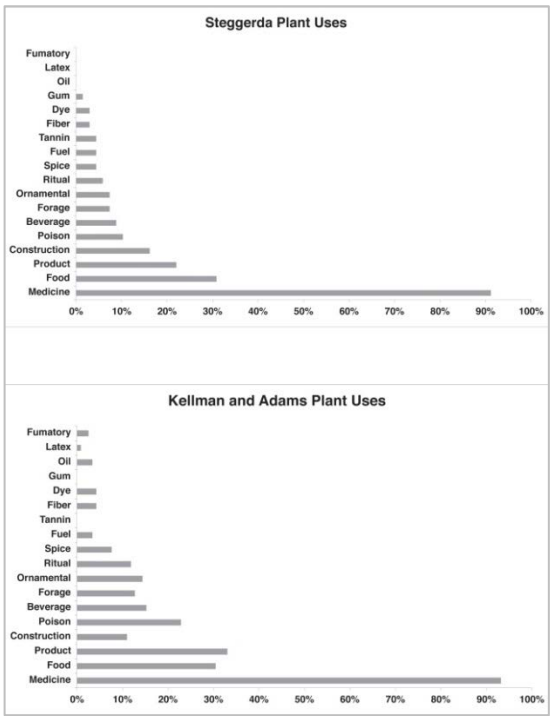

Figure 4. Economic Uses for the Weeds of the Milpa.

use, soil conservation, and reforestation of the open maize plot. Within the immediate uses of the plot are the biological controls. Domesticated crops are susceptible to a variety of pest and plant competitions, and specific weedy plants are known to have interactions that support crops and advantage yields. Allelopathic components can eliminate undesirable crop pests, attract insects and mold that otherwise would attack crops, and inhibit soil borne diseases to act as a natural biological control for the domesticated crops (Gliessman 1981:182, 1983, 2004:66). Soil improvement and natural chemical protection; insect, fungi, bacteria, and nematode pest control, and pollinator attraction, are just some of the ways weeds act to benefit crops. At the same time, plants are encouraged for other services: fast growing shade, production of leaf litter, and attraction of birds. The weeds described by Steggerda, as well as those identified by Kellman and Adams, serve conservation roles in the field. Alfonso Tzul, a retired agricultural extension officer in Belize, states that he has never seen a traditional milpa subject to erosion and has never seen a plowed field without erosion (Tzul 2011). Weeds, in fact, facilitate the resourceful and resilient management design of the milpa.

The picture that emerges is of an eclectic combination of plants in both the crop and weed components of the milpa. While most crops are annuals, most of the weeds are perennials that are largely biotically pollinated: 88% of the Yucatan milpa weeds and 75% of the Belize milpa weeds. We discovered that, like the crops that are predominantly biotically pollinated, only 6% of the Yucatan weeds, and 28% of the Belize weeds were wind pollinated. This demonstrates that the wind pollination component that would contribute to the pollen of the lake cores represents only a quarter of all the weeds, commonly found in the Maya milpa. In essence, there are no means by which direct data can identify the variety of plants of the milpa or the forest (Ford 2008). The lake core sediments are dominated by wind pollinated plants, all of the families of wind pollinated plants are found in the milpas and are found in the lake cores.

The milpa cycle is a creative development of the landscape that improves the quality of the biomass towards economical utility at every stage of the cycle. Beyond the immediate uses of plants, woody species recorded in the milpa fields, mainly in the form of stump-sprouts, play a significant role in the reforestation phase of the fields. These stump sprouts grow vigorously and quickly and shade the soil surface during the reforestation stage (Kellman 2011), inhibiting the expansion of grasses and representing a major advantage for water conservation in this area of porous limestone bedrock. The high proportion of woody shrubs and trees to annual herbs and grasses provides evidence that the open phase of the milpa cycle is already advancing to the later reforestation stages. The stump-sprouts of the maize field speed up the reforestation process, building protection as well as the conservation of water and soil. These woody plants are vital to the succeeding stages of the milpa cycle.

Tree and shrub species that re-sprout in the field are the subject of selection or elimination, influencing the plant composition of the regenerating forest (Ford 2008:186). In the first years, the plants grow under the annual maize canopy, one that is replaced at least twice a year. When the short years of the maize field stage of the cycle come to an end, the surviving stump sprouts that have already established themselves in the milpa, will become a part of the later mature stages of the cycle. In this way, the open milpa field is a central tool in the creation, development, and maintenance of the Maya forest garden (Teran and Rasmussen 1994, Ford and Nigh 2009, Linares and Bey 2010). Rather than replacing the forest, weeds of the maize field initiate the trajectory of regeneration and the resulting active reforestation directs the forest composition to desired states of economic and cultural utility.

Far from becoming a savanna, the maize field is a diverse agroecological setting with plants of all habits, uses, and durations. The composition of the weeds does not lend itself to the dominance of grasses and herbs, and while the grasses and herbs are present, they remain in small proportions as part of the ecological process of succession. The paleoecological presence of herbs and grasses is consistent with the presence of the maize milpa, they are not the dominant plants nor do they represent a

replacement of the forest. These results suggest that the "disturbance taxa" recorded in the paloeecological record support the interpretation of anthopogenic impacts, but do not support the interpretation of the savanna conversion.

Conclusion

An interpretation of the landscape of the Maya forest based on the dominance of wind borne taxa in the paleoecological record is premature. To understand the pollen data of the lake cores, one needs an appreciation of traditional uses of the tropical forest and the role of land use strategies. The agroecological dynamic of the milpa-forest garden depends on an understanding of the cyclical nature of the manipulated plots of the traditional Maya farmer. While open fields are part of the cycle, so are the succeeding reforestation stages. In structure, the opening of a Maya milpa is not unlike the gaps created in forests by natural events, such as tree falls and hurricanes that change the immediate composition of the landscape (Kellman and Tackaberry 1997:252-153). From gaps, to forest building, and on to the mature canopy, we recognize the stages of the milpa cycle from the open maize field, into the reforestation stages, and on to the closed canopy forest garden (Ford 2008). There will always be a proportion of the lowland Maya landscape in open fields, but there will also be a large proportion in the building and mature phases represented as well.

Today's Maya forest, part of the greater Mesoamerican forests that are among the most biodiverse in the world (Mittermeier et al. 2000:38), was left unmanaged after the Spanish conquest. Still, the forest today is dominated by the economic qualities that were part of the ancient Maya management system (Balick 2000, Campbell et al. 2006; Ross 2008). Many of these economic plants were capitalized in the colonial and historic periods (e.g. Logwood for dye, Mahogany for lumber, Chicle for gum, Allspice for seasoning). The value of the forest is the product of millennia of selection by the Maya (see Ford and Nigh 2010) which is evident in the inherent knowledge and respect that traditional farmers have for the forest today (Atran 1993; Balick 2000; Campbell 2007; Ford 2008; Gomez Pompa and Kaus 1990; Nigh 2008; Roys 1976; Toledo et al. 2008; Toledo and Barrera-Bassols. 2008).

The open maize field is a significant component of the milpa cycle, as evident in the ancient pollen of the lake cores. While up to dozens of different domesticated crops may be concurrently grown in the maize fields, it is the diversity of the weeds recorded in these fields that is remarkable. Since the majority of these weeds offer utility for the farmer's household, it is difficult to exclude them in calculating the overall value of the plot. Those same herbs and grasses noted in the paleoecological record speak directly to the management strategies of the traditional milpa cycle. The promotion of plant diversity in the initial sun loving, maize-dominated field guarantees the continuity of diversity into the reforestation and canopy stages of the cycle. This complex composition plays a long-term role in the creation and development of the Maya forest as a garden.

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XX WETLAND ENVIRONMENTS AND ANCIENT MAYA MANAGEMENT SYSTEMS OF THE NEAR-COASTAL EASTERN YUCATÁN PENINSULA: A COMPARISON OF NORTHERN BELIZE AND NORTHERN QUINTANA ROO, MEXICO

Scott L. Fedick, Jennifer Chmilar, Gerald Islebe, and Daniel Leonard

Two major freshwater wetland systems of the eastern Maya Lowlands are the riverine-associated wetlands around the New and Hondo Rivers of northern Belize, and the wetlands of the Yalahau region of northern Quintana Roo, Mexico, which are found in karstic depressions associated with the Holbox fracture zone. Both of these wetland systems are linked directly to the freshwater aquifers of the respective regions. In northern Belize the nature and timing of ancient Maya manipulation of the wetlands has been a source of long-standing debate. It has been suggested that ancient Maya use of wetlands in northern Belize has been significantly impacted by changes in the water table resulting primarily from changes in sea level. Recent and ongoing research in the Yalahau region has documented widespread evidence for manipulation of the wetlands by the ancient Maya, as well as evidence from wetland sediment studies that indicate a highly dynamic hydrological history. Comparing the historical ecology of the two major wetland systems has implications for the trajectories of ancient settlement and economic change in the eastern Maya Lowlands.

Introduction

The eastern side of the Yucatan Peninsula encompasses a great deal of environmental variability along 660 km from the Belize-Guatemala border at the Sarstoon River in the south, to Cabo Catoche at the far northern end of Quintana Roo, Mexico. Along this eastern side of the peninsula are found two extensive freshwater wetland systems that exhibit both similarities and stark differences (Figure 1). In northern Belize, a wetland system is found within the coastal plain associated with the New River and Hondo River. To the north in Mexico, the Yalahau wetlands stretch from the north coast of Quintana Roo to the south for about 50 km. Both of these wetland systems are now known to have been managed by the ancient Maya, presumably for subsistence production, yet the forms of management are strikingly different. In this study, the similarities and differences in both the environmental settings and ancient management strategies will be discussed, with a focus on recent and ongoing research in the Yalahau region.

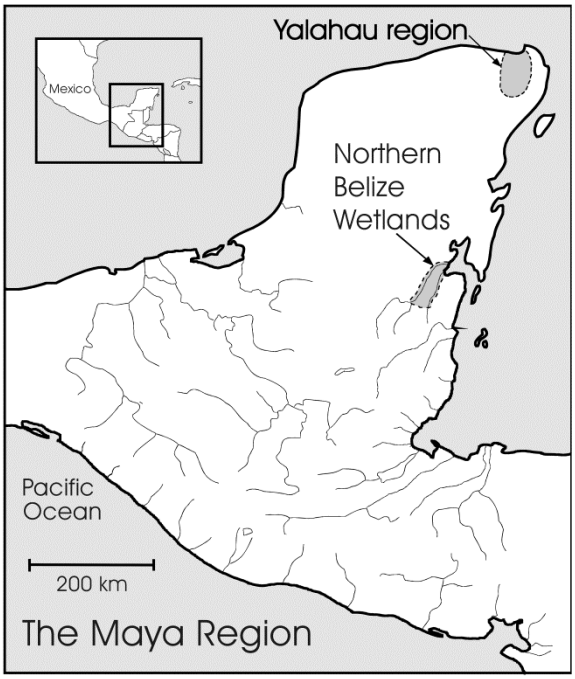

Figure 1. The Maya area with the Yalahau region and the northern Belize wetland zone indicated.

Background: Initial Investigations of Settlement and Wetland Use in the Yalahau Region

Ever since the first published announcement about the discovery of evidence for wetland manipulation by the ancient Maya associated with the Candelaria River of Campeche, Mexico (Siemens and Puleston 1972), there has been debate over the human origin of patterned ground in wetlands, the timing of wetland development, and the importance of wetland cultivation systems to ancient Maya subsistence (for summaries see Beach, Luzzadder-Beach, Dunning, Jones, Lohse, Guderjan, Bozarth, Millspaugh and

Research Reports in Belizean Archaeology, Vol. 9, 2012, pp. 289-295.

Bhattacharya 2009; Fedick 1996). A large portion of research on ancient Maya wetland use and manipulation has been conducted in northern Belize beginning with the Río Hondo Project in 1973 (Pohl 1990), followed by the first Pulltrouser Swamp study in 1979 (Turner and Harrison 1983), and the many subsequent and ongoing projects in the northern Belize wetland region (e.g., Beach, Luzzadder-Beach, Dunning, Jones, Lohse, Guderjan, Bozarth, Millspaugh and Bhattacharya 2009; Luzzadder-Beach and Beach 2009). The search for evidence of ancient wetland manipulation also spread across the interior of the southern lowlands, encompassing the extensive bajo systems of the Petén (e.g., Adams 1980; Beach, Luzzadder-Beach, Dunning, and Cook 2009).

The northern Maya Lowlands, it seemed, was not a participant in wetland cultivation, following, logically, the perceived lack of freshwater wetlands in the northern lowlands. In 1993, the Yalahau Regional Human Ecology Project was initiated in northern Quintana Roo, Mexico (Fedick and Taube 1995). The selection of this region for a new study was in part due to the existence of an unexplored freshwater wetland system, and the establishment in 1990 of the El Edén Ecological Reserve that encompassed one of the Yalahau wetlands.

The 1993 investigations by the Yalahau project established the first evidence for use of the wetlands in the form of ancient settlement clustering around wetlands, and a single rock alignment found within the margin of a wetland associated with the ancient Maya center of Naranjal (Fedick and Hovey 1995). In 1994, Arturo Gómez-Pompa, the founder of the El Edén Ecological Reserve, reported to Fedick the existence of rock alignments in the El Edén wetland. A brief visit by Fedick to the El Edén reserve in 1994, followed in 1995 by a more thorough reconnaissance, confirmed the existence of many rock alignment features within the wetland. A systematic survey of the El Edén wetland was conducted in 1996-1997, recording 78 rock alignment features, and conducting test excavations at a sample of four alignments representing different forms and settings of the features (Fedick et al. 2000).

Through subsequent years of study by the Yalahau Regional Human Ecology project, evidence was developed for extensive settlement throughout the region (Glover 2006), and rock alignments were noted in several other wetlands (Fedick and Morrison 2004). Ancient settlement in the Yalahau was found to date primarily to the Terminal Preclassic period, with a reoccupation in the Postclassic, beginning about 1250 A.D. (Fedick et al. 2011; Glover 2006; Glover and Stanton 2010). It was not until 2008 that the project turned attention back to the wetlands with the initiation of collaborative studies of wetland soils by colleagues from the Institute of Geology at the National Autonomous University of Mexico and with ecologists and paleobotanists from the College of the Southern Frontier, in Chetumal. The collaborative research also includes two archaeological dissertation projects by Jennifer Chmilar and Daniel Leonard, both of the University of California, Riverside, and conducted under the supervision of Scott Fedick. Before detailing the ongoing research on the Yalahau wetlands, it will be useful to first compare and contrast the physical settings of the Yalahau region and the northern Belize wetland zone.

A Comparison of Wetland Systems in Northern Belize and the Yalahau Region

The wetland systems of northern Belize and the Yalahau region are both situated in low-lying areas underlain by geological deposits of relatively young limestone originating in the Upper Tertiary period (Miocene and Pliocene epochs) (Lauderdale et al. 1979; Purdy et al. 2003).

The Yalahau wetlands are formed within north-south trending linear depressions that are associated with the underlying Holbox fracture zone (Tulaczyk et al. 1993). The total area covered by the Yalahau wetlands is about 134 km2, divided among more than 170 separate wetlands. These wetlands primarily range in area from about 0.5 ha to 800 ha, with three larger wetlands exceeding this range, the largest being an extremely long wetland covering 31 km2.

The coastal plain of northern Belize, between Blue Creek and Chetumal Bay "formed from deltaic progradation over the past 60 million years, forming tidal, lagoonal, and alluvial deposits that range from sea level to

about 10 m above sea level in elevation" (Luzzadder-Beach and Beach 2009:6-7). Wetlands within the coastal plain are found in depressions and low-lying areas adjacent to the New River and the Hondo River. The extent of the northern Belize wetlands is roughly comparable to the area of wetlands in the Yalahau region.

The northern Belize and Yalahau wetland systems are both linked directly to aquifers, the result being that the water level in the wetlands is basically equivalent to the water table, although in both cases the wetlands also serve to varying degrees as rainwater catchment basins. In northern Belize, the wetlands that are directly adjacent to the New and Hondo rivers can also receive backwater flooding during rainy-season surges in river flow. Northern Belize and the Yalahau region receive roughly the same amount of annual precipitation, between 1.3 m and 2.0 m, with the Yalahau region often receiving rainfall on the higher end of the range due to a sea-breeze convergence effect and the frequency of hurricanes that cross the northeast corner of the Yucatan Peninsula (Isphording 1975; Whigham et al. 2003). In the Yalahau region, there are no significant surface rivers, although a major system of underground rivers can raise the water level of wetlands through back-pressure during the rainy season. The extensive and thick Holbox-Xel Ha aquifer (Perry et al. 2003) underlies the Yalahau region, and is the only source for fresh water for the modern Cancun-Tulum development corridor, the fastest growing urban zone in Mexico. Both northern Belize and the Yalahau region are within about 50 km of the coast and are subject to seawater intrusion beneath the freshwater aquifer. As a result, the water table (and water levels in the wetlands) will move up and down in response to long-term changes in sea level. This fluctuation in the water table may have had profound impact on ancient Maya use of the wetlands in both regions.

Significant differences between the wetlands of northern Belize and the Yalahau region begin to emerge when soil formation and human modification are considered. Soil formation processes and the resulting edaphic environments would have presented dramatically different conditions for the ancient Maya to have adapted to, and responded to, given dynamic conditions.

Wetland soils of northern Belize are on average about 2 m deep, with profiles generally characterized by basal clays and paleosols (Mollisol/Vertisols/Histosol), deeply buried beneath gypsum, carbonate deposits, and so-called "Maya Clays", with modern topsoils consisting of Mollisols and Histosols (Beach, Luzzadder-Beach, Dunning, Jones, Lohse, Guderjan, Bozarth, Millspaugh and Bhattacharya 2009; Luzzadder-Beach and Beach 2009).

Ancient modification of the northern Belize wetlands consists primarily of excavated channels and canals intended to facilitate drainage of otherwise saturated surface soils, with some building up of soil planting-platforms between the excavated channels (although the extent of raised platform construction is debated, and likely minimal) (Beach, Luzzadder-Beach, Dunning, and Cook 2009; Beach, Luzzadder-Beach, Dunning, Jones, Lohse, Guderjan, Bozarth, Millspaugh and Bhattacharya 2009).

Recent and ongoing research on soils in the Yalahau region, both within the wetlands and in the surrounding uplands, have revealed a complex soil cover and ecological associations related to topographic variability, proximity to the water table, and long-term changes in water levels within the wetland depressions. A recent soil study conducted within the El Edén wetland found the dominant pedogenetic process to be calcium carbonate accumulation primarily in the form of micrite, synthesized by algae that grows in the wetland as periphyton communities (Solleiro-Rebolledo et al. 2011). The resulting wetland soils are classified as hydromorphic Epileptic Calcisols (Solleiro-Rebolledo et al. 2011, following IUSS Working Group WRB 2006). Interbedded within the Calcisols are darker, organic-rich horizons that have been classified as Calcic Sapric Histosols, Fluvic Epileptic Cambisols (Calcic, Humic, Eutric), and Endolepic Sapric Histosols (Solleiro-Rebolledo et al. 2011). Soil depths along a transect within the El Edén wetland varied between 12 cm and 62 cm, and averaged 31 cm (Solleiro-Rebolledo et al. 2011). Soils of the transition zone from the wetland to uplands graded from Cambric Leptosol (Calcaric) at the wetland edge to Leptic Phaeozems and Rendic Leptosols in the upland

forest (Sedov et al. 2007, 2008; Solleiro-Rebolledo et al. 2011).

Ongoing Research in the Yalahau Wetlands

The dissertation research of Jennifer Chmilar is intended to clarify the function of wetland rock alignments through an intensive program of high-resolution mapping of features previously recorded within the El Edén wetland (Fedick et al. 2000), coupled with a program of paleoenvironmental reconstruction based on wetland sediment cores. The high resolution mapping is being conducted with a laser total station, with vertical readings being taken at 5 m intervals across mapping blocks that each include multiple rock alignments. Four mapping blocks are being studied, which include a total of 12 rock alignment features. The absolute elevation for the datum in each mapping block will be determined with high-resolution Global Positioning System (GPS) receiver. The mapping blocks were selected to represent a range of physiographic settings and alignment forms. The completed digital maps will allow for modeling of water flow patterns to test hypotheses that the alignments were placed so as to manage rainwater runoff and/or to control the movement and deposition of sediments, with alternate hypotheses for function including field boundary markers or bases for fish weirs.

The study also explores how the function, form, and placement of rock alignments may have varied through time in response to changes in the level of the water table. Chmilar and Gerald Islebe extracted a total of six sediment cores from within the El Edén wetland, two of which extend over 1.5 m in length. The two longest cores now have multiple radiocarbon dates indicating they span approximately 4000 radiocarbon years. The cores are currently under analysis by Islebe for pollen identification to track changes in plant communities through time, and to potentially identify any plants that may have been cultivated in the wetland. The cores each exhibit multiple distinct horizons of alternating dark and light colored sediments, suggesting changes in soil formation processes under conditions of varying water level. An array of submergible pressure transducers has been deployed since July of 2010 within the El Edén wetland, and in a well located about 1 km outside of the wetland, to record water depth on an hourly basis to document modern seasonal fluctuations of the water table.

The dissertation research of Daniel Leonard is intended to discern the extent and distribution of ancient manipulation across the 170-plus wetlands of the Yalahau region, and to identify any pattern to the selection of wetlands for management based on variables including vegetation community, topography, and soils. As it was clearly not possible to visit all of the 170-plus wetlands, a sampling scheme was developed. First, a generalized vegetation classification was conducted for the wetlands using Landsat satellite images, and using vegetation information gathered for two transects conduced at the El Edén Ecological Reserve. A sample of 25 wetlands was then judgmentally selected to represent a range of wetland vegetation types, wetland sizes, and distribution across the wetland region.

Reconnaissance level survey was conducted in each of the 25 selected wetlands. Information on vegetation communities was gathered, and community boundaries were recorded with GPS receivers. Rock alignment features were recorded with GPS receivers, and standardized forms were used to collect information on several characteristics of rock alignments and the setting in which each is located. Topographic transects were established in five of the surveyed wetlands. These transects ranged in length from 200 m to 800 m, with detailed notes taken on vegetation patterns, and with elevation and soil depth recorded at 5 m intervals. As at the El Edén wetland, an array of submergible pressure transducers has been deployed since July of 2010 within two other wetlands to record water depth on an hourly basis to document modern seasonal fluctuations of the water table.

As part of the reconnaissance survey, a program of regional soil studies was conducted in collaboration with colleagues from the Institute of Geology at the National Autonomous University of Mexico. A total of 35 sediment cores was collected from 12 wetlands, and are currently under analysis.

Information on vegetation patterns within each surveyed wetland and from the topographic transects will be used to refine the Landsat-

based regional wetland vegetation classification. Vegetation communities will then serve as a proxy measure of elevation within the wetlands. It is explicitly recognized that environmental conditions within the wetlands have not remained constant over time, and that modern conditions therefore do not necessarily represent conditions in the past. Once a correlation is established between elevation, flooding period, and the distribution of plant communities and soils, computer-based modeling of changes in flooding periods in response to long-term water table fluctuations will provide a basis for interpreting the distribution of engineering features and the chronology of wetland manipulation.

Preliminary results from the regional wetland survey have defined 10 different wetland/transitional upland vegetation communities. A total of 436 rock alignment features have been identified and mapped in 19 of the 25 wetlands surveyed. The alignment features appear to be restricted to areas within the wetland with shallow soils generally less than 30 cm deep, and in association with the sedge marsh vegetation community. Wetlands lacking rock alignment features are those with deeper soils. One interesting finding of the survey is several wetlands with peaty soils reaching several meters in depth, a soil environment previously unidentified in the Yalahau region. Preliminary analysis of the sediment cores indicates substantial evidence for long-term changes in water levels within the wetlands.

Summary and Conclusions

There are both similarities and stark differences in the wetland systems found in northern Belize and the Yalahau region of the northeast Yucatan Peninsula of Mexico. Both wetland systems are in low elevation settings and are linked directly to aquifers, and are therefore subject to changes in water levels through time as a response to sea level changes. Soil formation in the two wetland systems has been distinctly different. In northern Belize, wetland soil profiles exhibit evidence of substantial aggradation, mostly in the form of gypsum precipitation from a rise in the water table. Modern wetland soils in northern Belize average about 2 m in depth. In the Yalahau region, much less aggradation is evident, with sediment formation due primarily to calcium carbonate accumulation in the form of micrite, synthesized by algae that grow in the wetland as periphyton communities. Modern wetland soils in the Yalahau region average about 30 cm in depth, although some notable exceptions to this have now been identified. Ancient Maya modification of wetlands in northern Belize took the form of channels and canals intended to facilitate drainage, while in the Yalahau region, modification appears to be limited to the construction of rock alignments, possibly intended to control the movement of water and soil within the wetland depressions. Ongoing collaborative, multidisciplinary research in the Yalahau region will hopefully soon answer many of the remaining questions concerning the function, extent, and timing of wetland modification in this unique landscape of the northern Maya Lowlands.

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XX THE ARCHAEOLOGY OF ST. GEORGE'S CAYE: RESULTS OF THE 2010 SEASON

Lauren A. Sullivan, James F. Garber, and Jaime J. Awe

There is no question that St. George's Caye played a critical role in the history and independence of Belize. Historic records have clearly documented the importance of the Caye and its position during the Battle of St. George's Caye in 1798 when the Baymen successfully repelled Spain's attempt to take Belize by force. While this location is a significant part of Belize's history, very little archaeology has been done on the island. During the 2010 season the primary focus of excavation was the local cemetery where several historic burials were re-located. The remains of a historic British Army officer's camp were also recovered.

Introduction

St. George's Caye played a vital role in the history and development of Belize as an independent nation. This small caye is one of hundreds of islands off the coast of Belize that are part of large reef system, the second largest in the world. Its predominant role in the early history of the English settlement was due to its position and shape (Figure 1). The reef system forms an offshore barrier that protects the coast. Because of the difficulties of navigation, these waters provided safe haven for merchants, buccaneers, and pirates that sailed the Caribbean. To access the mainland and harbors at the mouths of the rivers, one must navigate narrow passages through the reef and then follow a complex system of channels. In order to reach the Belize River, the country's main river system, one must pass by St. George's Caye, thus its strategic location guarding the port (Garber et. al. 2010).

St. George's Caye was the primary habitation for the initial English settlement and served as Belize's first capital. English and Spanish presence has been documented in the region since about 1550 when they began to exploit logwood around the Gulf of Campeche. This wood was indispensable for the dying of woolen goods in black, grey, purple and dark red. In 1677 Dominican Fray Joseph Delgado, traveled from Vera Paz (Guatemala) to Bacalar (Mexico) via southern Belize and across the Sarstoon River and then up the coast, where the English seized him, led by Bartholomew Sharpe, who had his headquarters at St. George's Caye. This incident confirms from Spanish records the presence of Englishmen in Belize in 1677. We are not sure

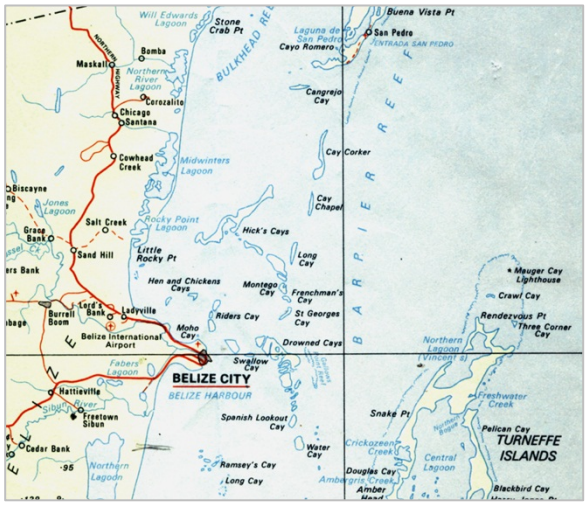

Figure 1. Map showing location of St. George's Caye.

when St. George's Caye was initially occupied but it was established as the first capital of Belize by the early 1700's. The Spanish captured the Caye in 1779 and a number of the residents were taken as prisoners to Cuba. When they returned, the settlement on the St. George's Caye was re-established in 1784 and the capital was moved to Belize City (Burdon 1931; Shoman 1994; Thompson 1988).

The Battle of St. George's Caye on September 10, 1798 represented the end of Spain's attempts to conquer the territory that is now known as Belize. After the vote to stay and fight, the Spanish were permanently driven off and a British military outpost was established on the Caye. Although Spanish never returned, the British military did not initially allow settlers back on the Caye after the battle.

Although this battle happened over 200 years ago, it is still plays a large role in Belizean

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culture, history, and identity. Even a revisionist view of Belizean history cannot reduce the importance of this conflict. This legacy is seen during the annual September Celebrations when people all over the country honor the Battle of St. George's Caye. These celebrations are seen as a unifying event and many Belizeans refer to the defenders of the Caye as "our forefathers" – unifying all Belizeans and not distinguishing between the different groups that existed at the time (Straughan 1998).

Figure 2. Thomas Potts tomb, St. George's Caye.

The Cemetery at St. George's Caye

The primary focus of the 2010 season was the St. George's Caye cemetery. Were it not for a one modern era burial crypt and a few modern memorial markers, one would hardy know the St. George's Caye cemetery was a burial ground much less the oldest non-Maya historic cemetery in Belize. Storm surges, hurricanes, vandalism, and the ravages of time have obliterated virtually all signs of its once striking appearance (Garber et. al. 2011).

Records indicate that the cemetery was reasonably well maintained into the 1920s. Destruction began with the hurricane of 1931 followed by hurricanes Hattie in 1961 and Greta in 1978. Hurricane Hattie did significant damage to the cemetery cutting an E-W channel across the width of the island, removing the southern edge of the cemetery and the cemetery's most notable marker, the elaborate above ground burial crypt of Thomas Potts (Figure 2). According to residents, the tomb slid into the cut, which was later filled in to prevent additional erosion. The exact location is not

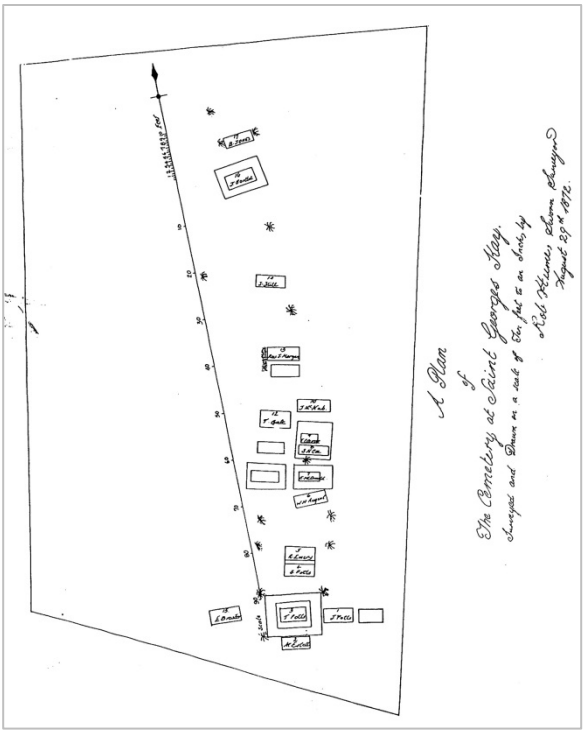

Figure 3. 1872 map of St. George's Caye cemetery by R. Hume.

known but it is apparently now outside the limits of the cemetery wall. Erosion from hurricane Greta in 1978 exposed a marble medallion that appears to be from the Potts' tomb (Garber et. al. 2011).

Photographs of the cemetery taken prior to the hurricanes indicate that it was once very similar in appearance to Yarborough Cemetery in Belize City. The graves typically consisted of a low rectangular platform composed of coursed red bricks held together by coarsely tempered cement capped with a large white marble or black sandstone slab upon which is an inscribed epitaph. These bricks were brought over from Europe as ballast in the hulls of ships and were used in a variety of building constructions such as St. John's Church and older buildings in Belize City. Residents indicate that there were once numerous unmarked graves in the St. George's Caye cemetery as well. Residents also note that after the hurricanes had broken up many of the stones, lobster fishermen used them for ballast in their traps.

The cemetery on St. George's Caye is the earliest known European cemetery in Belize. It and the slightly later Yarborough Cemetery in

Belize City were known as the burial grounds for the congregation of St. John's Church, which was built in 1812. Records do not indicate when the St. George's Caye cemetery was initially established and it is not shown on the 1764 map of the Caye. The earliest carved stone on record is 1787 and our excavations this past summer confirmed earlier unmarked graves. A map made in 1872 (Figure 3) documented the location of 20 graves in the cemetery prior to the destruction of the hurricanes, and James Purcell Usher recorded 21 epitaphs in 1907 (Usher 1907). In 1926 Thomas Gann noted an additional epitaph (Gann 1926). Mary Check-Pennel (1989) also documented eight additional burials in her comprehensive study of cemeteries in Belize. In modern times, only a few memorial stones have been placed in the cemetery along with one modern burial (Garber et. al. 2011).

The Officer's Barracks

Based on a high density of material recovered from a test pit in 2009 at the back of the cemetery five new excavation units were placed in this area – parallel to the back of the modern cemetery wall (Bentley et al. 2011). Materials recovered from the upper levels typically included whole Queen conch shells, brick, and mortar (not arranged in any specific pattern) and were most likely deposited by various storm surges that have passed across the Caye. A high concentration of military artifacts suggests that this was a midden associated with military officers barracks. These artifacts included a number of West Indies Regiment buttons (Figure 4). West India Regiments were infantry units of the British Army recruited from those stationed in the Caribbean Colonies from 1795 to 1927. The first button was recovered in 2009 and belonged to the 7th West Indies Regiment (Figure 4, left). Although historical documents indicate that several detachments of various West Indies regiments (1st, 2nd, 3rd, 5th, and 6th) served in Belize, the 7th was apparently never assigned there. Friends in different regiments may exchange buttons as souvenirs (Palacio 1976). In 1812 Lt. Colonel George Arthur purchased a majority of the 7th Regiment and soon after was given the post of assistant quartermaster general in Jamaica where the 7th

Figure 4. British military buttons recovered on St. George's Caye: left, 7th West Indian Regiment; center, Duke of York 5th West Indian Regiment; right, 2nd Regiment of foot.

was formed. Here he began his career with the Colonial Office and was appointed Superintendent of the Bay Settlement (Belize). He served in that post from 1814-1822 and may have brought some of his best soldiers from the 7th with him (Garber et. al. 2011).

Several buttons inscribed with "Duke of York W. Indian Regiment" and the Roman numeral "V", indicating it was part of the 5th West Indian Regiment were also located (Figure 4, center). A number of these buttons had an interesting back mark produced by die stamping: "I Nutting & Son". These buttons were from Covent Garden in London, which were big producers of military buttons between 1800 and 1829 (Nayler 1993). It is interesting to note that on one of the button backs the word Covent is misspelled as Coovent. During the second half of the eighteenth century there was already "an existing demands for imitation precious metalwares" (Clifford 1999:241). There is some evidence that craftsmen would deliberately misspell marks, most often on Pewter plates, to give the impression that their product was a superior imported product (for example using "LQDON" instead of "LONDON") (Benahmou 1991; Clifford 1999).

We also located a button with the number "2" over a crown from the British Army Second Regiment of foot (Figure 4, right). The British Army started marking buttons in 1767 and this button is similar to buttons that date from 1855 to 1881. This regiment is known for participating in Battles again the French in the West Indies (1794 to 1797), Ireland (1798), Holland (1799), and Egypt (1800) and is thought to have served as marines in various other battles. The earliest button recovered is copper with no back mark and likely dates before 1750. Buttons with back marks were not produced

Figure 5. Artifacts from St. George's Caye: left, pipe bowls and stems; right gambling die.

until the second half of the 18th century ("2nd (Queens Royal") Regiment of Foot").

A silver Spanish Real from 1775 was also recovered from these units in the back of the cemetery. Spanish Reals were used as legal tender in North America and in England during the late 1700's (Martin 1977). The Spanish 8 Real was the inspiration for the American silver dollar.

Other artifacts that support the interpretation of this deposit as a military midden include a lead grapeshot ball, a gun mechanism, gunflints, and several musket barrel fragments. Gunflints are seen from the early 1700s to early 1800s and were used in flintlock guns. The gun mechanism appears to be from a British Brown Bess. There were several versions of this gun. The one we have appears to be either the marine version or the East India Company version.

As one might imagine, the military out on St. George's Caye were not working all of the time. Based on the artifacts recovered there was plenty of time to smoke, drink, and gamble. Several clay pipe bowls and stems were recovered (Figure 5). These white kaolin clay tobacco pipes are typical of the pipes produced in many areas throughout England and the Netherlands around the early part of the 17th century. Most pipes were distributed locally; however, port towns and cities allowed for overseas trading thus bringing clay pipes to the North American colonies. These pipes were extremely inexpensive, resulting in all social and economic classes owning and disposing of them. There were typically broken and discarded within one to two years (Walker 1977).

Gambling was a powerful economic and social force in the English speaking world from 1660s to 1800s and Englishmen were said to have bet on everything from dog fights, births, deaths, races, chess, and even military actions. The onset of the Revolutionary War did nothing to slow down gamblers. The Continental and British armies tossed dice and cards into the knapsacks and marched off to fight.

For commanders on both sides, gambling was a constant problem. George Washington's headquarters repeatedly issued orders trying to stop the military to stop wagering. Washington shouldn't have worried as the British army was facing the same problem. "The men are given to great gambling," an English officer wrote, "and most shan't have a coin left, even parting with their shirts at the dice and sundry card games." (Crews 2008). Our two die recovered from St. George Caye suggest the military here was also gambling (Figure 5).

Figure 6. Artifacts from St. George's Caye: left, latticino stemware; right decanter stoppers.

Evidence of drinking is found in the two glass decanter stoppers, the base of an Italian Latticinio stemware glass, bottles, and other various sherds of broken glass and ceramics (Figure 6). In 18th and early 19th century drinking was considered socially acceptable, especially by military officers. This was not the case for soldiers, as drinking was thought hinder performance and cause discipline problems. The army did issue certain alcoholic beverages to the troops to maintain health and morale but these were much more monitored that what was seen with officers. Between 1755 and 1820 wine was the drink of choice for officers. In many cases the wines were "fortified" with brandy making the drink stronger and sweeter. Other alcoholic beverages included were malt liquors like beer, ale, and porter, spirits like rum, brandy, gin,

whiskey, and fermented cider. Rum was one of the more popular spirits and was seldom sold by individual bottle and instead in greater quantities. Rum was often given out for "health" issues – as a preventative and treatment for illness - with half the portion consumed before work and half after (Jones and Smith 1985; Kopperman 1996).

The most common type of bottle found in association with British military is the dark green glass wine bottle. These were thought to be multipurpose bottles also used for vinegar, linseed oil, and other non-alcoholic beverages. Decanters associated with bottles used for alcoholic and non-alcoholic beverages and most are thought to be British in origin (Jones and Smith 1985).

The two primary forms used for drinking glasses were tumblers and stemware – both lead glass of British origin. Stemware seems to be mentioned in newspaper advertisements and found in archaeological context quite frequently between 1756 and 1763. After this time period there is contradictory evidence, records of sales suggest more wine glasses sold but archaeological excavations suggest tumblers were the more common form. It is also noted that tumblers, although plainer, were more expensive. Price was possibly based on the weight of glass and tumblers were heavier. Nonetheless, wine glasses were described as being "socially and aesthetically superior" to tumblers (Jones and Smith 1985:38). The latticino stem or "opaque-twist" stem –style recovered from the Caye was most popular in the late 1770's, although they were seen earlier (Figure 6).

Records suggest that officers' messes/barracks were organized by the 1750's but became much more popular by the 1780's and onward. They were developed so that "the Officers, without distinction of rank, can be properly and genteelly accommodated" (Jones and Smith 1985:113). The barracks were seen as a way to create a cohesive unit and to reinforce the status of military officers. They were considered especially important when officers were stationed outside Britain. When there was no mess area the officers were dependent on local commercial establishments, sutlers, or private dinner invitations and none of these would have been available on St. George's Caye. A black and white drawing titled "Life at St. George's Caye, Belize, 1886" shows the officer's barrack structure along with a group of British officers as well as officers wearing the traditional dress of the West Indies Regiment. This structure can also be seen in a photo from before the 1931 hurricane. Today, part of the St. George's Caye Resort is situated where the barracks were located.

In the level below the military midden a concentration of human bone and teeth were recovered. Among these human remains were fragments of mahogany or Santa Maria wood. We believe this wood to be fragments of a burial coffin based on their association with the human remains. At the bottom of this level human long bones were located in the northeast corner of the unit at a depth of approximately 65 cm. Based on the discovery of human remains and coffin fragments we conclude that this is the remains of an unmarked grave which does not appear on the 1872 plan map (Bentley et al. 2011).

Burials

The other excavations conducted in 2010 were focused on locating the burials documented on the early cemetery maps. Excavations that exposed an empty burial chamber were expanded and a large rectangular cement object was located (Figure 7). The lid was made of a crude cement mixture with stones and marine shells (including a few whole conch shells). Earlier photos and burial platforms at Yarbrough Cemetery in Belize City suggest that the brick burial platforms were capped with cement tops upon which an inscribed marble slab was placed. In this case the marble slab was not recovered but, as mentioned earlier, many of the locals have mentioned that marble slabs broken up by storms were used as ballast in lobster traps. During excavations disarticulated human bones were recovered, which were probably originally from the burial chambers (Bentley et al. 2011). Based on cemetery maps, this is most likely the burial of John Emmons Hill who passed away on May 11, 1808.

Below the cement lid was an unmarked grave that included an articulated adult human skeleton lying on the base of a coffin made of mahogany or Santa Maria (Figure 7). The

Figure 7. St. George's Caye excavations showing burial chamber, lid, and wood coffins.

Figure 8. Brick layer at bottom of burials, St. George's Caye.

remains of a child and a child-sized coffin were placed inside the larger coffin. The remains of yet another unmarked mahogany coffin were associated with a metal gate latch and metal fence posts – most likely associated with a small fence marking a grave (Bentley et al. 2011).

As part of our plan to relocate documented graves, an excavation unit was placed between the modern day Battle of St. George's Caye Monument and the concrete base of the flagpole. On the 1872 map two graves lying side by side are shown in this area: one for Reverend John C. Mongan and the other is unmarked. Mongan's epitaph from his stone on St. George's Caye was recorded by Usher (1907) (see below). A plaque dedicated to Reverend Mongan was also placed at St. Mary's Church (Check-Pennell 1989) (see below). The layers of bricks uncovered appear to be the bottoms of two different burial chambers (no lids were found) (Figure 8). Outside the rows of bricks found several disarticulated human bones with a coffin tack embedded in a piece of mahogany or Santa Maria wood was recovered. Both burials had been severely disturbed by storm surges (Bentley et al. 2011).

Plaque from cemetery stone (Usher 1907):

In Memory of
REV'D. JOHN C. MONGAN, M.A.
INCUMBENT OF ST. MARY'S CHURCH
WHO DEPARTED THIS LIFE
ON THE 22ND AUGUST, 1860
AGED 60 YEARS.

Plaque from St. Mary's Church (Check-Pennel 1989):

REV. JOHN CHARLES MONGAN, M.A.
LATE INCUMBENT OF ST. MARY'S, BELIZE
AND GARISON CHAPLAIN OF BRITISH HONDURAS
ALSO VICAR OF DISHANE
AND RECTOR OF KILNEMARTORY,
IN THE COUNTY OF CORK, IRELAND.
HE DIED ON THE 22ND DAY OF AUGUST
1860
AGED 60 YEARS
REGRETTED BY ALL WHO KNEW HIM.

"Blessed are ye that sow beside all waters."
Isaiah xxxii, 20.

Conclusions

The excavations on St. George's Caye have allowed us to confirm the presence of the British military outpost that was established on the Caye after the battle in 1798. We have also been able to re-locate a number of burials that were noted on the old cemetery maps but were

no longer visible as well as a number of unmarked graves. It is our hope to continue to document these early burials that have been obscured over the years by hurricanes and other events in order to better understand this important part of Belizean history.

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XX ARCHAEOLOGY AND THE "GREY LADY" GHOST OF ST. GEORGE'S CAYE

James F. Garber and Lauren A. Sullivan

One of Belize's most often told ghost stories is that of the "Grey Lady" ghost of St. George's Caye. A search of the internet, archives, and interviews with island residents has revealed three distinct versions of the story. One involves a lady friend of the famous pirate Captain Henry Morgan, another involves a headless ghost searching for her lost lover, and the third is the story of a young girl who drowned during the horrific hurricane that struck Belize on September 10, 1931. Archival research, interviews, archaeological investigations, and a search of a Belize cemetery have revealed the facts surrounding this intriguing story.

Introduction

The concept of a "Grey Lady" ghost is quite common in British folklore. They are believed to typically inhabit castles, hospitals, and libraries. The grey gowns that they typically wear are said to have their origin in the grey uniforms worn by nurses in British military hospitals. While conducting archaeological research on St. George's Caye, residents frequently referred to, and talked about, the Grey Lady Ghost that inhabits their island. In the course of our research we had an opportunity to excavate a feature that was reportedly associated with the ghost. In the course of our research we encountered three distinct versions of the Grey Lady story.

Version 1

Several internet web sites (Moon Belize Travel Guide, Belize Trip Advisor, and Caribbean Property Magazine) tell a version of the Grey Lady ghost story that involves the famous 18th century English pirate Sir Henry Morgan (Figure 1). The following can be found on several internet web sites.

> In all good myths and legends, the details are often sketchy, but facts are usually delicious. The famous legend centers around Captain Morgan's lady, who he brought with him during one of his sojourns to Belize. This lady it seems was a very independent and tempestuous woman. One stormy night, after a particularly fierce quarrel, having to do with the seaman who was standing watch the night before, Captain Morgan forced his lady to walk the plank into the ocean off St. George's Caye. She wore a gray gossamer gown that fateful night, whipping around her legs in the angry wind. The lady in grey has been roaming St. George's Caye trying to find her lover. Don't scoff – some islanders will speak no ill of the Grey Lady, and on stormy nights they stay safely behind closed doors.

While Captain Morgan's exploits in the Caribbean have been well documented, there is no evidence of his presence in the waters immediately around St. George's Caye.

Figure 1. Popular 18th century woodcut of Sir Henry Morgan

Version 2

Another version of the Grey Lady ghost story was told to us by children of property owners on St. George's Caye. In this version,

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Figure 2. Lady Jane Grey, the "Nine Days Queen" of England.

Figure 3. Beheading of Lady Jane Grey

the Grey Lady is a headless woman who roams the caye at night searching for her lover/husband who was lost at sea during a rough storm. A sheet of zinc that had blown off a roof during the storm apparently decapitated her. Those who told us this version were all in their teens or early twenties. In all likelihood, the "headless" aspect of this story has been influenced by Hollywood and the true story of Lady Jane Grey the "Nine Days Queen" of England (Figure 2). Lady Jane Grey was queen of England for only nine days (July 10-19, 1553). She was beheaded on February 12, 1554. Her story is well known in British history and folklore. Her beheading has been the subject of several stories and been featured in several works of art (Figure 3). There is a website that sells dolls of beheaded famous historical figures including Lady Jane Grey. Version two of the St. George's Grey Lady story is the fusion or syncretism of the headless Lady Jane Grey with the popular British concept of Grey Lady ghosts and the bloody headless ghost stories of Hollywood.

Figure 4. Photo of Heloise "Jim" Masson (center in dark suit) ca. 1925. Photo courtesy of Van Bibber family photo collection.

Version 3

This version was recounted to us by several island property owners. It is the story of a young girl who was killed on St. George's Caye in the hurricane of 1931. She has reportedly been seen as a ghost by island residents and visitors and is simply known as the "Grey Lady". The girls name is Heloise Masson (Figure 4). While her mother was pregnant with Heloise, the Masson family received word that a relative, Jim Masson, who had signed up with a British regiment to fight in WWI, was killed in Europe (Figure 5). The family believed that the new baby would be "Jim". Although named Heloise, she was always known as "Jim". "Jim" was out on St. George's Caye visiting friends when the hurricane struck on September 10, 1931. This was one of the most devastating hurricanes to hit Belize in historic times. All of

Figure 5. Photo of Jim Masson, WWI soldier killed in Europe. Photo courtesy of Masson family

the houses on the caye were of wood and could not provide adequate shelter in a hurricane. The following details come from a written account of one the survivors. As was the custom, the islanders tied themselves in a rope chain fastened to the sturdiest feature they could find. In this case it was the foundation of a large water vat. "Jim" was the first on the line, closest to the vat. The winds and storm surges caused the vat to topple, pinning "Jim", still alive, amongst the debris. Others on the rope tried to frantically remove the debris and pull her out but to no avail. She drowned as the waves surged over her head. After the storm passed the survivors were able to find shelter and spend the night in what the author of the account described as a toppled octagonal metal water tank a nearby yard. The following day a sailboat showed up and took them to Belize City. "Jim's" body was wrapped in a sheet and pulled behind them in a dory. When they reached Belize City Jim's father was there and took charge of the body.

After her death, islanders would occasionally see an apparition of a young girl that they believed was "Jim" and refer to her as the "Grey Lady". She is reported to have been seen in front yards and verandas and is supposedly a good or friendly ghost not wishing to cause anyone harm or ill will.

Figure 6. Surface photo -bricks of the water vat foundation

The Archaeology

While conducting a pedestrian survey of the island, we encountered a row of mortared bricks angled in the ground (Figure 6). The bricks appeared to be the typical English red/orange bricks that were used as ship ballast. Similar bricks were used in the construction of burial monuments in the cemetery as well as older buildings in Belize City. Bricks of this type were loaded as ballast into the hulls of ships leaving England and were dumped prior to taking on their heavy loads of mahogany. We asked the landowner, Paul Hunt, if he knew anything about the brick feature. He informed us that he had been told that it was the foundation for the water vat that pinned "Jim" in the 1931 hurricane. What can be seen in Figure 6 is the same feature that Mr. Hunt had seen. We contacted John Masson, of Belize City, who had seen the intact feature as a boy. He remembered the feature being approximately 15 feet across and a few feet high.

We opened an excavation area to clear what remained of the feature. Unfortunately, the water table is very high and we encountered water approximately 15 cm below the surface. By using a gasoline powered bilge pump we were able to remove enough water to clear all

Figure 7. Excavation of the water vat foundation.

Figure 8. Gravestone of "Jim" Masson, Lords Ridge Cemetery, Belize City

but the deepest part of the feature (Figure 7). As can be seen in the photo it has six sides. We do not know if this is the foundation of the tank that pinned "Jim" or was perhaps the foundation of the tank in which the survivors sought shelter (note that the written account referred to the shelter tank as having eight sides). The brick construction is extremely well made and designed. Only minor cracking on a few of the bricks was evident. Although the feature is at a steep angle due to undercutting, it appears intact. The quality of the brickwork is such that it had to have been designed and constructed by experienced bricklayers. Bricklayers had been brought over from England to construct St. John's Church in Belize City. The overall style of the construction, particularly the small steps at the base is very similar to the brickwork of the sugar mill at Indian Church and is probably of the same period (1860s).

Additionally, John Masson informed us that "Jim" is buried in Lords Ridge Cemetery (Belize City) and that her grave is marked "Jim".

With his assistance we located the grave (Figure 8). The information on the stone confirms many elements of the story.

IN LOVING MEMORY

OF

HELOISE ALICE MASSON

"JIM"

BORN SEP. 6TH 1917

DIED DURING THE TERRIFIC HURRICANE ON

SEPT. 10TH 1931

ST. GEORGE'S CAYE B.H.

THOU SHOULDST CALL ME TO RESIGN

WHAT MOST I PRIZE, IT NEVER WAS MINE

I ONLY YIELD THEE WHAT IS THINE

THY WILL BE DONE

The Grey Lady ghost story is one of Belize's most commonly told stories. Through archival research, interviews, and archaeology we were able to reveal the true elements of this part of Belize history.

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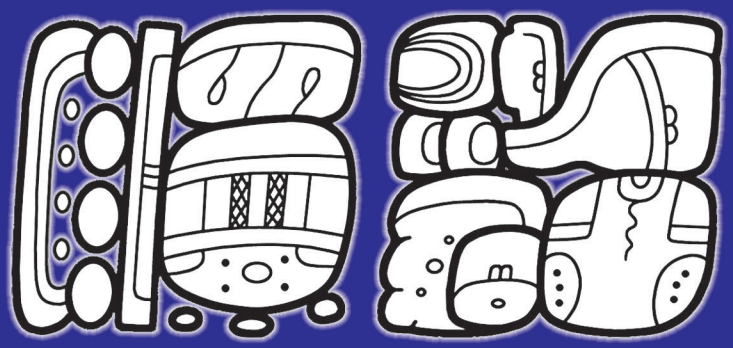

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