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Maya Settlement Patterns and Land Use in Buena Vista, Cozumel, México

Research Year: 2003
Culture: Maya
Chronology: Post Classic
Location: Cozumel, México
Site: Buena Vista

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Abstract

The Buena Vista Archaeological Project is a study of postclassic Maya settlement patterns and land use on the island of Cozumel, México. Field work carried out in the site during the months of June–August 2003 was sponsored by the Foundation for the Advancement of Mesoamerican Studies, Inc., (FAMSI). Previous archaeological research in Buena Vista had focused in a central area of seven hectares and reported the existence of an extensive wall system and platforms at the site which was interpreted as a storage center for exchange and resupply transactions. In this interpretation, the platforms supported perishable structures used to store trade commodities, and the wall system was built to protect these trade goods from possible pirate attacks (Sabloff and Rathje 1975, Freidel and Sabloff 1984). However, the nature and extension of the wall system around the central area had not been investigated in detail. The research objectives of this project were to analyze the Buena Vista settlement pattern following a settlement ecology model (Stone 1996, Killion 1992), which seeks to understand the relationship between population and agricultural practices in an ecological setting. The project followed a program of surface survey and mapping of the wall system, related structures, and natural features located in an area of 4 km^2 around the center of the site. Preliminary results of this study presented in this report show how the Buena Vista settlement pattern seems to be that of an agrarian settlement totally adapted to its ecological setting and not a trade/storage center as previously thought.

Resumen

El Proyecto Buena Vista es un estudio del patrón de asentamiento del Posclásico maya y del uso del suelo en la isla de Cozumel, México. El trabajo de campo llevado a cabo en el sitio de junio a agosto del 2003, fue patrocinado por la Fundación para el Avance de los Estudios Mesoamericanos, Inc. (FAMSI). La investigación arqueológica previa en Buena Vista estuvo concentrada en un área central de siete hectáreas, en las que se observó la presencia en el sitio de un extenso sistema de albarradas y plataformas, que fue interpretado como un centro de almacenamiento para actividades de intercambio y reabastecimiento. Según ésta interpretación, las plataformas servían de base a estructuras hechas con material perecedero que se utilizaban para almacenar bienes de intercambio, y el sistema de albarradas fue construido para proteger estos bienes contra posibles ataques piratas (Sabloff y Rathje 1975, Freidel y Sabloff 1984). Sin embargo, la naturaleza y extensión del sistema de albarradas no fueron investigadas en detalle. El objetivo de investigación en este proyecto fue analizar el patrón de asentamiento en Buena Vista, siguiendo un modelo de ecología de asentamiento (Stone 1996, Killion 1992), a fin de llegar a entender la relación entre población y prácticas agrícolas en su entorno ecológico. El proyecto siguió un programa de prospección de superficie y mapeo del sistema de albarradas, de las estructuras asociadas y de las características naturales ubicadas en un área de 4 km^2 alrededor

del centro del sitio. Los resultados preliminares de este estudio presentados en el el presente informe ponen en evidencia que el patrón de asentamiento de Buena Vista se asemeja al de un asentamiento agrícola totalmente adaptado a su entorno ecológico, y no al de un centro de comercio/almacenamiento, como se pensó anteriormente.

Submitted 03/05/2004 by:
Adolfo Iván Batún Alpuche, Ph.D. candidate
University of Florida
batun@ufl.edu

Introduction

Cozumel's importance during the Late Postclassic period as both a port located in the long distance trade route between Honduras and Tabasco, and as a main sacred pilgrimage center is mentioned in several ethnohistorical sources (Roys, *et al.* 1940, Tozzer 1941, Wagner 1942). Thirty-three archaeological sites of different sizes have been reported on the island. The largest of them, San Gervasio is located in its north-central region, and is composed of six architectonic complexes and several domestic features covering an area of about 3.14 km2. Four other sites, two in the north: La Expedicion and San Miguel, and two in the South: El Cedral and Buena Vista, were along with San Gervasio the most important settlements on the island. One of the most remarkable features on Cozumel is a field wall system that covers all but a small portion of the land, divided into irregular plots (Arnold and Frost 1909, Escalona Ramos 1946, Sanders 1956, Freidel and Sabloff 1984). The most elaborate forms of field walls have been only reported around two sites: Buena Vista and Chen Cedral (Freidel and Sabloff 1984).

Studies of land use and subsistence technology in the Maya area (Harrison and Turner 1978, 1983, Siemens and Puleston 1972, Adams 1982, Healy *et al.* 1983, Pohl 1990, Gomez Pompa *et al.* 1987, Killion 1992, Fedick 1996, Alexander 2000, Liendo and Vega 2000) indicate that prehispanic Maya were not limited to slash and burn agricultural technologies, as had been suggested before, instead, they employed a variety of techniques associated with higher levels of production, such as raised field, terraces, walled fields, house orchards, and irrigation canals adapted to different microenvironmental zones such as akalches (bajos), hills, coastal areas, swamps, aguadas, cenotes (sinkholes), and rejolladas (conical depressions).

Research on Cozumel's field wall network, which was probably built to delimitate agricultural plots rather than for defensive purposes, could be a key to understand prehispanic forms of land use and agrarian technology in the island and at the same time help to understand the function of similar field walls reported at other prehispanic

settlements on the main land such as Tulum (Vargas 1997), Coba (Fletcher 1984), Xamanha (Silva and Hernandez 1991), Rancho Ina (Terrones 1990, 1994), Chunchucmil (Vleck 1978), Mayapan (Bullard 1952) and Xcaret (Andrews) among others.

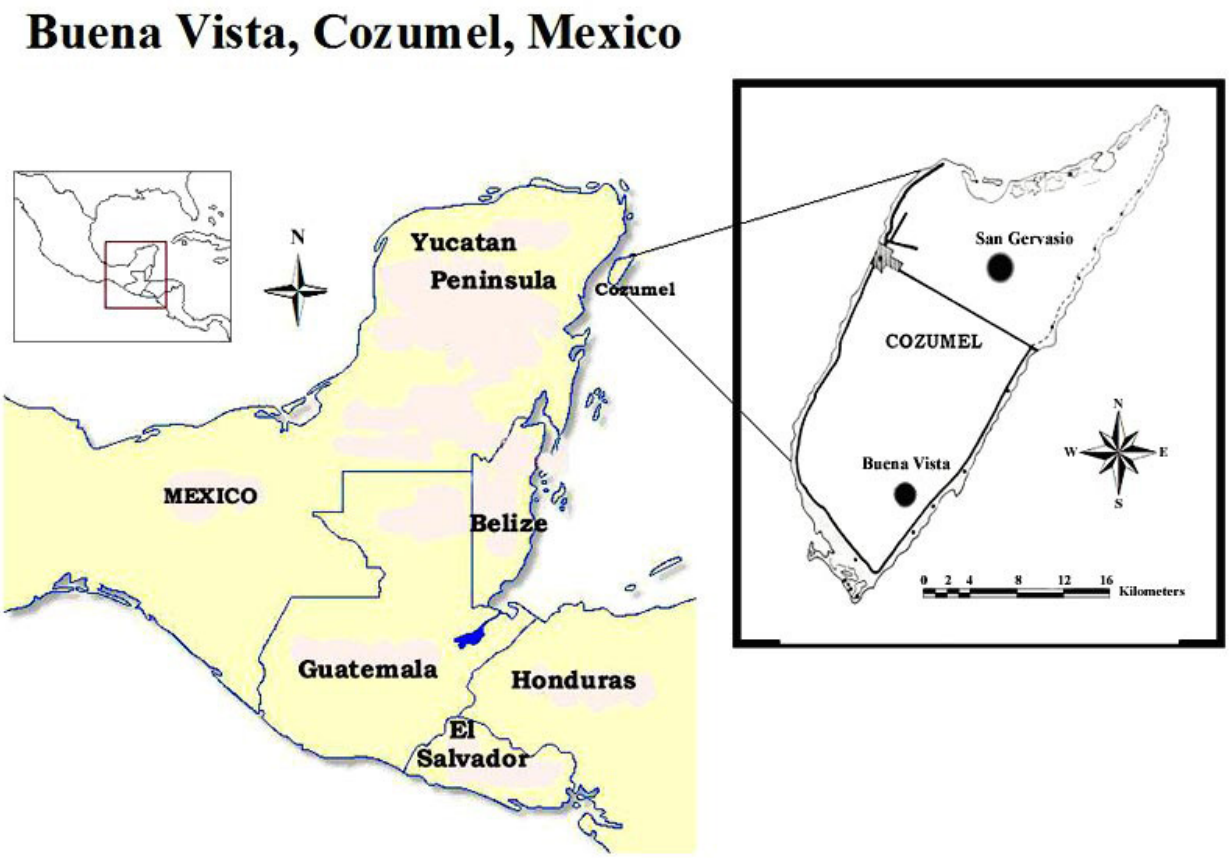

Figure 1. Map showing Cozumel location and Buena Vista position in the island.

Buena Vista, where the most prominent walls in the island are presented, is the perfect site to study how plots are delimited and the relationship between plots and other archaeological remains and physical features.

The site of Buena Vista is located 1.5 km inland from the southeastern coast of the island of Cozumel, which is situated 16 km off the northeastern coast of the Yucatán Peninsula, México (Figure 1, shown above) (Buena Vista UTM coordinates: Zone 16, 506227 East, 2247436 North). Previous archaeological work by Freidel and Sabloff (1984) indicated that the site is composed of a complex of agglutinate substructures that supported a variety of perishable superstructural remains and some masonry structures. The largest substructure in the site is an artificially raised and leveled area (main platform) covering approximately 7 ha. Its height varies from 2 to 10 m in some areas, and a large mound-plaza group is built upon its northern end. To the north and south of

this platform substructure are groups of "shrines" as well as several scattered smaller platforms and structures (Figure 2). To the east and west there are also other substructures. Small platform substructures continue in moderate density south, east, and west of the main complex. Beyond those is the extensive network of field walls mentioned above. They vary in size from single-course rubble walls (with an estimated standing height of 1 m), to massive walls with rubble and gravel cores and dry-laid masonry retainers standing more than 2 m high and more than 2 m wide. Such massive and simple walls occur in an apparently random fashion, and they enclose areas of 1 ha or less.

From early June to late August 2003, the Buena Vista Archaeological Project under the direction of Adolfo Iván Batún and with the permission of INAH (doc. num. C.A. 401-36/0565), cleared 12 km of "brechas" in the rain forest around the Buena Vista main platform enclosing an area of 4 km^2, divided into four quadrants of 1,000,000 m^2. Systematic survey and mapping of all archaeological and physical features over a distance of 30 m on each side of these transects was conducted. In addition, we surveyed each quadrant by walking from side to side every 200 m and chose representative areas to map intensively and test soil profiles.

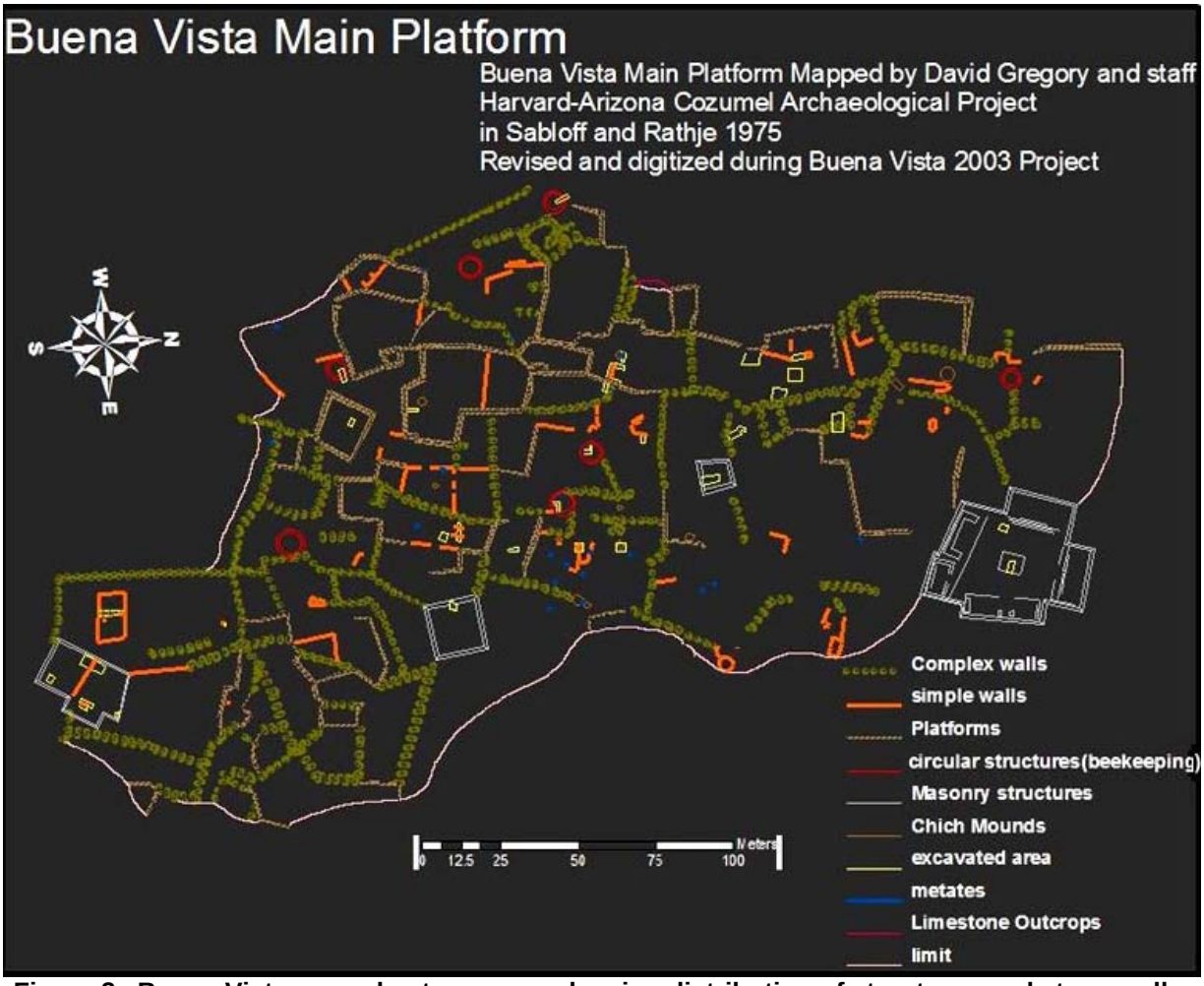

Figure 2. Buena Vista seven hectares core showing distribution of structures and stone walls.

Project Goals

This study focused on the nature of the Buena Vista settlement pattern to identify land uses and agrarian production and organization in the site. The basic theoretical model guiding this research is that of "Settlement Ecology" which is designed to study agrarian settlements investigating the relationship between population and agricultural practices in that ecological setting (Stone 1996, Killion 1992). Our first aim in this study was to determinate how the wall system extent around the site center and how these walls are enclosing land plots and other archaeological features. As a second aim, we sought to register microenvironmental differences in the Buena Vista region. Our third aim was to obtain information on soil potential for agricultural production in the survey area. Our site map and intensive surface survey provided information to meet the first and second goals. Soil profile sampling in selected areas of the site helped us to partially meet the third aim.

Research Design and Methods

The theoretical emphasis of "settlement agriculture" is to strengthen our understanding of the archaeological record as a consequence of the organization of the agricultural production in and around settlements. Settlement pattern analysis includes architectural remains, agricultural facilities, and field features of the core settlement and its adjacent zones. Archaeological remains are examined as diagnostic indicators of agricultural activities and soil analysis is utilized to help identify the use of settled and cultivated spaces. This project involved students from the University of Yucatán as well as hired persons from Cozumel. Tape and compass were used in the elaboration of the map and GPS (geographical positioning system) was used in selected forest cleared areas to correct and georeference our map in the UTM coordinate system. First we began with a systematic survey of the site's central area, based on the map elaborated by Sabloff and Rathje in the 1970s. West of the main platform, we found masonry structures not recorded in the draft, which we measured and GPS-georeferenced. In addition, we detected several Karstic features (rejolladas, cenotes, hills, and bajos) closely related with the distribution of structures. All of them were registered with the same techniques to complement the map of the site center.

As a second step, we delimited the total area to be surveyed during this field season. Four transects of brecha were opened, beginning from a datum located in the southeast corner of the altar in the center of the main plaza. Stakes were set every 50 m. Transects 1000 m long were run in the direction of the four cardinal points. All archaeological and natural features along the brechas were registered, including caves, rejolladas, cenotes, akalches, and wells. Following the same method of registration, we opened 8000 m of brechas to bound our study area in four quadrants. A quadrant denotation was assigned to differentiate them as Northeast, Northwest, Southeast, and Southwest quadrant respectively.

After mapping a total of 12 km transects bounding quadrants, we surveyed inside each quadrant along transects distributed every 200 meters, to register additional features and search for sample areas to map in detail.

Due to time constraints, we selected some representative areas to map intensively. Four hectares were selected in the Northeast quadrant, and two hectares in the Southeast. In addition, to gather information about agricultural potential in Buena Vista, we chose different microenvironments to sample soil profiles, and we constructed a complete soil map of the four hectares selected in the Northeast quadrant.

Preliminary Results

Microenvironmental Zones

During our survey in Buena Vista, we distinguished different microenvironmental zones common in coralline origin limestone islands like Cozumel. The geology of Cozumel is known as Karstic, with underground drainage and an irregular terrain punctuated with

depressions (Davidson 1967). However, as we walked from the coast to the center of the island, we distinguished microenvironmental differences marked by terrain elevations and different types of depressions.

Figure 3. East coast near Buena Vista, characterized by coralline rocks and narrow sandy beaches; at the horizon it is possible to see a low cliff of approximately 10 meters.

Figure 4. East coast in front of Buena Vista, showing vegetation of Tabaquillo (*Tournefortia gnaphalodes*) and Uva de mar (*Coccoloba uvifera*) on beach dunes.

We distinguished seven different microzones in direct relation with distance from the coast. The first 100/150 m from the coast is a **zone of narrow sandy beaches**, occasionally interrupted by low cliffs and rocky areas (Figure 3, shown above). Vegetation in this zone is represented by Pantsil (*Suriana maritima*), Tabaquillo (*Tournefortia gnaphalodes*), Uva de mar (*Coccoloba uvifera*), and Lirio (*Hymenocallis americana*) (Figure 4, shown above). The ruins of one prehispanic building know by locals as "Cinco Puertas" is located in this zone. No vestiges of the wall system were seen here (Figure 5, shown below).

In the following 500 m, we distinguished two different zones, one located southeast of the site center and the other to the northeast. The former is a zone of mangrove swamps (aguadas) inundated during most of the year, but dry at the end of the dry season from March to May. Vegetation in this zone is represented by Mangle (*Rhizophora mangle*), Mangle Blanco (*Avicennia germinanfs*), Tsal Kokom (*Laguncularia racemes*), and Kanche (*Conocarpus erectus*) (Figure 6). No walls are found in this zone. The latter is a zone dominated by **Tasiste palms** (*Acoellorraphe wrightii*) reaching a height of 3 to 4 m. Soil in this area is shallow with outcrops of limestone (Figure 7). Other plants in this zone are Chit palms (*Thrinax radiata*), Nopal (*Opuntia stricta*), and Huano (*Sabal yapa*). Walls in this area are formed by a single line of boulders 30 cm diameter in average up to a height of 0.75 m (Figure 8).

Figure 5. Vestiges of a prehispanic structure located at Buena Vista east coast, known as "Cinco Puertas." It was probably used in Buena Vista port activities.

Figure 6. Buena Vista east aguada during the rainy season with abundant dune-like vegetation and several Mangle species.

Figure 7. Tasiste palm zone dominated by Tasiste (Acoellorraphe wrightii) Chit (Thrinax radiata) and Huano palms (Sabal yapa).

Next to the Tasiste zone, northeast of the site center, where the modern ranch quarter of Buena Vista is located, we found a **zone of akahuales** or secondary forest with low, thorny vegetation in different stages of successional growth. Outcrops of limestone are common in this area, together with sinkholes or rejolladas (2-4 m depth), caves, sartenejas (small cavities in the limestone outcrops), and huayas (small concave depressions in the limestone outcrops, 0.40-0.70 m depth). The type of soil in this zone is known as "Tzekel" because of its shallow depth (10-15 cm), rock outcrops, and abundance of limestone fragments (Figure 9).

Figure 8. Simple stone wall (albarrada) formed by a single line of dry-laid boulders.

Some common plants in this zone are Chacah (*Bursera simaruba*), Jabin (*Piscidia piscipula*), Katzin (*Acacia gaumeri*), Tzitzilche (*Gymnopodium floribundum*), and Guarumo (*Cecropia peltata*) that grow to 4 to 6 m in height. Under the canopy of these plants, thorny flowering shrubs are abundant. Plants and shrubs in this zone are high nectar producers. This zone extends 450-500 m west. Walls are abundant here, showing differences in shape and size. We first divided the walls in two main types. The first, **simple type** is built of a single dry-laid line of boulders elevated 0.50-0.75 m, and is present in the Tasiste palms zone also. The second and more **complex type** is built of several dry-laid lines of boulders forming massive walls 1-2 m high and 1.5-2 m wide (Figure 10).

Figure 9. Akahuales with secondary thorny vegetation.

Figure 10. A complex wall, 1.25 m height and 2.10 m width.

Southeast of the site center after the mangrove zone, there is a **zone of Bajos or Akalches**. These are low, poorly-drained areas of red soil with abundant limestone fragments that are filled with water during the rainy season. Vegetation is short and medium-size forest 10-15 m in height with plants of Chechen (*Metopium brownei*), Sakboob (*Coccoloba cozumelensis*), Tsalam (*Lysiloma latisiliquum*), Siricote blanco (*Cordia dodecandra*), and Salche (*Cassia alata*) among other species. Shrubs are scarce under the canopy of this type of forest (Figure 11). Akalches extend in different directions in the form of river streams, approximately 15 to 25 m wide. Walls of the simple type described above are common in this zone, marking the limits of the akalches and crossing them side to side (Figure 12) delimiting plots.

Figure 11. Akalche bajos. Note calabash tree (*Crescentia cujete L.*) to the right.

Figure 12. Simple wall crossing inundated akalche during rainy season.

In the proximity of the site center, we distinguished two different microzones aligned one after the other. The site center is located in the highest elevated area on the island, at approximately 10 m in height. This, however is not a single elevation, but a chain of hills 30-35 m wide at the top. This hill system runs north to south to west, forming a chain of intercalated hills and low areas of 20-30 m wide in the lower areas between hills.

Above the hills, we found black soil with fragments of limestone and spots of limestone outcrops. Vegetation on the hills is tall and medium-size rain forest 25-30 m in height, with trees of Ramon (*Brosimum alicastrum*), Chicozapote (*Manilkara zapota*), Kopo (*Ficus tecolutensis*), and Palo de corcho (*Annona glabra*) among other species. Walls in this area are of the simple and complex types. They usually delimit the borders of hills as soil retainers and other walls cross the hill from side to side delimiting plots (Figure 13).

In the low areas between hills, the vegetation consists of short and medium-size forest 10-15 m in height dominated by Katzin (*Acacia gaumeri*), Chaca (*Bursera simaruba*), Chit palm (*Thrinax radiata*), Flor de mayo (*Schomburgkia tibicinis*), and Sakyab (*Gliricidia septium*). Walls in this area are of the two types also. Limestone outcrops, caves, rejolladas, and cenotes are common in this zone (Figure 14). Vegetation and walls look similar to those in the akahuales zone.

Figure 13. Medium forest in hill area with several Ramon (*Brosimum alicastrum*) trees among prehispanic vestiges.

Figure 14. Low and medium forest in an open brecha.

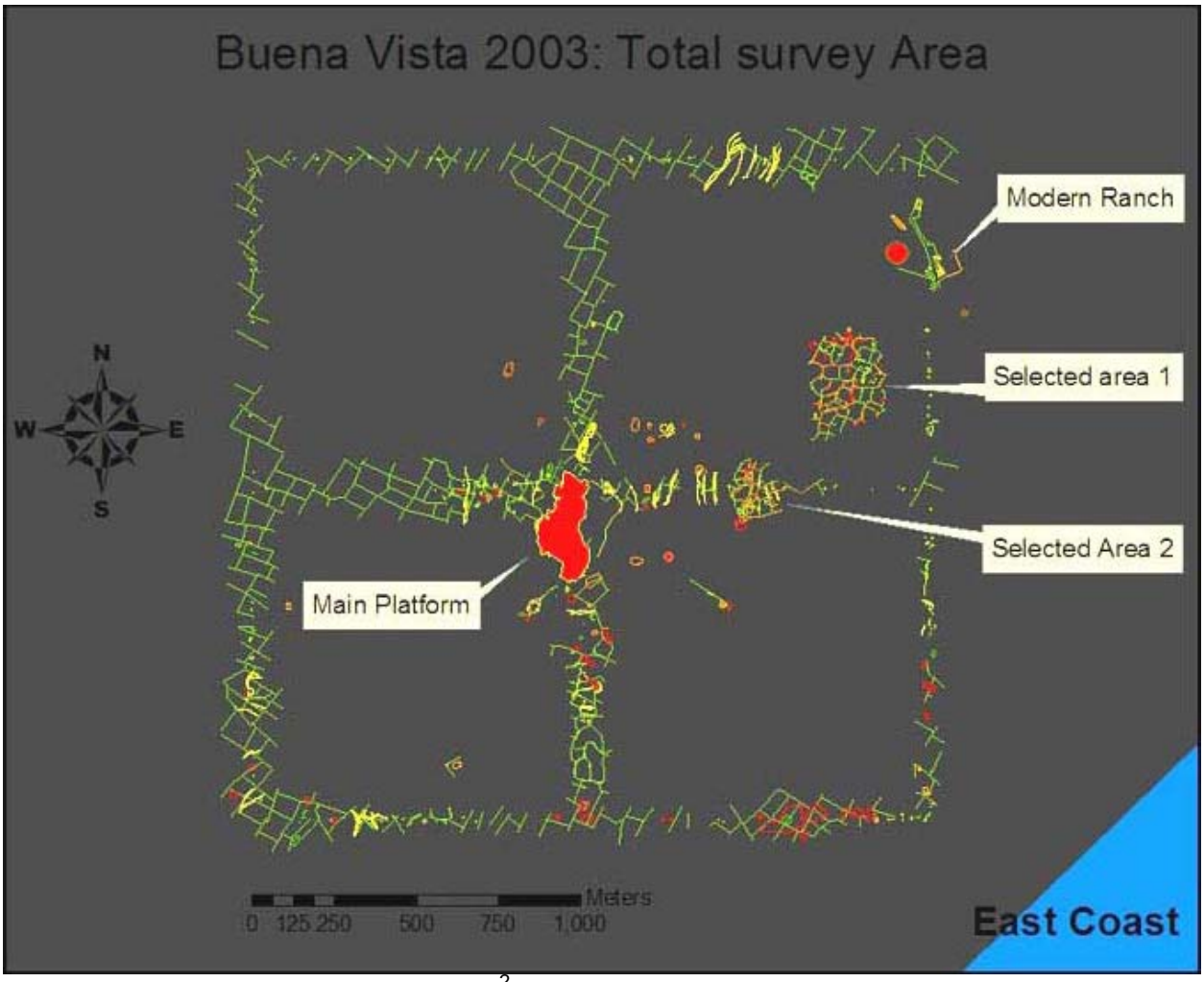

Figure 15. Map of the total 4 km^2 area surveyed during Buena Vista 2003 project.

Main Transects

As mentioned above, 12 km of transects (brechas) beginning in the site center and bounding four quadrants were surveyed and mapped. All features over these transects were registered on the map (Figure 15):

North Transect:

Our point "0" was located in the southeast corner of the altar at the main central plaza. Eighty m to north we reached the limit of the main platform marked by a wall of the simple type 0.50-0.75 m high. From this wall to the point 300 (300 m from point 0) we found walls delimiting 10 plots of 1200 m^2 on average, these walls were also of the

simple type with only a portion 30 m long of the complex type walls. From here to the point 800, we found seven plots larger than the first ones of 6500 m^2 on average, delimited with walls of the simple type. The lot in point 400 enclosed four round structures that we identify as beekeeping structures. They were identified this way because of the presence inside these circles of stone disks probably used to cap the borders of hollow logs used as beehives, in the same way that modern beekeepers do on the mainland (Figure 16, Figure 17 and Figure 18).

Figure 16. Sample of a dry-laid stone circular structure used to guard Maya beehives.

Figure 17. Stone disks "panuchos" used to plug the Maya beehives.

Figure 18. Maya beehives guard in a hut by modern Maya beekeepers, showing stone disks "panuchos" used to plug them.

To the right side in point 500, we found a lot 1500 m^2 totally enclosed by walls of the complex type. From the point 800 to 1000, we found five lots of the same size as the first ones, 1200 m^2. On average, these lots have wells carved in the limestone, probably for water reserve used in pot irrigation. Some of these wells have a cap stone used to close the aperture (Figure 19). Walls in these lots are of the simple type.

Figure 19. Sample of the wells probably used in pot irrigation. Note marks left during drilling operations at sides of the hole, also note stone cap that fell inside the well, when pulled out it matched as a lid to close well aperture.

South Transect:

The main platform extends to south through the point 270 m. At point 300, we found the first wall of the simple type. From here to the point 500, only three plots of 6000 m^2 on average were enclosed. All these plots have rejolladas, the largest rejollada of 50 m diameter located in the plot at point 300. Right of point 500, there is a 2000 m^2 plot delimited on three sides by the complex type of wall and on one side with the simple type. From this point to point 1000, eleven small plots 2000 m^2 on average were found. Most of these plots were delimited by walls of the complex type. Plots at point 750, 850, and 900 have a small circular platform about 5 m in diameter and 0.50-0.60 m high. At the end of the transect, there is a zone of akalches (bajos) traversed by walls of the simple type.

East Transect:

The main platform extends to the east to point 55. There we found the beginning of a series of intercalated hills and low areas up to point 450. Simple type walls are present above the hills, but not in the low areas. One 30 m diameter rejollada and a vaulted cave are located north of point 200. From point 450 to 650, there is a zone of hills and low areas with complex and simple walls delimiting plots. A large number of rejolladas were registered here, and we selected this zone for extensive mapping (Zone 2). It will be described in the next section. From 650 to the end of the transect, we only found two simple type walls, but this area lay inside a zone used for cattle pasture by modern ranch farmers. In order to survey beyond this disturbed zone, we extended this transect to 1050 m.

West Transect:

The main platform extends to point 88 to the west; there we go down to a low zone 48 m wide. At point 150, we found a cenote enclosed by simple type walls. From here to point 300, there are three lots 4000 m^2 on average with masonry structures. South of point 300 is a zone of rejolladas enclosed by simple type walls. At point 350 in a low zone, we found a rejollada enclosed by walls of the complex type. Fifty m south of point 400, we found a group of five circular structures, three of them intersected by simple type walls and two of them inside a plot of 2000 m^2, next to this plot, a one-sided complex walled plot has a half-circle structure, where we found stone disks. From point 400 to 800, six large plots 5000 m^2 in average were registered. Plots decreased in size after this point to point 1000. Several small wells were noted in this area.

Transects Limiting Quadrants

Point 1050 East to North (E-N)

Only one line of simple walls was registered in this transect, which is the closest to the modern ranch, however several piles of boulders were noted; as mentioned earlier because the proximity to the ranch is an area that was looted for modern constructions. From point 600 to 900 is the modern ranch of Buena Vista. Point 1000 is a small zone of akalches or bajos.

1000 (E-N) to West (E-N-W)

In this transect, all walls were of the simple type enclosing plots of 4000 m^2 on average, fifteen plots were noted in this transect. At 30 m north of point 275, we found a circular structure with several stone disks. Associated with the same plot, we noted a small mound 0.50 m high, and 6 m in diameter. Similar mounds were registered in plots north and west of this plot. A zone of hills and bajos was noted from point 450 to 650 with simple walls delimiting plots.

Point 1000 North to West (N-W)

Twenty-two lots were registered in this transect, all of them delimited by simple type walls. In average they enclose areas of 3000 m^2. All this transect lay in an elevated zone noted by the presence of tall rain forest. After point 400, most of the plots have small wells carved in the limestone to retain rain water. Small piles of boulders were noted, enclosing some of these wells (Figure 20).

1000 (N-W) to South (N-W-S)

Eighteen plots were registered in this transect, most of them with two or more small wells. Enclosed plot area was 3000 m^2 in average with the same natural setting as the area in transect N-W.

Figure 20. Well enclosed in a small dry-laid stone circle.

Point 1000 West to South (W-S)

Twenty-four plots were registered in this transect, most of them enclosed by simple type walls. Fifteen m west of point 170 and in point 200, circular beekeeping structures were found, together with a platform 10 by 8 m wide and .60 m height. At point 515, another platform of the same dimensions as that in point 170 was noted. At point 630, a group of six circular beekeeping structures was found, and one additional at 30 m west of point 650 (Figure 21) and at point 980. Vegetation in this area is medium-size forest.

1000 (W-S) to East (W-S-E)

Simple type walls delimit 20 plots in this transect. Plots have 3500 m^2 in average. At point 150, a circular beekeeping structure was found. Two small platforms 4 by 5 m average were registered at points 350 and 400. At point 450, we noted a circular mound 5 m diameter, and at point 515, we register a platform 10 by 7 m, 0.60 m high. One more circular mound was found at point 610. From here to the end of the brecha, seven simple walls were registered. At point 1000, we reached an akalche area.

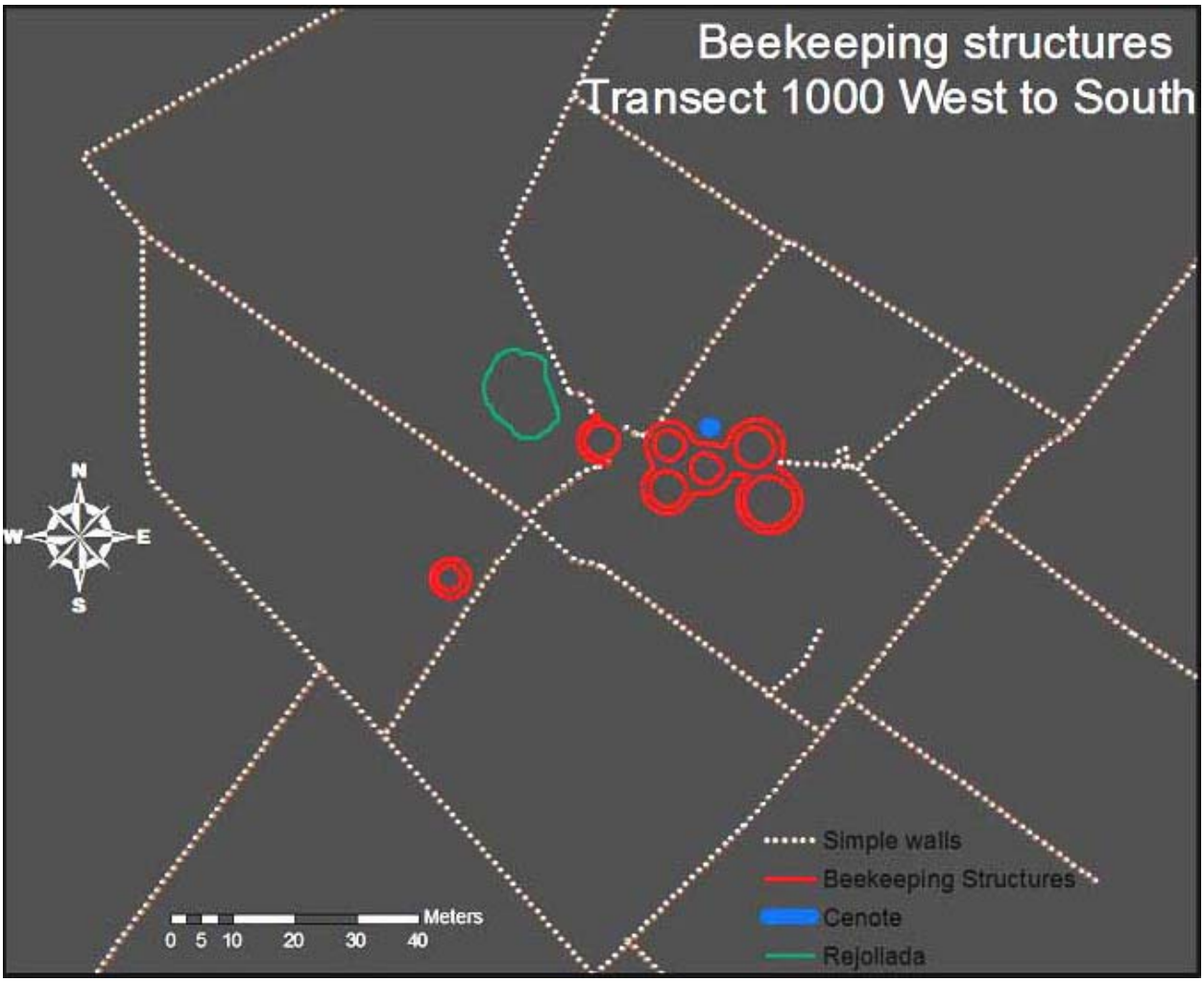

Figure 21. Group of circular beekeeping structures associated to cenote and rejollada.

Point 1000 East to South (E-S)

From the beginning to point 500, just two very deteriorated and short walls were registered, one at point 220 and the other at point 270. Several piles of boulders were seen and some registered in the map, although these piles seem to be formed by boulders removed from ancient walls by looters. From point 500 to the end of the transect, six other simple type walls were registered, but these walls are not enclosing any lot totally, however we can extrapolate and calculate the size of the plots in this area in 2000 m^2. This is an area of akahuales rich in rejolladas. A probable quarry of limestone was registered in point 350, where several big slabs and boulders were noted, but we cannot be sure if this was in use in prehispanic times. From point 800 to

the end of the transect, we got into an area of Tasiste palms; this is our closest point to the coast, located about 250 m east from point 1000.

1000 (E-S) to West (E-S-W)

This transect is located in an area of akalches. Walls in this transect were of the simple type. No walls were noted in the first 170 m of transect; at point 175, we found a simple wall delimiting an akalche. From here to point 550, eleven lots were registered with an average of 3600 m^2. These lots basically enclosed and divided akalches (Figure 22). From point 550 to 1050, eight walls of the simple type were noted, following the same pattern of distribution. No other structures were found in this transect.

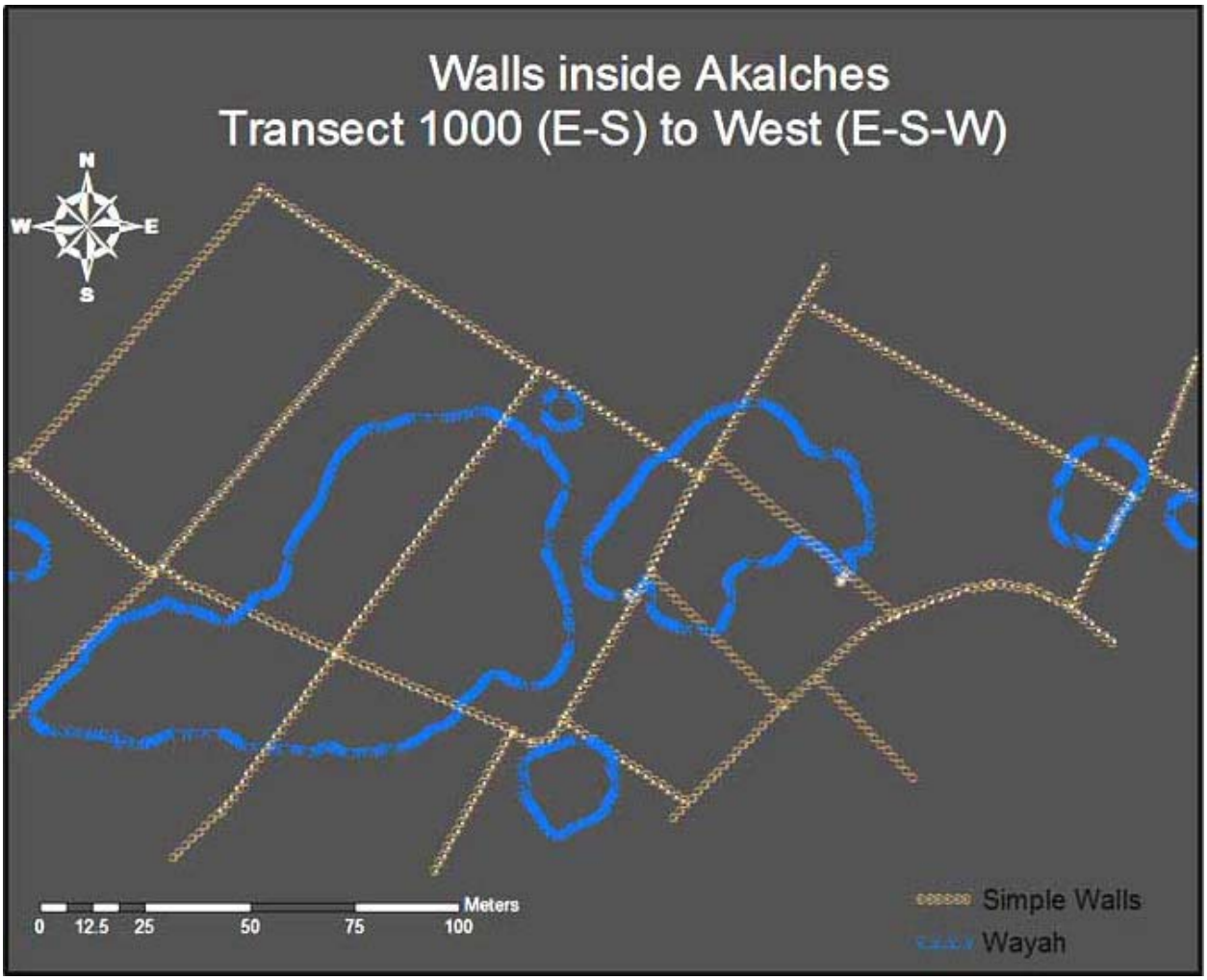

Figure 22. Stone walls enclosing and dividing plots inside akalches.

Selected Areas

Because of our constraints of time to map inside all quadrants, we selected two areas to map systematically and increase our sample of the wall system. These areas were selected based on the presence of different types of walls and different microenvironments.

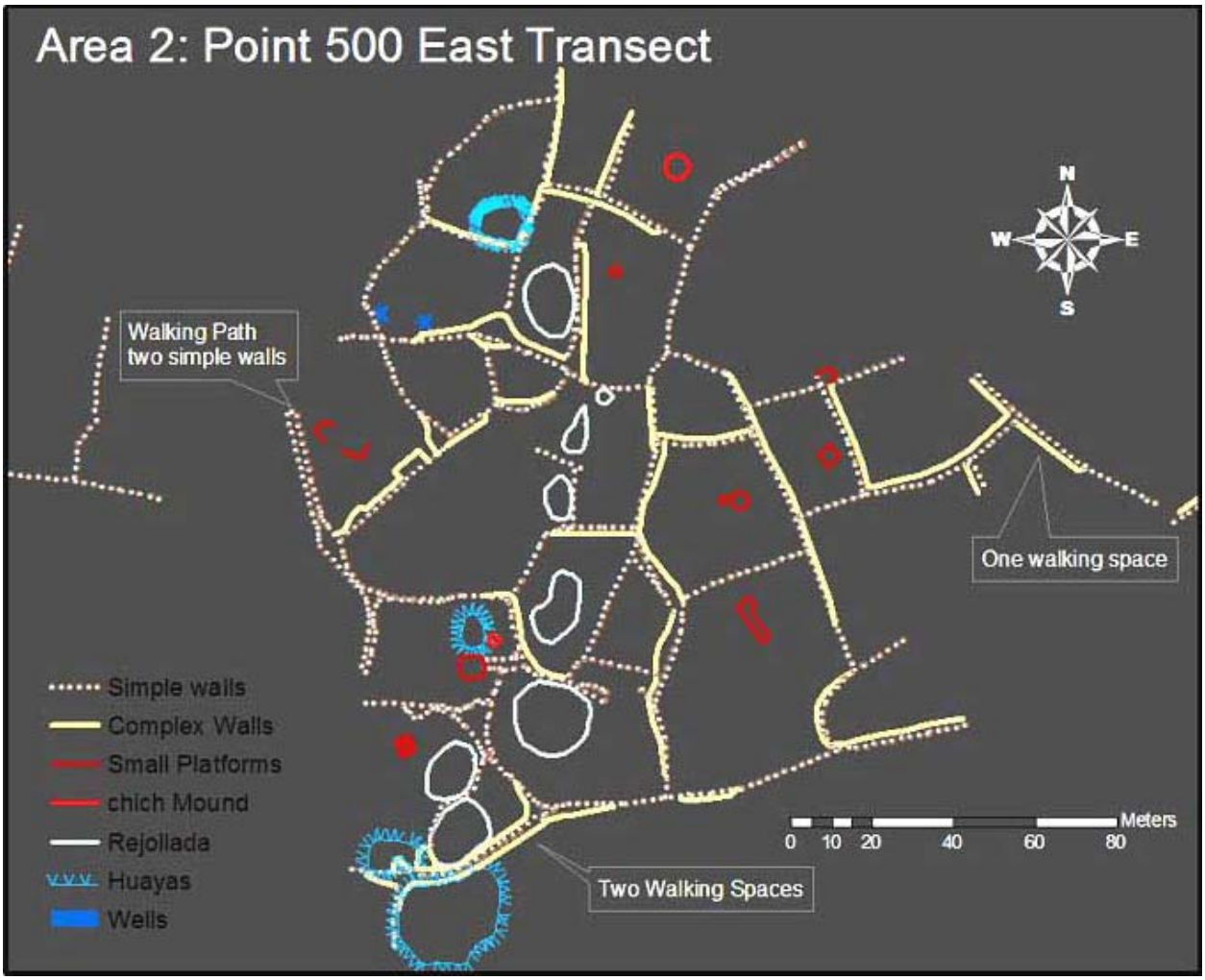

Figure 23. Selected Area 2 showing distribution of stone walled plots, enclosing rejolladas, huayas, and associate structures.

Two hectares Point 500 East (Area 2) (See Figure 23.)

The center of this area is located at point 500 East. This area is situated in a zone of hill elevations and intercalate low areas. Eight rejolladas were registered, all of them enclosed in plots with walls of the two types, in addition six huayas were also enclosed in similar plots. Plot area varies from 600 m^2, the smallest ones, to 1800 m^2, the largest. Three new variations of the wall types were detected in this area; one a variation of the simple type, formed by two simple lines of dry-laid stones running parallel, separated by a space of one meter on average. This space seems to be used as a walking path. This sub-type resembles the sacbes connecting structures in the central main platform (Figure 24, shown below), however, here it is used to enclose plots.

Figure 24. Sample of two parallel stone walls (albarradas) leaving a walking space (andador) in the middle.

The two other variations noted were of the complex type. The first was an elevated wall, built with two parallel retention lines of boulders and filled with rubble; it raises 1 meter high on average and is 1.5 to 2 m wide on the top; one of the retention walls is taller than the other, giving shape to a walking space in the top of the elevated area (Figure 25). The second variation is similar to the previous one, but leaving two walking spaces in the top space, divided by a simple type wall. All different types of walls are presented in an irregular pattern. Not a single plot is delimited by just one type of walls. Two

circular mounds and two square basements were reported inside plots, together with two "L" shaped basements only seen in this area.

Figure 25. Elevated stone wall (albarrada), showing a walking space (andador) at the left side.

Four hectares Northeast Quadrant (Area 1) (See Figure 26.)

This area is located in a plain zone with abundant limestone outcrops and huayas. Thirty plots were defined in this area. As in Area 2, not a single type of wall is enclosing each plot, but different types. Thirteen huayas were mapped, all inside walled plots, in addition most of the plots have circular mounds 6 m diameter in average and 0.40-0.70 m high. On the top of one of these mounds, we found a probable burial crypt delimited by stone slabs (Figure 27). At the center of the area and at the North limit, two circular mounds similar to the others, but with rubble ramps to ground level were registered. Three circular basements were found, probably basements of beekeeping structures; in one of them we found two stone disks.

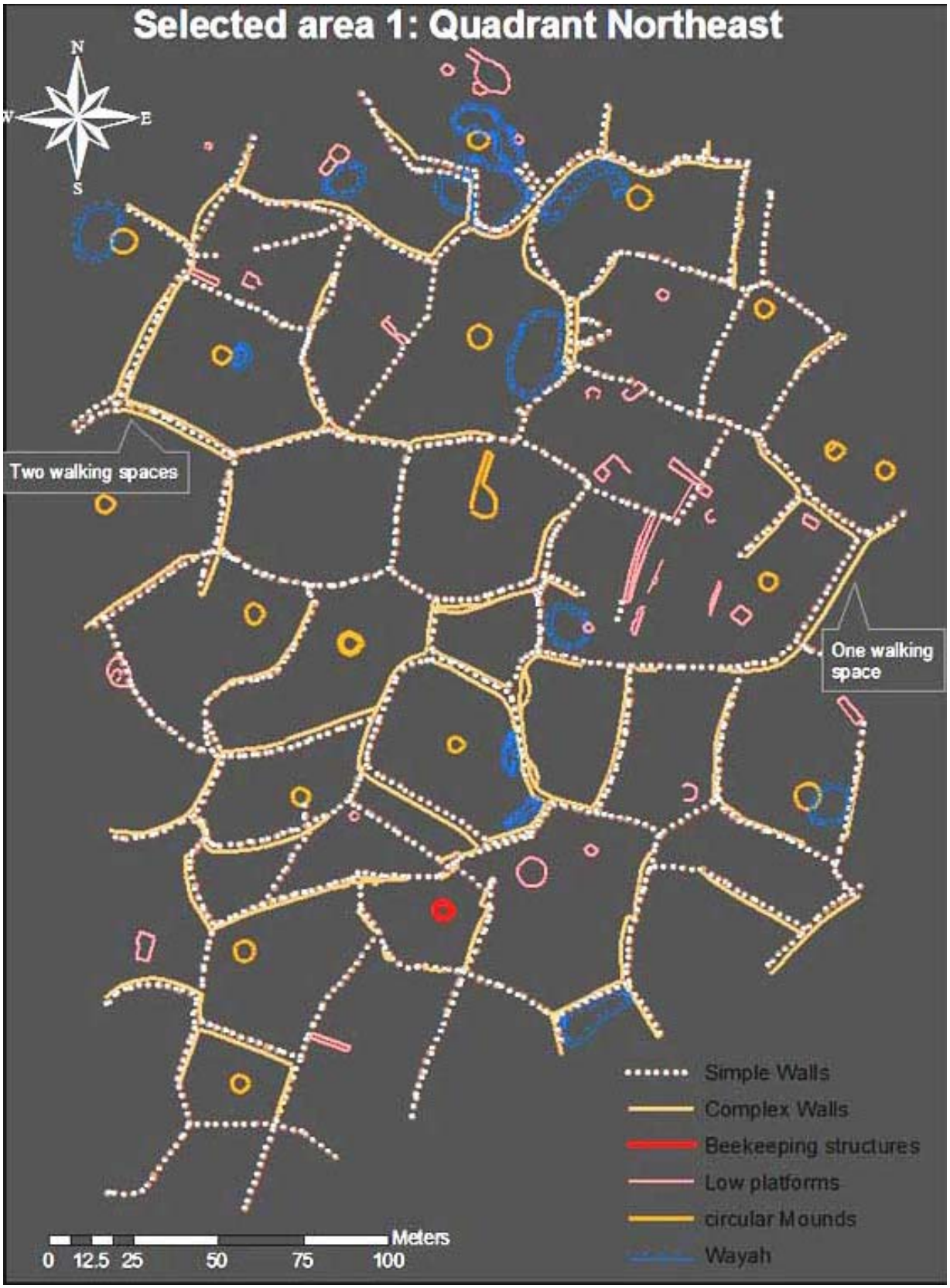

Figure 26. Selected Area 1 showing enclosed plots with chich mounds, and distribution of different types of stone walls.

Figure 27. Chich mound with a stone square in the top, at selected Area 1.

Soil Profiles

We selected two rejolladas, two huayas, a hill, and a plain area with abundant fragments of limestone and outcrops (tzekel), to test soil profiles:

Rejolladas:

Two rejolladas were sampled, the first located in the southwest quadrant, 350 m west of the main platform. This rejollada had the deepest soil profile in our sample, 84 cm depth from surface to bedrock. Five soil horizons were distinguished in this profile: The first horizon (0-5 cm) of dark brown color (5YR 2.5/2) and rich in organic material. The second (5-17 cm) a little lighter (2.5YR 25/1) with 35% of limestone. The third (17-47 cm) dark/light brown (5YR 2.5/1) with little concentration of calcium carbonate ($CaCO_3$). The fourth (47-60 cm) light/dark brown (5YR 2.5/2) with little concentration of $CaCO_3$ and 25% of gravel. And the fifth (60-84 cm) brown of clayish texture (7.5YR 3/2) with little concentration of $CaCO_3$ and 5% of gravel.

The second rejollada located in southeast quadrant presents a profile only 18 cm depth. It had the first three horizons of the first sample at (0-4 cm), (4-7 cm), and (7-18 cm).

Top of a Hill:

This area located 300 m west of main platform presents a soil profile 50 cm depth, with three horizons: The first (0-6 cm) of dark brown color (7.5YR 2.5/1) rich in organic material with a little concentration of $CaCO_3$. The second (6-18 cm) of black color (2.5Y 2.5/1), rich in organic material and 20% of limestones. And the third (18-50 cm), of black color (2.5Y 3/1), of characteristics similar to the preceding horizon, but with some larger stones.

Huayas:

Two huayas were sampled, both of them located in the northeast quadrant inside the selected Area 1. Profiles were similar in both huayas, showing a depth of 50 to 60 cm with three basic horizons: First (0-4/8) of dark brown color (7.5YR 2.5/2) with no $CaCO_3$ and rich in organic material (50%). The second (4/8-20/25) of brown color (75YR 3/2) with a little concentration of $CaCO_3$ and less organic material than the upper horizon. The third horizon (20/25-31/60) was of brown color (7.5YR 3/3) with clayish texture.

Tzekel:

This type of soil is the dominant in selected Area 1, where we tested several spots. It is only 7-10 cm depth of light brown color (10YR 2/1) to brown reddish (10YR 2/2), with high concentration of limestone rocks and free of $CaCO_3$.

Summary and Conclusion

The Buena Vista 2003 archaeological project focused in an area of 4 km^2 around the central 7 ha platform of the site. I mapped archaeological and physical features alongside 12 km of brecha, as well as inside two selected zones with a total area of 6 ha. As a result of this systematic survey, we obtained a substantial sample of the wall network and associated cultural and physical features on the island.

The data presented so far is still under analysis, however, preliminary observations support the hypothesis that Buena Vista functioned as an agrarian settlement,

strategically situated to take advantage of the different microenvironmental zones in the region, and not as a storage/commercial center as previously thought.

The field wall network around Buena Vista delimits plots with well-drained soil rich in organic material, located inside rejolladas, huayas, and in top hill zones. It also delimits plots with poorly-drained soils inside akalches and shallow tzekel soil areas. These soil quality differences inside enclosed plots are probably related with management of distinct crops in each microenvironmental zone.

Chich mounds found inside plots at Area 1 were probably used as platforms supporting perishable field storage structures. No evidence of domestic material was found in these mounds nor inside enclosed plots during our surface analysis.

Circular and half-circle beekeeping structures found as part of complex walls and inside some enclosed plots all over the survey area confirm historical accounts mentioning beekeeping as one of the most important activities on the island at time of Spanish contact (Wagner 1942). Differences in wall size could be explained as a need of walking spaces between plots, but also as a means to retain humidity and soil nutrients in hills and slope areas.

Wells found in hill areas are narrow cavities carved in the limestone to reach the water table. Almost every plot in hill areas had one or more of these wells. It is likely that these wells were used in "pot irrigation" as reported in prehispanic Oaxaca by Flannery (1967) and Kirkby (1973).

Sabloff and Rathje (1975) reported findings from excavations and surface collections in the main 7 ha platform. They found 88 stone and coral disks and 70 shell tools. In San Gervasio, twice as much dirt was removed, but produced only 59 shell tools and 38 stone and coral disks. This suggests a more specialized industry in Buena Vista. In addition, concentration of domestic ceramics (mainly late Postclassic) and metates in the main platform, and the total absence of potsherds and metates or any other domestic activity signature in our survey area around it, points to concentration of domestic and manufacturing tasks on the main platform.

In conclusion, our survey suggests the area was a nucleated site for beekeeping and agriculture production, where people lived and worked in manufacturing tasks. These activities were clustered on the main 7 ha platform, and local inhabitants took care of the field plots and beehives located at walking distance, rather than locating residences adjacent to their fields, as one finds in dispersed settlements.

The wall network delimits a large number of field plots where Buena Vista inhabitants could produce more than their subsistence needs. They could therefore supply the elite living in San Gervasio and pilgrims visiting the Cozumel sanctuary.

Survey in Buena Vista provided us with an excellent sample of agrarian remains in the site, showing vestiges of a more complex agriculture system in prehispanic times, than the slash and burn cultivation in practice today all over the Maya area. Further analysis and excavation is required to clarify agricultural techniques and identify the crops

cultivated in different microenvironmental zones in Buena Vista, to increase our knowledge of postclassic Cozumel Maya economy and prehispanic agrarian activities.

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