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Preclassic Settlements and Geomorphology in the Highlands of Guatemala: Excavations at Urías, Valley of Antigua

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Archaeological investigations in the Antigua Valley, Guatemala, in 1996, by the Proyecto Arqueológico del Area Kaqchikel (P.A.A.K.) were focused on the question of the origins and evolution of the ancestors of the Maya. Researchers hypothesize that the place of the origin of the Maya language lay in the linguistically diverse area of the western highlands of Guatemala (Campbell and Kaufman 1980; Kaufman 1976). Archaeological evidence suggests, however, that Maya culture evolved in the Pacific piedmont and central and eastern highland zones of Guatemala, a geographic and cultural bridge between the precocious Pacific Coast cultures of the Early Preclassic (1550-1000 B.C.) and the florescence of the lowland Maya civilization in the Classic period (A.D. 300-900)(Blake et al. 1992; Blake et al. 1995; Bove 1989; Clark and Blake1994; Coe and Flannery 1967; Green and Lowe 1967; Pye and Demarest 1991) (Figure 12.1). Throughout the Preclassic period and until A.D. 200, the Pacific piedmont and the highlands were the site of the gradual evolution of complex society culminating in cultures using the Izapan style of sculpture, a precursor of Classic Maya styles of the Petén lowlands (Parsons 1986; Shook et al. 1979; Sharer and Sedat 1987). Critical for understanding the evolution of the Classic Maya are the adaptations and cultural affiliations of early agriculturalists in this zone. Pottery dating to the end of the Early Preclassic period has been found in a few locations in the highlands. These sites include Kaminaljuyú in Guatemala City, Cakhay, near Tecpán, Semetebaj at Lake Atitlán, and Salamá in AltaVerapaz (Sharer and Sedat 1987; Shook et al. 1979; Swezey 1998;

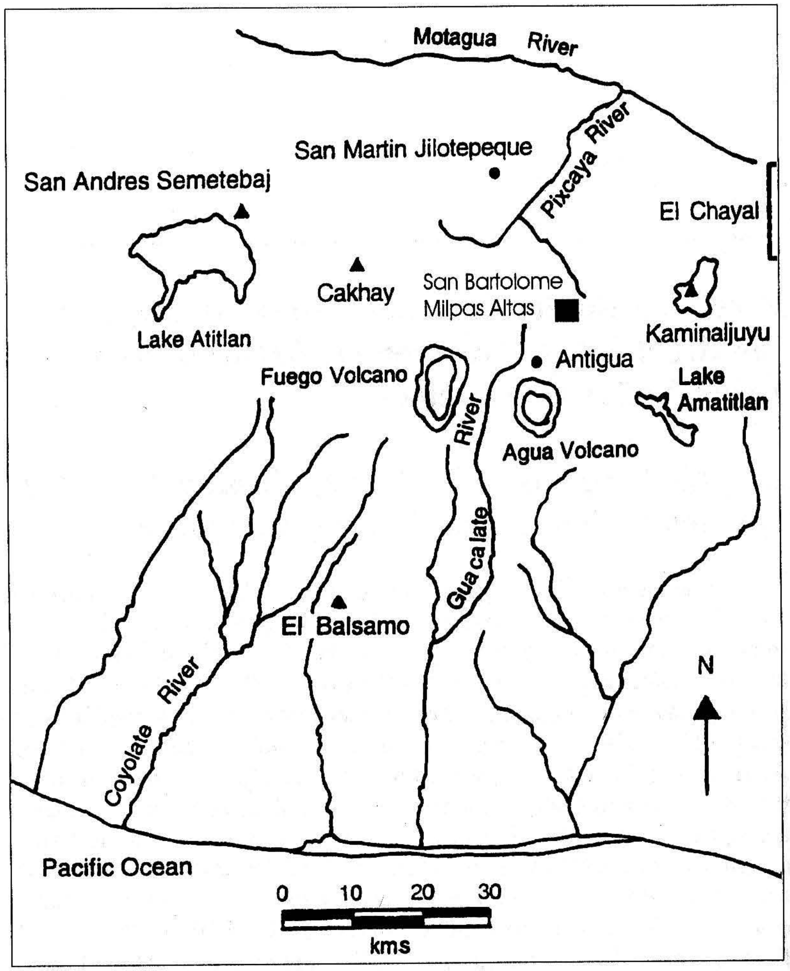

Figure 12.1 The central highlands of Guatemala, showing important sites, town and geomorphological features.

Wetherington 1978). Some of the pottery of this period is related to coastal forms and types, suggesting that there was interaction with Pacific Coast peoples at this time. The mixed archaeological contexts of these materials, usually found associated with later ceramics, has left questions concerning early highland culture unanswered.

The goal of our research in 1996 was to find and excavate a Preclassic site in the Guatemala highlands in order to resolve questions about the adaptations of these early cultures in a mountainous environment and their

interactions with other groups. Our investigations at Urías were rewarded by the discovery of a multicomponent site with stratified Middle Preclassic pottery, faunal remains, and lithics dating to about 900-300 B.C. The survey by Farrell of approximately 5 km^2 at the base of the Agua Volcano and near the Lake Quilisimate allowed us to characterize the regional sites, soils and geomorphological processes of the zone in which the Preclassic people lived. In 1997, Freidel took soil samples within the Lake Quilisimate in order to assess the past volcanic and climatic changes in the area.

Archaeology of the Study Area

In the southern end of the Antigua Valley, there are different environmental zones that have Preclassic sites (Figure 12.2). One of these areas is a broad expanse of land near the banks of the Guacalate River and on the nearby slopes of the Agua Volcano. Two of these sites had ceramics with Early Preclassic modes as did the previously excavated site of Rucal located on the volcanic slopes (Robinson 1994; Robinson and Pye 1996). Sites with the subsequent early Middle Preclassic ceramics of 1000-700 B.C., cross-dated to the Charcas Period at Kaminaljuyú (Popenoe de Hatch 1997), existed at many of the same locations and at Los Terrenos and Pompeya, sites located at the base of the volcano near Ciudad Vieja and San Miguel Escobar (Shook 1952). At Rucal, farther up the volcano, excavations found deeply buried early Middle Preclassic platforms (Robinson and Pye 1996).

Another area of potential early settlement was the former Lake Quilisimate, approximately 1 km northwest of Ciudad Vieja. This lake, drained in the 1920s for malaria control, covered approximately 4 km^2. The lakebed is now planted in coffee and only a small marsh area and pond remains in the northern section. A 10 m tall platform stands on the lakebed approximately 300 m from the rise in contours defining the old shoreline. This platform, discovered by Rodrigo Aparicio in 1990 and named by local people *Cerro Encantado* (site B382090), had associated Preclassic, Classic and Late Postclassic pottery (A.D. 1200-1525). The location of the platform is similar to that of some complex Early Preclassic sites of the estuaries of the Pacific south coast, suggesting that it, too, might date to that period. However, excavation at the site found that the mound dated to just before the Spanish conquest. In the beginning this project hypothesized that the rich volcanic soils and plentiful rainfall of the area would have provided an ideal environmental setting for populations adopting agricultural and sedentary lifeways during the Preclassic period. As well, the aquatic resources in this area of the Antigua Valley would have been attractive to Preclassic peoples. Nearby was the

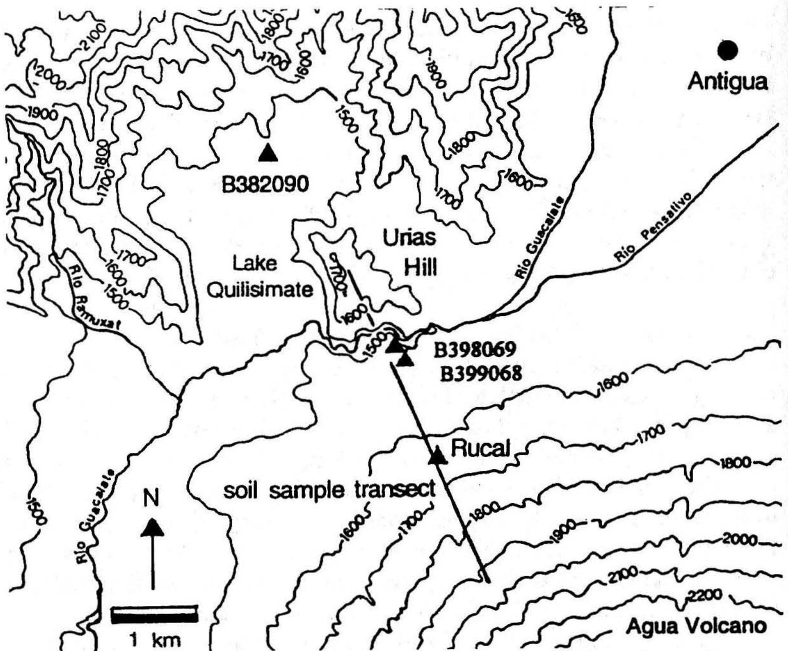

Figure 12.2 The Antigua Valley, showing the locations of the soil sample transect, sites, rivers, lakes and volcanoes.

Guacalate River, Lake Quilisimate, and swamps that had fish, turtles, crabs, and other aquatic species. The environmental location provided plentiful and necessary resources for early agriculture, hunting, and fishing in the zone.

Urías

Urías (B399068) lies on an approximate 500-m wide, gently sloped expanse of land at the base of the Agua Volcano. This parcel of land has several surface archaeological sites spanning the Preclassic through the Late Postclassic periods. We chose to work at two locations, Urías and site B398069, because there was the possibility they were both Preclassic in date. Urías was distinguished by having a 1.5m tall mound.

Suboperation 1, a 1.5 x 1.5 m test excavation, was placed at the northern base of the mound (Figure 12.3). The soil and sediment stratigraphy in the excavation is consistent with that of Andisols, that is layers of ash (or tephra) in which several buried soils have developed. The upper 40 cm of the excavation is a plowed A horizon (Ap1 and Ap2), containing a mixture of recently cultivated soil and colluvium from

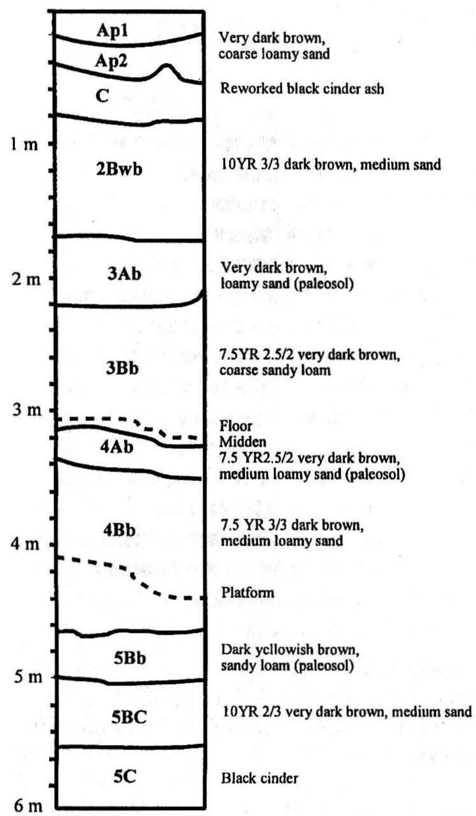

Figure 12.3 Profile of the east wall of Suboperation 1 at Urías.

slopewash. This layer is a very dark brown, coarse loamy sand. Below the A horizon is approximately 20 cm of reworked black ash, a C horizon. The first buried B horizon (2Bwb), which begins at approximately 75 cm below the surface, is a dark brown, medium sand, with pumice cobbles. At a depth of approximately 1.70 m from the surface is an apparent buried A horizon (3Ab), which extends to 35 cm. This is a very dark brown loamy sand, which shows a spike in organic carbon content (2.3% organic carbon) and a very high total phosphate value (758 mg/kg) (Figure 12.4). At 2.2 m, a B horizon (3Bb) of very dark brown, coarse sandy loam, extends to a depth of 315 cm below the surface. Below this B horizon is another buried A horizon (4Ab) layer (15 cm thick) of very dark brown, medium loamy sand, which includes a midden deposit. Beneath the midden layer is a buried B horizon (4Bb), a very dark brown, medium loamy sand, including what appears to be a early Middle Preclassic packed earth platform. At approximately 4.65-5.0 m is a dark yellowish brown sandy loam (5Bb), which appears to be thixotrophic or "quick clay," which becomes fluid when agitated, for example, in an earthquake. The textural change, very high organic content (2.9%), and the high total phosphate (517 mg/kg) of this level suggest that this is another buried soil. A transitional 5BC horizon extends to a sterile black cinder layer (5C) at 5.5 m and the excavation terminated at 6 m with bedrock.

Ceramics show that the stratigraphic soil divisions and cultural

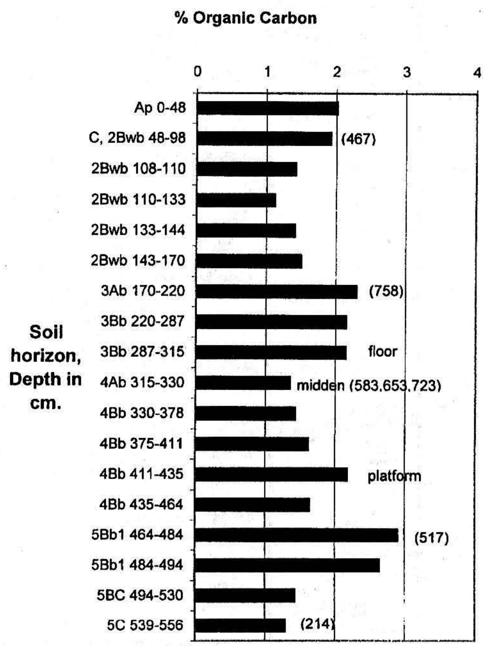

Figure 12.4 Percent organic carbon and total phosphate, east wall, Suboperartion 1, Urías. Numbers in parentheses are total phosphate in mg/kg.

features correlated with distinct chronological periods. Artifacts from the plow zone date to the Classic (A.D. 300-900) and Late Postclassic periods. Middle Preclassic artifacts were first encountered at about 2 m in depth in the 3AB horizon. At 3 m in depth there was a packed earthen floor. It marks a transition to earlier Middle Preclassic pottery in a 1 m deep trash midden deposited in volcanic sand. The midden has an organic carbon content of 1.35%. The total phosphorous in three midden samples ranges from 583 to 723 mg/kg. These high P values suggest the deposition of refuse. At 4.1 m below the surface, visible in the west wall of the profile but poorly defined in the east, is a stepped platform that terminateson about 20 cm of hard packed soil of the 4B horizon. This platform is better defined in the adjoining Suboperation 2 excavated in 1997 and is estimated to 60 cm high. It is probably an early Middle Preclassic mound. The lowest levels of the excavation, to 5.6 m in depth, had a few sherds that seem to be material that has worked down from upper levels, rather than pottery of an Early Preclassic complex.

The natural stratigraphy, the seriation of the ceramics, and comparison to the ceramic chronologies at Kaminaljuyú and the Pacific Coast suggest there are two different Preclassic chronological periods represented in the excavation. This interpretation rests on the analysis of 456 diagnostic rims and decorated body sherds, amounting to 19% of the excavated ceramics. Ceramics of the later Middle Preclassic period (700-300 B.C.) lie between 2.4 m and the 3 m deep earthen floor. The diagnostic Sacatepéquez White Paste White Ware (Xuc Ware)

predominates in these levels and indicates that these levels correspond to the Sacatepéquez phase defined by Shook for the area and the Providencia phase of Kaminaljuyú (Shook 1951; Wetherington 1978).

Below the floor and in a midden is pottery similar to that of the Las Charcas period (1000-700 B.C.) of Kaminaljuyú (Popenoe de Hatch 1997; Shook 1951; Shook and Popenoe de Hatch 1999; Wetherington 1978). In these levels reduced quantities of the Xuc ware are found with the strongly represented Las Charcas Streaky Gray-Brown Polychrome (Figure 12.5 a, b, c). Our examples has highly polished grey-brown surfaces with resist red paint in bowl and jar forms, a type known from the Las Charcas excavations at Kaminaljuyú (Robinson and Pye 1996: Shook 1951; Shook personal communication 1994, 1996). A few sherds of zoned red and black pottery on a red paste also exist in these levels. White slipped pottery with both buff and red pastes occurs in the midden and may be analogous to the pottery named Providencia Cream Slipped from Kaminaljuyú; a distinct type at Urías has orange painted designs (Figure 12.5f) (Wetherington 1978). Other types with surface decoration with similar modes to those from Kaminaljuyú and the Pacific Coast are red-on buff pottery (Figure 12.5g,h) and highly polished red and orange on buff pottery reminiscent of the Villanueva Polished Orange of the Morada Buff Orange wares of Kaminaljuyú (Wetherington 1978). Throughout the excavation, Las Charcas Streaky Gray-Brown Ware, a dark gray, burnished pottery occurs in bowl and jar forms (Figures 12.5d,e). Although not present in the Suboperation 1, the Pallid Red jars characteristic of the Las Charcas materials have been found at Urías (Shook 1951). Also, red paste jars, some with black slip and others with red slipped rims, do occur in these levels (Figure 12.6c).

The flaring- and incurved-wall bowl or tecomate forms typical of the Early Preclassic complexes of the Pacific Coast also occur at Urías. Usually diagnostics of the Early Preclassic period, these forms occurred in the levels above the structure and are probably part of the early Middle Preclassic complex of ceramics. The flaring-wall bowls have thick walls (1 cm or greater) and are large in rim diameter. One example has a black slip and postslip horizontal incisions on the exterior (Figure 12.5i). Another fragmentary example has orange-on-white surface decoration (Figure 12.5f). Other Urías tecomates are generally thin-walled (less than 1 cm thick) and have a variety of surface treatments. Associated with the midden are Las Charcas Polychromes as well as orange slipped examples (Figure 12.6a). In the lowest levels are other tecomate forms with a white slip on a buff paste (similar to examples of El Bálsamo Coastal Undifferentiated (Shook and Hatch 1978)and a black smudged example with excised wide lines around the rim (Figure 12.6b). One thick-walled

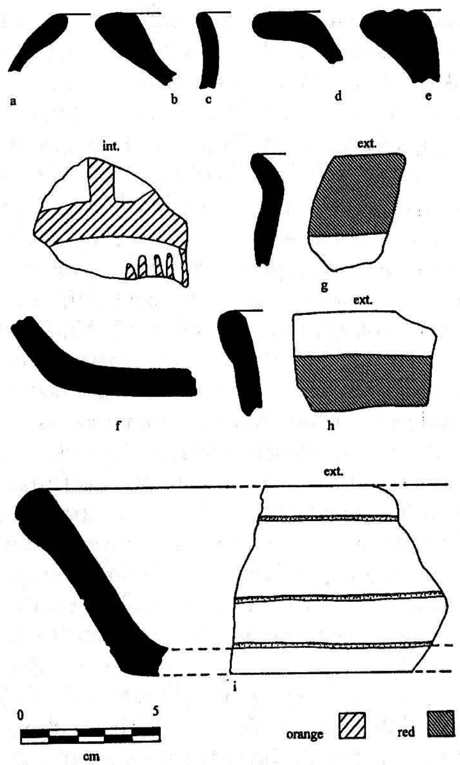

Figure 12.5 Bowls and jars of Las Charcas Polychrome (a-c); Rim forms of Las Charcas Streaky Gray (d-e); Orange-on-White bowl (f); Red-on-Buff bowls (g-h); Flaring wall bowl of black slipped red ware (i).

example has a red burnished exterior surface decoration (see Figure 12.5d).

A few unusual sherds from the lower levels of the excavation, at 3.8 meters and 4.8 meters, have modes of early coastal pottery. The higher sherd is buff and has an overall shell impression on the exterior and the lower sherd has a micaceous white slip with traces of red paint. Both of these are surface decorations of Coastal Undifferentiated Ware defined at El Bálsamo, and similar to Cuadros and Jocotal pottery of approximately 1100-800 B.C. (Shook and Hatch 1978).

Other ceramics from the Pacific Coast that date to 900-600 B.C. were found at a depth of four meters. One pottery is the El Bálsamo Brown Ware (Gashed-Incised), jars with deep diagonal slash incisions on the exterior of the jar neck or upper shoulder (Figure 12.6e) (Shook and Hatch 1978). The surface decoration of the related Costeño Type, punctate decoration on the shoulder of the tecomate, also occurs in these levels on the exterior of a jar rim (Figure 12.6f) (Arroyo 1994). Neutron activation analysis of a single El Bálsamo Brown Ware sherd from Urías has determined that it comes from the Pacific Coast (Hector Neff, personal communication 1996).

Another interesting piece of pottery is analogous to Tacaná Incised White from Altamira. This pottery from a late Jocotal context is characterized by Olmec iconography and a white slip (Green and Lowe 1967). The Urías sherd has a fragmentary design (possibly an Olmec

"clover") created by scraping the white slip and exposing the red paste (Figure 12.6g) (Clark and Pye 2000).

Overall, this pottery has strong affiliations with both coastal and highland types, especially those from Kaminaljuyú and El Bálsamo. This ceramic review shows that an interregional network of trade and communication existed at this time between the highlands and the coast that included the rural settlers in the Antigua zone.

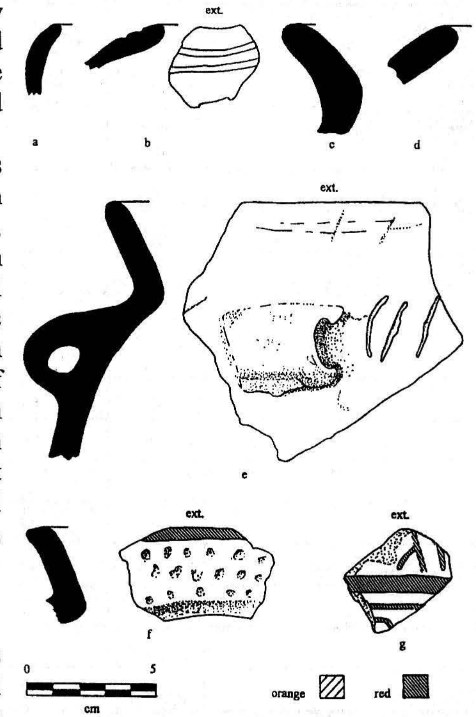

Figure 12.6 Orange slipped incurved-wall bowl (a); Black incurved-wall bowl (b); Jar rim red paste (c); Red-slipped incurved wall bowl (d); El Bálsamo Brown jar, gash incised (e); Costeño like jar (f); scraped-slipped sherd (g).

Zooarchaeology

Preliminary analyses of the Urías faunal collection indicate that the early inhabitants of this highland region effectively exploited both terrestrial and aquatic resources. However, despite the accessibility of riverine and swamp resources, a single large land mammal, the white tailed deer (*Odocoileus virginianus)* dominated the Urías diet (see Table 12.1). This reliance on the white tailed deer is characteristic of most Maya sites (Carr 1996) from the Preclassic period (Pohl 1994) onward in both the Maya region as a whole, and the highland area in particular (Ashmore 1987; Emery 1995).

Most of the Urías white tailed deer bones were limb elements (52% of identified deer specimens by level), suggesting that instead of *in situ* butchering and discard, only the "haunches" of meat were brought to the site. The proportion of juvenile deer elements is also high (43% of the minimum number of deer individuals by level) relative to that found in other Mesoamerican zooarchaeological samples (eg. Carr 1986; Emery 1990, 1996; Pohl 1985, 1990; Shaw 1991; cf. Hamblin 1984; Wing

Species	Body	NISP	%NISP	MNI	%MNI
cf. Testudines	limb	1	1.72	1	8.33
Aves	axial	1	1.72	1	8.33
Canis *familiaris*	distal	1	1.72	2	16.67
	forelimb	1	1.72		
Odocoileus *virginianus*	cranial	1	1.72	8	66.67
	dental	2	3.45		
	axial	1	1.72		
	forelimb	9	15.52		
	hindlimb	13	22.41		
	limb	8	13.79		
	distal	4	6.9		
Mammalia, large	cranial	3	5.17		
	axial	1	1.72		
	indeterm	7	12.07		
Mammalia	indeterm	5	8.62		
TOTAL			100	12	100

Table 12.1 Urías archaeological fauna identifications by species and anatomical portion.
NISP is an abbreviation for the number of identified specimens.
MNI is an abbreviation for the minimum number of individuals. The MNI calculations were derived on the basis of chronological level divisions.

and Scudder 1991). This distribution is unusual, both because a hunted population is predominantly adult, and because mature remains preserve well and are therefore better represented in most faunal assemblages. The high proportion of juvenile elements suggests a less conservative use of the resource in the Urías region than at sites in the Guatemalan Petén (Pohl 1990) and in northern Belize (Carr 1986; Shaw 1991). In fact, the combination of selective body portion use, and inclusion of juveniles indicates that deer was neither a limited nor cautiously used resource at Urías.

Despite the obvious reliance on the white tailed deer by the Preclassic residents of Urías, the recovery of remains of both small birds and turtles attests to a wider breadth of diet and resource utilization than has so far been recorded. More importantly, the presence of the domestic dog (*Canis familiaris*) in all levels is confirmed both by the recovery of small frequencies of their remains (see Table 12.1), and by the evidence of canid tooth marks on many deer bones. However, in comparison to other Preclassic assemblages the frequency of dog remains is relatively low. This species was an important component of the Preclassic Maya diet at many sites (Carr 1986; Pohl 1994; Shaw 1991; Wing and Scudder 1991) and was a vital source of terrestrial protein for the residents of many coastal sites (Hamblin 1984; Wing 1978). Interestingly, there is also no evidence of the marine fishes and other ocean resources that were such an important part of the dietary complement at sites along the neighboring South Coast of Guatemala (Coe and Flannery 1967; Pye and Demarest 1991; Wake personal communication 1998), despite the ceramic evidence suggesting trade relations between the two regions.

To date, the subsample of zooarchaeological remains examined is small (34% of the total sample), and because its selection was biased toward the better preserved and larger species and elements, our conclusions are limited. However, the preservation of the Urías animal remains was excellent and further animal bone analysis promises to yield considerable environmental and dietary information.

Obsidian

The chipped stone artifacts from Urías are all made of obsidian, a volcanic glass. To date, 1,338 obsidian artifacts recovered from excavations have been analyzed. The distribution of artifact types is important because it provides the best evidence yet gathered for stone-tool production in the Maya highlands during the Middle Preclassic period. Moreover, the Middle Preclassic collection from the site allows comparison and diachronic analysis. The sample sizes for both periods permit robust statistical inquiry; 277 obsidian artifacts come from the lower early Middle Preclassic contexts and 512 were recovered from later Middle Preclassic levels.

Research in Chiapas, the Pacific Coast of Guatemala, and western Belize has strongly suggested that prismatic blade technology commenced in the Maya area at the inception of the Middle Preclassic period (Awe and Healy 1994; Clark 1988; Jackson and Love 1991). Early Middle Preclassic levels at Urías contained 11 prismatic blade fragments (see Table 12.2). These, along with a dozen blade fragments recently recovered from Arévalo (1100-1000 B.C.) or very early Las Charcas (ca. 1000 B.C.) phase contexts at Kaminaljuyú-Miraflores II, are among the earliest evidence for the practice of the prismatic blade industry in the Maya

	Prismatic Blade	Retouch	Bipolar Percussion	Casual Percussion	Undifferentiated Percussion
Early Middle Preclassic	11 (4.0%)	14 (5.1%)*	79 (28.5%)	90 (32.5%)	85 (30.7%)
Later Middle Preclassic	68 (13.3%)	12 (2.3%)	161 (31.4%)	131 (25.6%)	140 (27.3%)

*Included are a retouched prismatic blade, also attributed to the prismatic blade industry, and a bifacially worked chunk, also classified in the unidentified percussion industry. For this reason Middle Preclassic totals appear to be 279, rather than 277 artifacts

Table 12.2 Lithic industries represented in the Urías obsidian collection by period.

region (Braswell 1997, 1999; Braswell and Amador 1999). Nevertheless, it seems unlikely that prismatic blades were particularly important tools for the early inhabitants of Urías. Prismatic blades and related artifacts constitute only 4.0% of the early Middle Preclassic and just 13.3% of the Middle Preclassic obsidian assemblage of the site. Furthermore, there is no evidence of the production of prismatic blades at Urías during either period. It seems more likely that small quantities of blades, produced at sites yet undetermined, were brought to the site.

Limited evidence for the production or resharpening of retouched tools was found throughout the excavations. For the most part, this evidence consists of thinning flakes, a debitage taxon. One early Middle Preclassic blade was bifacially notched just below the bulb of percussion. This kind of artifact is frequently found in Classic period burials and is interpreted as a foreskin perforator. The presence of such an object in an early Middle Preclassic context indicates that the roots of Maya bloodletting ceremonies goes back to this period.

The majority of both early Middle and later Middle Preclassic obsidian artifacts from Urías can be assigned to two very simple lithic industries: bipolar and casual percussion. Fully 61.0% of the early Middle Preclassic and 57.0% of the Middle Preclassic collections can be attributed to each industry. In addition, a substantial fraction, some 85 early Middle Preclassic and 140 later Middle Preclassic artifacts, are shatter, chunks, and unidentifiable core fragments resulting from some form of percussion. Thus a total of 91.7% of the early Middle Preclassic sample and 84.3% of the later Middle Preclassic collection are the products or byproducts of rudimentary percussion industries. This suggests that lithic production at

	San Martín Jilotepeque	El Chayal	San Bartolomé Milpas Altas
Early Middle Preclassic	185 (66.8%)	88 (31.8%)	4 (1.4%)
Later Middle Preclassic	341 (66.6%)	168 (32.8%)	3 (0.6%)

Table 12.3 Obsidian sources represented in the Urías collection by period.

Urías was carried out by nonspecialists, probably working in a domestic context. The slight but significant drop in the relative importance of these industries that occurred between the early Middle and later Middle Preclassic periods is directly related to the increase in prismatic blade fragments. Although the great majority of the Middle Preclassic tools used at Urías were locally produced flakes, the later importance of imported prismatic blades increased during this period.

All of the obsidian found at Urías comes from geological sources within a two-day walk of the site. There is little difference between resource procurement patterns in either period: obsidian from San Martín Jilotepeque in the Department of Chimaltenango accounts for about two-thirds of both the early Middle Preclassic and later Middle Preclassic sample, and about one-third of the material comes from the El Chayal source (see Table 12.3). These relative proportions reflect the distance to each source; El Chayal (53 km) is about twice as far from Urías as San Martín Jilotepeque (27 km). A few pieces dating to each period are from the nearby San Bartolomé Milpas Altas source, about 14 km from Urías. The reason so little raw material comes from this source probably is its quality. Obsidian from San Bartolomé is quite fragile and fractures in an uneven and unpredictable manner. As often as not, bipolar percussion causes small chunks of San Bartolomé obsidian to splinter into glass dust and very small, unusable shatter.

There is no indication that obsidian from either major source was used preferentially for any particular industry during the early Middle Preclassic. For example, four of the 11 prismatic blade fragments dating to that period come from El Chayal, a proportion roughly equal to that of El Chayal obsidian in the entire early Middle Preclassic sample. In contrast, 30 of the 68 later Middle Preclassic blade fragments come from El Chayal, a proportion about one-third higher than in the general Middle Preclassic sample. Since there is no evidence for prismatic blade production at Urías, this may reflect a slight shift in trading patterns. Perhaps prismatic blade production and trade was conducted at a slightly higher scale in Middle Preclassic Kaminaljuyú than in the Chimaltenango area.

Procurement patterns for both time periods suggest significant interaction with both the Chimaltenango region and the Valley of Guatemala. This is mirrored at Kaminaljuyú, where approximately 12% of Arévalo/Early Las Charcas obsidian is from San Martín Jilotepeque (Braswell 1997, 1999). Ceramics from both the Valley of Guatemala and the Chimaltenango/Sacatepéquez area were also quite similar during the first half of the second millenium. Popenoe de Hatch (1997), however, has noted that by the end of the Middle Preclassic period, the ceramic sequences of Kaminaljuyú and the Chimaltenango/Sacatepéquez region diverged significantly, suggesting little economic interaction. This pattern also has been noted in the obsidian of Kaminaljuyú (Braswell 1997; 1999). The fact that significant quantities of both San Martín Jilotepeque and El Chayal obsidian are found in the Urías collection supports an early date for this material.

Soils

The soils of the Valley of Antigua provide a rich but fragile resource because the volcanic slopes are fertile but subject to erosion unless carefully managed. Today intensive, but rainfed, agricultural techniques maintain the productivity of the slopes. The seasonal swamp and former lakebed of Lake Quilisimate provide other wetland resources such as fish, waterfowl, and tule (rushes used today to make mats).

The samples of soils for this study come from a transect that spanned the slope of the pedestal of the Agua Volcano, through the Guacalate Valley, to the summit of the small Urías Hill (see Figure 12.2 for the location of the transect). Included in the transect are the former Lake Quilisimate, and the profiles from excavations at Urías and site B398069. These soils have been tentatively classified using both Simmons, Tárano and Pinto (1959) and the USDA Seventh Approximation Systems (Soil Survey Staff 1999).

Predominantly, the soils in the survey belong to the Andisol order, which includes all soils developed on volcanic deposits. Most of the Andisols in the transect are Ustands, due to the Ustic (or wet-dry) soil moisture regime of the Guatemalan highlands. Perhaps the most significant characteristics of these soils, with regard to ancient settlement, are high fertility, the need for careful management to prevent erosion, and the natural chronological markers provided by their stratigraphy. The high fertility of Andisols is due to a number of factors. Fresh deposits of ash resupply nutrients to the soils, maintaining their fertility as they weather. They have a high organic matter content (ranging from 1.5 to 3.1% in the transect Andisols) and a high water retention capacity, due to the presence of allophane, a product of weathering of volcanic materials in a tropical environment. Allophane has a very high internal negative charge that allows it to absorb cations. This gives the soil a high cation exchange capacity (a measure of fertility) and the ability to retain water. The thixotrophy, or "smeariness", of the 5Bb horizon of the soil in Figure 12.3, is evidence of the high water retention in the soils, despite their coarse textures. The crumbly and friable structure of the soils makes them excellent rooting media for crops. Limitations of the soils include low available phosphorous and high erosion vulnerability. Allophane and iron oxides in Andisols tend to fix phosphorus, making it unavailable to plants. These soils are highly susceptible to wind and water erosion when the surface cover is removed or degraded (Sumner 2000).

Evidence of the fertility of the soils in the valley is demonstrated by current land use. In addition to the high base saturations, friable consistency and good cation exchange capacity of these Andisols, evidence of their fertility exists in their current land use. These soils are intensively cultivated for maize and coffee as well as other vegetable crops. Erosion is controlled by unfaced terraces formed by hoe cultivation. This is a labor-intensive method but is highly effective in controlling slope erosion on steep slopes (McBryde 1947; Wilken 1971). The hoe-terraced fields are intermixed with small plots and give the Agua volcano and Cerro de Urías slopes a quilt-like pattern of carefully managed cultivation. Variability in agricultural techniques is associated more with changes in slope angles than with climate or elevation differences (Whitmore and Turner 1992; Wilken 1971). This represents a careful adaptation to terracing and micromanagement by farmers. Hoe terraces would have been feasible for Precolumbian farmers as well, and it is unlikely that the extensive terrace systems that surround the Valley of Antigua today are all postconquest in origin (Wilken 1971).

The transect includes two alluvial soils, an Entisol and an Inceptisol, from the floodplain of the Guacalate River. On the floodplain was a fertile soil, a Psamment, that probably was seasonally inundated. On an alluvial terrace at a slightly higher elevation is an Aquept. This soil had a noticeably elevated organic matter content (11.3%) and a relatively high cation exchange capacity of 28 meq, indicating high soil fertility. This extremely rich soil exists in only a limited portion of the valley due to the rapid downcutting of the Guacalate River. The Andisols found on the slopes of the Agua Volcano are well-drained fertile soils. But they require careful management due to their high susceptibility to erosion.

A deep well in the area of the Cerro Encantado allowed for the sampling of soils at the former Lake Quilisimate edge. The exposed soil was classified by Simmons et al. (1959) as Guatemala clay loam. This soil is characteristic of a seasonally inundated wetland. According to Simmons et al. (1959), this is a soil of high natural fertility, low susceptibility to erosion, high facility for root penetration, and high capacity for water retention.

The former lake and seasonal swamp are important features in terms of resources and settlement location. The presence of seasonal swamps was one of the objections raised to locating the colonial capital city in the Valley of Antigua. The valley is also known as the Valley of "Panchoy", meaning "dry lake" in Kaqchikel. Pleistocene volcanic flows blocked drainage systems, thereby creating lakes which then filled with volcanic and alluvial material. The excavation in the former lake bed revealed layered deposits of volcanic and alluvial material.

The volcanic slopes presented not only fertile conditions, but also an environmental hazard for valley dwellers. In 1541, the city of Ciudad Vieja was buried when a torrential rain created a landslide, reported to have dragged along large rocks, boulders, trees and mud. In a few minutes, the mud slide inundated and destroyed the buildings in its path as well as much of the unsuspecting population (Lutz 1982).

Environmental Context of Urías and the Lake Quilisimate

The Urías site, on a bluff at the toe of the north slopes of Agua Volcano, is about 2.1 km east and upstream from Lake Quilisimate along the southern banks of the Guacalate River. Lake Quilisimate was formed in a Pleistocene-aged caldera whose outlet was partially dammed by lava flows from Agua Volcano on the east, and/or the Fuego-Acatenango Volcano complex on the west (Figure 12.2). Thus, the lake was probably sensitive to variations in climate as well as to large influxes of volcanic ash emanating from the nearby volcanoes. Investigation of the soils and sediments of the recently drained lakebed of Lake Quilisimate yielded evidence of past environmental events during the period of occupation at Urías.

A transect of five auger holes was dug perpendicular to the old shorelines from within the modern marsh area across the old lake bottom, and to the edge of the ancient lake at the edge of the valley (Figures 12.7, 12.8). The auger holes averaged 3 m deep and ranged from 4.5 m deep, at the deepest part of the lakebed, to 1 m on the slopes of the valley walls. The soils and sediments were described using USDA Soil Taxonomy terminology (Soil Survey Staff 1999).

The auger probes revealed a number of black cinder ash layers and fine air fall ash interbedded with diatomite, powdered remains of algae cell walls, and fine lake sediments in the lower levels. The ash layers were

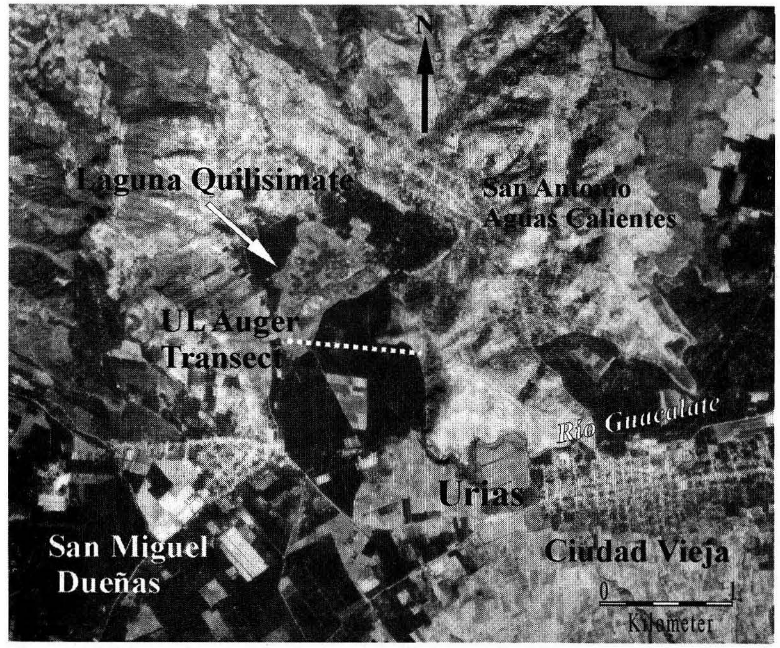

Figure 12.7 Locations of the Laguna Quilisimate, the UL Auger Transect, Urías, and the surrounding towns of Ciudad Vieja, San Miguel Dueñas, and San Antonio Aguas Calientes.

evidence of intermittent local volcanic eruptions, most likely from Fuego and/or Acatenango, less than 10 km to the southwest. Fuego is at present highly active and Acatenango has been active in the recent past. Koch and McLean (1975) identify three black cinder layers (G_1-G_3) in the region, of recent but unknown age, that they estimate originated with Fuego or Acatenango Volcanos. In the deepest lake sediments probed, four cinder ash layers were found. The upper two, at a depth of about 1.5 m, are separated by 10 cm of silt loam with much diatomite. Together these two layers make a 0.5 m thick layer. The next deeper ash layer, at 2.7 m, is about 10 cm thick. Between these two sets of cinder layers are fine lake sediments and diatomite. No peat was encountered. A similar pattern is seen across the bed of the ancient lake, although at about 375 m from the deepest part of the lake the lower cinder layers appear reworked, which suggests that at that location the lake was either very shallow or that the ash was fluvially reworked by flood discharge from the Guacalate River as it entered the lake.

The significance of these cinder layers is that they seem to correspond

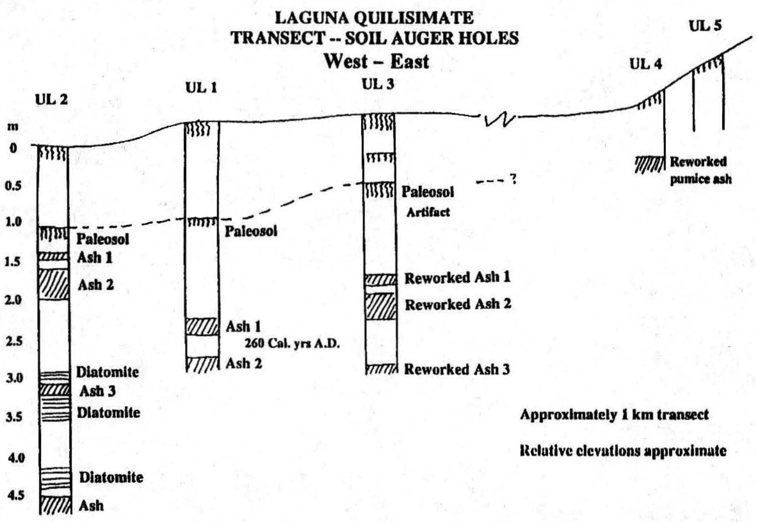

Figure 12.8 Profile of auger holes in the Laguna Quilismate.

with the two black ash layers that bracket, top and bottom, the cultural deposits in the Urías excavation. The lower ash appears to correspond with the black cinder ash layer that overlies bedrock at the bottom of the Suboperation 1 excavation, and the upper two together appear to correspond with the 0.5 m of black cinder below the plow zone in Suboperation 1. The age of the lower cinder is not known, but a radiocarbon age on charcoal in another excavation at Urías indicates that it is older than 1280 Cal. yrs B.C. (3260±120 B.P., Beta-114963). If the correlation is correct between the lake sediments and the Urías excavation, then the reworked upper cinder ash in the Suboperation 1 excavation is younger than 260 Cal. yrs A.D., based on a radiocarbon age on lake sediment between the two ash layers (1740± 40 B.P., Beta-145687). These ages are consistent with the artifacts from the excavation. Because the sediment between the cinder layers also consists of airfall tephra, with at least two paleosol surfaces, this suggests that during the 1700 years between the two dates at least three significant ash fall eruptions occurred in the local area. Although not frequent, and hundreds of years apart, these eruptions would have had devastating effects on agriculture and other human activities.

A second interesting feature of the Lake Quilisimate sediments is evidence of one or more years of severe desiccation, indicated by a hardened paleosol surface with cracked clay fragments, coated with

oxidized reddish coverings (Munsell 5YR 4/6 dry). This surface is encountered throughout the lake bed area above the highest black cinder layer, and 1 m below the modern surface. Thus the desiccation event must have occurred sometime after 260 Cal yrs A.D. Sediments above this paleosol appear reworked, possibly fluvially deposited, suggesting that the lake was never as deep after this event.

In summary, the lake sediments from Lake Quilisimate reveal a history of a shallow lake that was larger and deeper around the time of early human occupation, possibly indicating moister climatic conditions. Volcanic eruptions of tephra into the lake and on the surrounding landscape occurred every several hundred years. A severe drought may have occurred sometime after 260 Cal yrs A.D., after which the lake was probably smaller than during the previous 1000 years.

Conclusions

Early settlers at Urías moved into an area rich in environmental resources. This first sedentary occupation seems to have occurred once soils had developed above an ash matrix. The location was near a river's edge, on a flood free terrace formed of deep, fertile and fine soils that with management would have been well suited for maize agriculture. Water sources included the Guacalate River and possibly the fresh springs that now enter the river near the site. Faunal collections have shown that deer and domestic dog were part of the subsistence regime and future studies will determine the extent of the exploitation of other forest and aquatic species.

Obsidian studies have revealed evidence for the very early practice of the prismatic blade industry in the Maya region, dating to the early Middle Preclassic period. There are no data, though, suggesting that prismatic blades were manufactured at Urías during either the early Middle Preclassic or later Middle Preclassic periods. Procurement patterns demonstrate close connections not only with the inhabitants of the Chimaltenango region, but also with Kaminaljuyú. Cultural contact and economic exchange was ongoing in this highland area during the first half of the first millenium B.C.; in contrast to the barriers that existed subsequent to 400 B.C.

Ceramic comparisons show that there were strong cultural affiliations of the Preclassic peoples with both the highlands and the Pacific Coast. A new finding that encourages our understanding of early highland exchange and cultural traditions is the presence of the El Bálsamo Brown Ware (Gashed Incised) coastal pottery in this highland context. Trade in coastal pottery was ongoing and highland and coastal groups must have shared cultural ideas about ceramics.

The ceramic similarities between the coast and the highlands raises questions about the degree of cultural differentiation of the highland people at this time. At Urías, adaptations to the local environment and spatial separation from other groups in the highlands and coast must have played a role in the development of cultural regionalization. With more archaeological and environmental studies in the highlands, will we be able to assess the degree of cultural and environmental variation that may have existed in the Preclassic period. In the Antigua area, periodic and severe ash falls may have interrupted local cultural evolution. Future research will focus on defining the archaeological cultures of the early sedentary communities in the Guatemalan highlands with the goals of understanding their ecological adaptations, cultural origins, economies and evolution.

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