24 THE ARCHITECTURE OF SALT PRODUCTION AT THE JOHN SPANG SITE, PAYNES CREEK NATIONAL PARK, BELIZE

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Archaeological investigations were undertaken at the John Spang site, a Late Classic Maya salt works in Punta Ycacos Lagoon, Paynes Creek National Park, and southern Belize. The field survey mapping yielded 149 wooden architectural posts preserved below the sea floor in mangrove peat. The wooden architecture is associated with the infrastructure of salt production and distribution. The wooden architecture, artifact boundaries, and site boundaries were mapped and combined in a GIS to evaluate the spatial patterns. The post patterns at the John Spang site resemble the data (rectangular structures) in Robert C. Wauchope's 1938 ***Modern Maya Houses****. Variations exist between the past and present in regards to site layout and post dimensions.*

Introduction

Research at the John Spang Site, a Late Classic (A.D. 600-900) underwater Maya site in Paynes Creek National Park, Belize, includes study of the patterning and significance of wooden posts in terms of salt architecture and salt production (Figure 1). Although organic artifacts are rarely preserved in the tropical soils of the Maya area, remains of perishable wooden structures have been found at a number of sites, including Cerén (Sheets 2002), preserved by volcanic eruption. Postmolds are known from a variety of ancient Maya sites. However, the Paynes Creek sites have the actual posts and not their decayed remains, due to the preservation of ancient wood in a peat bog below the seafloor. The Paynes Creek sites have yielded the only ancient Maya wooden architecture discovered in the Maya area (McKillop 2005; Sills 2007; Somers 2007). In this paper, we report fieldwork at one of the Paynes Creek underwater sites, the John Spang site, and evaluate the patterning of wooden posts with reference to modern Maya wooden architecture, including structures associated with the salt industry in Mesoamerica.

Studies of modern Maya buildings can provide useful analogies for interpreting ancient Maya pole and thatch architecture. Wauchope's (1938) study of Maya house types provides models for evaluating the wooden architecture at the John Spang Site. Wauchope visited towns and villages in the Yucatan of Mexico, Guatemala, and Belize to study how the modern Maya at that time built their wooden houses, storerooms, and miscellaneous house plot buildings. His study was conducted to provide data to compare with archaeological data of house formations. Wauchope assumed the premise that continuity exists between modern Maya houses and the remnants of houses found at archaeological sites. Our study at the John

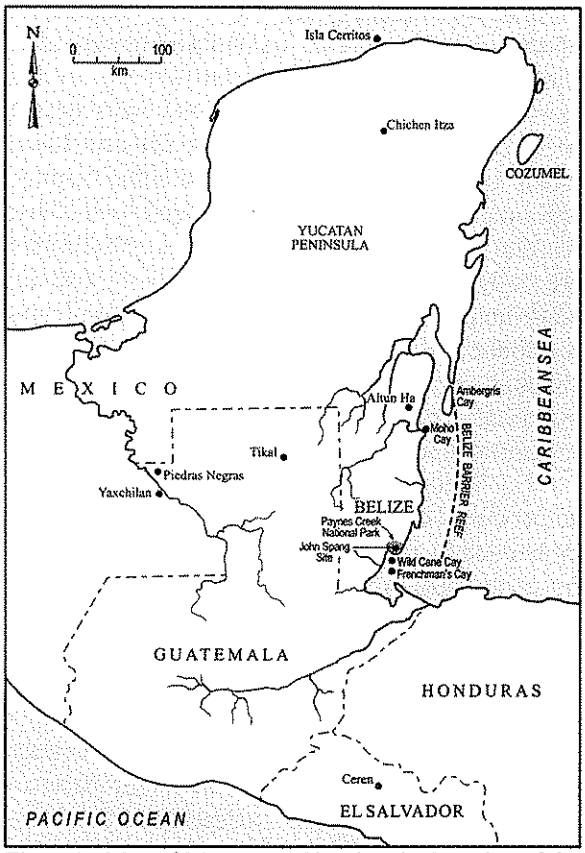

Figure1. Map of Maya Area Showing the Location of the John Spang Site in Paynes Creek National Park, Belize *(Map by Mary Lee Eggart, Louisiana State University)*

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Spang site provides a test of Wauchope's assumption.

Wauchope's (1938: Figure 6) study includes four different house construction shapes, including rectangular, square houses, flattened end, and apsidal houses. Mainposts, or load bearing posts, for all four construction types range from 12 to 18 centimeters (cm) in diameter. Wall poles range from four to eight cm in diameter. Walls are sometimes absent for temporary shelters or storehouses. Walls either abut the ground surface or are imbedded into the ground. Wauchope (1938:30) notes, "regardless of the ultimate plan of the house (rectangular, square, apsidal), mainposts are set up in the ground in such a position that lines were drawn between adjacent posts, the space thus enclosed would be rectangular." Walls are either aligned with main posts are supported by pole plates that rest on the ends of the crossbeams. Walls that are aligned with the main posts usually contribute to the support of the roof. Compared to houses, there is more variability in size, shape, and construction of non-dwelling buildings such as kitchens, storehouses, and temporary shelters.

Wauchope (1938:117) observed that some items in the interior of the dwellings are embedded in the floor. The fireplace is situated on a platform whose legs are embedded in the floor of Maya kitchen structures in Guatemala. Metates can be placed either on the ground or placed on troughs with the legs of the trough embedded into the ground.

Moore and Gasco's (1990) findings from interviews suggest that different parts of pole and thatch structures deteriorate and are replaced at different times in modern villages in coastal Chiapas, Mexico. The palm thatching usually needs to be replaced every five to six years, whereas the rafters and crossbeams every six to 10 years. The main posts, usually made from more durable wood, determine the life of the building. Moore and Gasco (1990:207) note that "the type of wood used for upright posts is a major factor in the length of time a house is occupied." Some wood can last twenty years.

Investigations at the John Spang Site

Fieldwork was carried out at the John Spang salt work in 2006 as part of the "Mapping Ancient Maya Architecture on the Sea Floor" project (Sills 2007). The John Spang Site is an underwater site in Punta Ycacos Lagoon, a large salt-water lagoon (Figure 2). Wooden architecture associated with the ancient Maya salt industry is preserved in mangrove peat below the sea floor (Figure 3). The wood is preserved because of the peat, an anaerobic sediment. The John Spang Site was discovered in March 2006 due to a low pressure system that decreased the sea-level during low tide and exposed portions of the site. The site is accessible only by boat and is located in the western arm of the Punta Ycacos Lagoon. The field equipment was then transported on a PRS (Portable Research Station) to the site. A datum was established in this area of the lagoon near a grove of red mangroves to map the site. The initial reconnaissance survey yielded the discovery of 23 wooden posts and artifacts associated with saltmaking.

Figure 2. Photo of the John Spang site. (Photo by H. McKillop).

Between March and April the team conducted a 100 percent systematic survey on RFD's (Research Flotation Devices). A flotation survey was preferred over a more traditional pedestrian survey because it minimized the disturbance to the site and allows for greater coverage while searching for wooden posts. During this portion of the investigations a site marker was placed in a centrally located area and marked with a ¼-inch PVC pipe. GPS coordinates for the site were taken from this marker.

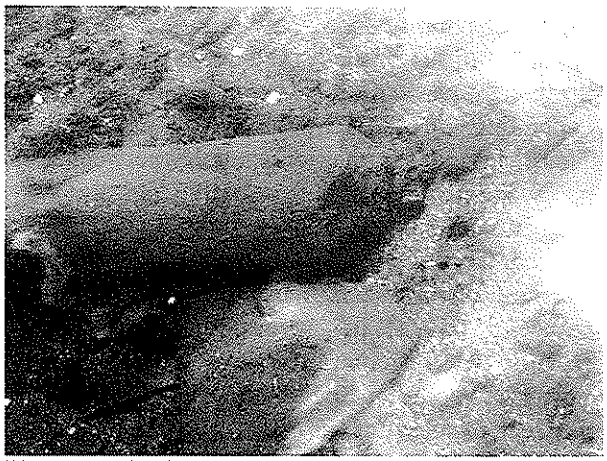

Figure 3. Wooden Post Preserved Underwater at the John Spang site (Photo by H. McKillop).

A systematic flotation survey was conducted across the site (Figure 4). The field crew lined up parallel to each other, shoulder to shoulder, on our floatation devices and moved across the site. Our hands are placed flat on the surface of the peat feeling for wooden posts, artifacts, and other cultural material. Metal survey flags were used to mark posts, artifact boundaries, and diagnostic artifacts. All of the wooden posts flagged during the survey were labeled and measured.

Figure 4. Flotation Survey at the John Spang site (Photo by H. McKillop).

Mapping of the site was accomplished using a total station and a prism stadia rod. After mapping at the site was completed, the data were downloaded into the GIS program Intergraph GeoMedia® for observation and study of spatial patterns and distribution of the wooden posts. Using this geospatial software allows the team to create spatial queries and spatial overlays to compare the distribution of posts, as well as, comparisons of post sizes. Viewing the artifact boundaries that were mapped allows assumptions to be made regarding initial site size and the spatial relationship among artifacts and the wooden architecture.

The systematic flotation survey revealed 149 wooden posts (Figure 5). The posts were recorded as hardwood or palmetto palm, pending species identifications. The hardwoods are hearty solid wood, whereas the pimenta posts are fragile. Often, the pimenta are hollow due to decay, which leaves only the shell of the bark to note its presence. The 149 mapped wooden posts included 100 vertical hardwoods, 40 vertical palmetto palm posts, six horizontal hardwood posts, and three horizontal palmetto palm posts. The length of the vertical wooden posts was unknown since no excavation of the posts was undertaken during this stage of the research. Excavation of the wooden posts would have hastened their deterioration because the peat acts as a preservative keeping the posts intact whereas excavation would have exposed the wood to the air and consequent decay.

Mapping of the posts and artifacts on the seafloor revealed the aerial extent of the site to be 80 meters (m) north to south and 50.6 m east to west. By viewing the spatial layout of the site, initial observations can be presented. Overall, the mapped wooden posts at the John Spang Site have a northwest to southeast alignment. Seven or more groupings of wooden posts can visually be observed at the site. These groupings are separated by spaces where no wooden posts were found. Even though no wooden posts were discovered in these areas artifacts are located in these spaces. The hardwood post diameters range from 3 to 18 cm with a mean of nine cm. The diameters recorded for palmetto palm posts range from five to eight cm.

The analysis of hardwood post diameters show the Paynes Creek Maya at the John Spang site had a "mental template" of post diameters for construction. Over half of the hardwood posts fall between eight and 14 cm in diameter. Only four hardwood posts were within 14 to 18 cm in diameter. There was a

preference for post diameters between the ranges of five to 14 cm in diameter at the John Spang Site. On the other hand, larger diameter posts were rare at the site.

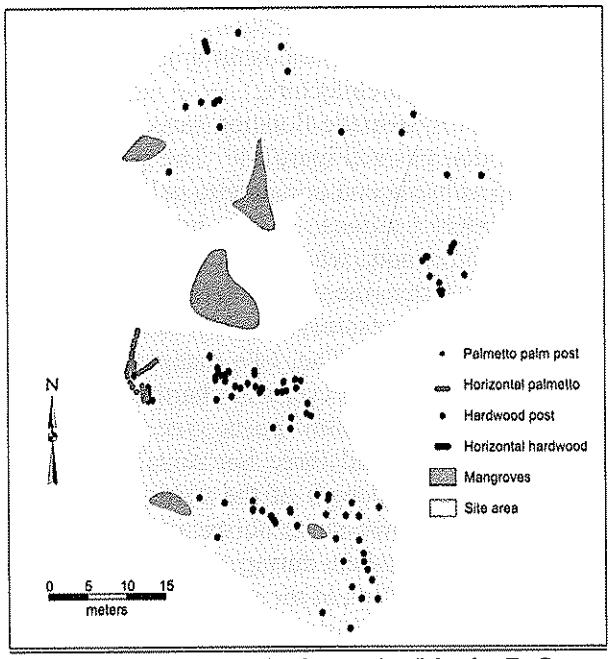

Figure 5. Map of the John Spang site (Map by E. Cory Sills enhanced by M.L. Eggart)

Discussion

What is the significance of the distribution of wooden posts at the John Spang Site in terms of ancient Maya wooden architecture? Are these houses as described by Wauchope (1938) or are some of them outbuildings? Are they specialized structures to support salt production? If they are buildings, were structures arranged over the landscape to form plazuela groups?

The size of buildings varies within the Maya area. Wauchope (1938) describes various house shapes, sizes, and materials used in the construction of houses and miscellaneous houseplot buildings. Outbuildings are smaller than houses in domestic dwellings. According to Wauchope (1938), post diameters for mainposts should fall within a range of 12 to 18 cm in diameters. The hardwood posts at the John Spang Site do not conform to Wauchope's observations. Instead, there is a greater range of what was preferred for mainposts at the John Spang site. Perhaps the smaller posts were utilized because the structures were not built to last as long as household dwellings. Larger species of hardwoods may not have been as abundant in the past as smaller trees or, perhaps the ancient Maya preferred smaller sizes of posts depending on the availability of hardwoods. There is a clear separation spatially between the hardwood and palmetto palm posts. The palmetto palm posts are only found in the central western portion of the site. The spatial distribution between these two preliminary classifications of posts can be interpreted as serving two different functions. Based on the results at the John Spang Site, there may be a variety of sizes and shapes of structures. However, the systematic flotation survey revealed an abundance of briquetage, indicating the structures were all used in salt production. Modern studies of saltmaking suggest that the wooden structures at the site could have been used in the salt production process and not specifically as buildings (Andrews 1983; Good 1995; McKillop 2002, 2005; Parsons 2001; Reina and Monaghan 1981; Williams 1999).

Based on the ethnographic and archaeological literature, there is a diversity of structures and spatial layouts at salt making sites. However, the same concepts of harvesting the soil and brine, leaching the soil, boiling the water, and preparing the salt are found at the majority of saltmaking sites using the sal cocida or briquetage method. Although the same methods were employed, variability exists in the structures used to carry out the process related to saltmaking. Even at individual saltmaking sites and amongst those in close proximity variation occur in the placement and spatial distribution of buildings and saltmaking apparatuses. Reina and Monaghan (1981) describe platforms housed inside buildings at Sacapulas, in Guatemala. Outside of the buildings are large vessels for holding and leaching salt laden soil. McKillop (2005) mentions exterior walls of a rectangular wooden building at the saltmaking site of Chak Sak Ha Nal in Paynes Creek National Park, in Belize. Williams (1999) describes structures used in the salt production process for leaching and canoes used to dry out the brine to obtain salt. Good (1995) mentions platforms for leaching. Various other modifications to the environment can be found at saltmaking sites, such as, drying pans made from soil or posts,

and retaining walls (Andrews 1983). Other landform modifications include, dams or impoundments that have been recorded in the archaeological record at saltmaking sites at Salinas de los Nueve Cerros in southern Guatemala and at El Salado, in Veracruz, Mexico (Dillon et al. 1998; Santley 2004). The results of the systematic flotation survey and mapping conducted at the John Spang site reveal wooden architecture associated with the ancient Maya saltmaking industry in the Late Classic period.

Lines of palmetto palm posts are somewhat of an enigma. Forming a backward y shape located in the western portion of the John Spang site they are divided from the central portion of the site by an absence of artifacts (Figure 6). Although the palmetto palm lines do not form enclosed areas, they could have formed a holding area for brackish salt water from which the water is then collected to be placed within an apparatus on which to leach the soil, or a land retaining wall. Based on ethnographic correlates these palmetto palm post lines could have formed salt pans or retaining walls to hold saline enriched water for processing.

The evidence at the site suggests that salt was made using the briquetage technique. However, the sal solar method could also have been taking place. The palmetto post lines do not conform to Andrews (1983) descriptions of salt pans in the Yucatan as being "shallow rectangular pans located on the shores of the lagoons". Majority of archaeological and ethnographic salt making accounts indicate that the briquetage technique and the sal solar method do not occur at the same time. This is not true in all cases in antiquity. Dillon et al. (1998) hypothesized the possibility of a combination of both techniques occurring in southern Guatemala. Here, salt was primarily made using the briquetage technique but due to the presence of a salt flat the salt could have also been harvested during the dry season.

Plazuela groups, the basic unit of Maya architecture, are not visible at the John Spang Site. This suggests that the site's alignment was not similarly designed as historic and modern domestic house sites. The absence of a plazuela group indicates that not all structures built by the ancient Maya are designed with the same basic principle of a central courtyard. Other possibilities regarding the alignment of the wooden architecture at Site 72 suggest the structures were erected during one occupation or the structures were aligned to follow a remnant shoreline to the west in the lagoon.

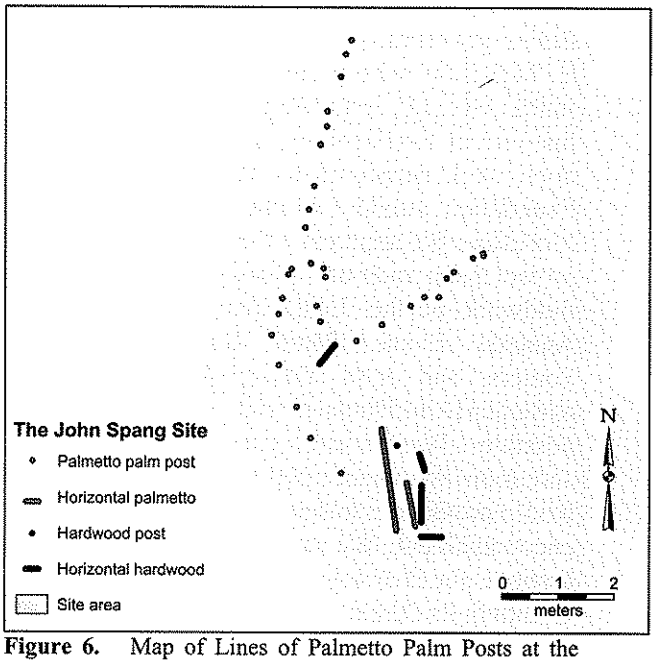

Figure 6. Map of Lines of Palmetto Palm Posts at the John Spang site (Map by E. Cory Sills enhanced by M. L. Eggart).

Conclusions

The discovery of salt production sites, as well as, infrastructure associated with salt production in Paynes Creek National Park, southern Belize, indicates that salt was a substantial trade commodity (McKillop 1995, 2002, 2005). Trade routes have been documented for salt production from ethnohistoric and archaeological evidence (Andrews 1983). Salt would have been needed to supplement the diet of the ancient Maya. Also, salt could be used for tanning hides, as a preservative for meat and seafood, and for ritual and medicinal uses (Andrews 1983).

The various shapes and techniques, described by Wauchope (1938), are useful in determining the shape of the possible buildings. There are rectangular shaped buildings as described by Wauchope. However, the size of the buildings and structures at the John Spang Site site show variability. Analysis at this site

also shows that although there is continuity from the past to the present in regards to shapes, hardwood post sizes and the sizes of structures were variable in the past as they are in the present.

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