21 CLASSIC MAYA WORKSHOPS: ANCIENT SALT WORKS IN PAYNES CREEK NATIONAL PARK, BELIZE

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This paper questions the centralized model of the Late Classic Maya economy in which the urban royal Maya and their courtiers controlled the production and distribution of goods and resources. Notwithstanding the presence of attached specialists producing highly crafted goods in lowlands cities, there was considerable variability in the production and level of elite control of other, including more utilitarian goods. The existence of independent workshops not associated with household production is underscored by the discovery of 45 salt works, now underwater in Punta Ycacos Lagoon, Paynes Creek National Park, Belize. Sea-level rise inundated the workshops, preserving pots in situ

Variability in the control of production and distribution of goods and resources supports Marcus' (1993) dynamic model of Classic Maya political organization, with fluctuations between centralized and more de-centralized (segmentary) organization. The Classic Maya economy consisted of the political economy and the subsistence economy (Masson and Freidel 2002; McKillop 2002, 2004a). The political economy included attached specialists of the royal court who crafted goods for the royal Maya, whereas the subsistence economy was focused on basic needs of each household. Neglected in this dichotomy are various types of production beyond the household level, perhaps because there are few instances in which production or workshops have been identified. More often, it is the finished products that are discovered in burials, offerings, middens, and construction fill that indicate production elsewhere. A growing body of data indicates that workshop production beyond the household needs by specialists who were not attached to the royal courts, but the level of royal control of production and distribution of the goods has remained undefined. The discovery and excavation of Classic Maya workshops provides an opportunity to re-evaluate the dichotomy between political and subsistence economy as they relate to the control of production and distribution of goods and resources and the organization of Classic Maya society. Excavated and analyzed workshops include the cottage industry workshop production of stone tools at Colha (Shafer and Hester 1983), and independent, non-domestic salt works in Paynes Creek National Park (McKillop 2002).

At the height of the Late Classic period there were arguably up to 80 city-states within the southern Maya lowlands, each controlled by dynastic royal kings and queens (Martin and Grube 2000). Hieroglyphic records on stelae in royal courtyards proclaim marriage alliances and city-states conquered, contributing to a picture of changing alliances that variously grouped city-states into larger political and economic units. However, the degree of centralization, both within and among city-states, is a point of some discussion among Maya archaeologists. Contrasting views of Classic Maya political economy pit the centralist model of the organization of Maya society (Chase and Chase 1996) against the more de-centralized, segmentary model (Demarest 1996; Dunham et al. 1989;

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McKillop 2002, 2004a). The centralist model is hierarchical, with power vested with the royal Maya in urban centers (Chase and Chase 2001). The segmentary model addresses lateral relations, and alliances, and vests power in heterarchal relations (Scarborough et al. 2003). Joyce Marcus (1993) suggests a dynamic model of Maya society, in which the political organization alternated between a centralist and more decentralized, segmentary organization, depending on spatial and temporal variability within the southern Maya lowlands (see Braswell et al. 2004).

The political economy included attached specialists for the dynastic royal Maya kings and queens. The attached specialists worked in royal court workshops in urban centers. The craft workers created fancy pottery vessels and highly crafted objects of jade. They had proprietary knowledge of written language, painted on paper books, pottery vessels, jade objects, and carved in stone (Coe and Kerr 1998; Inomata 2001). The knowledge, skills, and products of the attached specialists reinforced, modified, and recreated the authority of the ruling Maya kings and queens.

Scribes are depicted on painted pottery vessels, writing in books. Some scribes even signed their names on their works, as on carved stones at Yaxchilan (Tate 1992). Texts on Late Classic Maya vases describe the pictorial scenes of royal court life depicted on the vessels (Reents-Budet 1994, 2001). "Codex style" vases mimic the line drawings of paper books known from Postclassic codices and unfortunately destroyed and lost from earlier times. Highly crafted goods, both of locally available materials, and from imported "value-added" materials, were used during the lives of the royalty and interred with them in their graves as offerings. The 4.4 kg carved jade head of *K'inich Ajaw*, the sun god, from the Tomb of the SunGod; Temple B4 at Altun Ha (Pendergast 1982) is almost obscenely large and elaborate in the burial of such a valuable resource. The acquisition of highly crafted goods and imported resources was of greatest interest to the royal Maya as symbols and conveyors of their power. As such, these goods and resources were desired by others who wanted to attain power and climb the social ladder.

Potters, painters, scribes, and specialists were part of the royal court producing highly crafted goods for the elite Maya. Ancient texts recording dynastic records of Maya royalty and the important events of their lives provide important clues to the economy: We assume that economic transactions were embedded in marriage and military alliances, territorial expansion, and the maintenance of hierarchical and heterarchal relations within and between polities. These economic transactions were exotic, highly crafted, limited edition goods for elite use in life and death.

While ancient texts are virtually silent on the nature of the subsistence economy, there is much evidence on the production and distribution of goods and resources from dirt archaeology. The non-local origin of obsidian, chert, ground stone, pottery, and shells document exchange (McKillop 2002, 2004a, b; McKillop and Winemiller 2004). Plant and animal remains, relict fields, and bone chemistry identify the diet and subsistence patterns. A variety of other goods were produced for use in the daily lives of the ancient Maya, from kings to commoners. Pots, stone tools, clothing, boats, weapons, household goods and furniture, were needed by all sectors of Maya society. Some of these goods were produced by each household; some were produced in cottage industries for use by others as with the chert tool workshops at Colha (Shafer and Hester 1983). My

ing research in on the south coast of ze demonstrates that there were shops not associated with household duction or cottage industries and that workshops were geographically distant and beyond the political and economic trol of the inland urban Maya. There is nsive evidence for independent kshops in Paynes Creek National Park, re salt was produced by boiling seawater pots over fires in Paynes Creek National k. We have discovered and investigated salt works in the park. All date to the te Classic on the basis of ceramic and diocarbon analyses.

In distinguishing between the political economy and the subsistence economy, we often assume centralized control by the urban royal Maya in prestige goods. In contrast, we often assume the subsistence economy was focused on household production and distribution. However, this dichotomy ignores the existence of cottage industry production as at Colha and independent workshops as at Paynes Creek. The political-subsistence economy dichotomy further masks the organization of the subsistence economy beyond the household level and/or the interest among the royal urban Maya in controlling the subsistence economy. Colha provides the best example to date of cottage industry for the ancient Maya, where stone tools were produced at household workshops for local and regional distribution (Shafer and Hester 1983).

I have previously reported and discussed 4 salt workshops in Paynes Creek National Park that provide a new dimension to our understanding of the ancient Maya subsistence economy (Figure 1). In *Salt: White Gold of the Ancient Maya*, I described the boiling of seawater or brine in pots over fires to produce salt, suggesting it was produced under coastal control to meet the salt needs and appetite of the nearby inland urban Maya. We documented that salt was produced and by standardization studies that the pots were standardized in size suggesting mass-production. The workshops were places where salt was produced for use elsewhere. They were workshops with no settlement. The sites lack food remains, burials, or other settlement data. The pottery assemblage is restricted in shape and types to pots used in salt making. The discovery of 8 new salt works in Paynes Creek National Park in 2003, together with 33 additional salt works discovered in 2004 underscore the extent of independent workshop production during the Late Classic on the south coast of Belize. The extent of independent workshop production supports a de-centralized organization of Maya society, with the control of production and distribution of some critical resources, such as salt, in the hands of the local producers. Due to their control of the salt works, the coastal Maya of southern Belize were politically and economically autonomous from their nearby inland city states, who negotiated marriage and trade alliances with the coastal Maya in order to obtain salt, a biological necessity, as well as obsidian and other resources traded along the coast from more distant places within and beyond the Maya lowlands (McKillop 2002, 2005; McKillop et al. 2004).

Salt (sodium chloride) is a basic mineral component of the intercellular system of the human body. The body strives to maintain salt balance: The body hoards salt when it is unavailable or under increased physical activity. The body excretes excess salt through kidneys. Salt enhances the flavor of food and as one of the four taste sensations on the human tongue, salt appetite clearly works to help the body obtain its biological quota (see McKillop 2002). There are various estimates for the amount of salt the ancient Maya needed, all dependent on population estimates of Maya

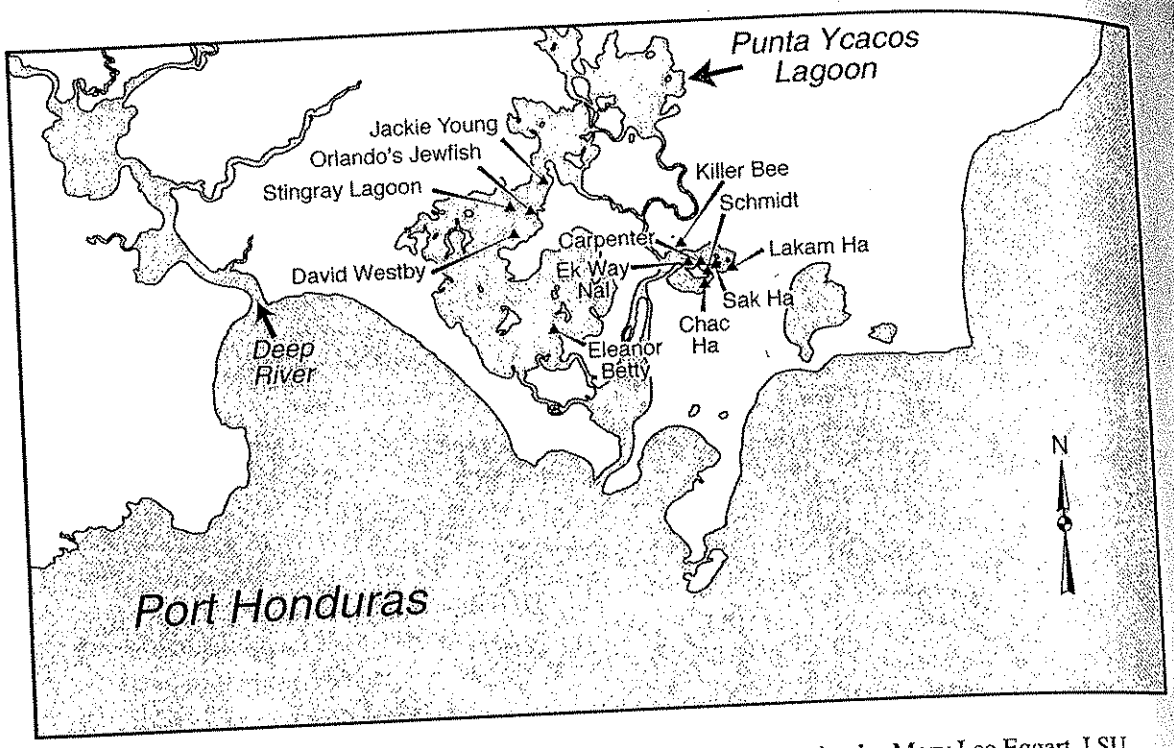

Figure 1. Punta Ycacos Lagoon, Paynes Creek National Park. Drawing by Mary Lee Eggart, LSU.

settlements and various estimates of the body's biological salt needs (Andrews 1983).

Where did the Classic Maya get salt? What can the production and distribution of salt tell us about the Classic Maya economy and the organization of ancient Maya society? There are two main methods of salt production that were widespread historically and prehistorically worldwide, including the Maya area: Salt was acquired by gathering salt created by solar evaporation on salt flats on the north coast of the Yucatan (Andrews 1983). Salt was produced by boiling brine or seawater in pots over fires on the coast of Belize and the Pacific coasts of Guatemala, El Salvador, and Mexico (Coe and Flannery 1967; Mackinnon and Kepecs 1989; McKillop 1995, 2002; Mock 1994; Nance 1992).

Fieldwork on the south coast of Belize has revealed extensive salt production by the boiling method in Punta Ycacos Lagoon, a large salt-water lagoon, in Paynes Creek National Park, some 25 km north of Punta Gorda. The low-lying landscape consists of a typical mangrove ecosystem dominated by red mangroves (*Rhizophora mangle*), with their phenophores in the salt water. North and east of the lagoon, the poorly drained pine savannah has scattered clumps of palmettos (*Acoelorraphe wrightii*), pine (*Pinus caribaea*), and oak (*Quercus sp.*; Johnson and Chaffey 1974). In areas farther inland and where the savannah is drier, other species grow, including crabbo (*Byrsonima crassifolia*), icaco plum (*Chrysobalanus icaco*), and white poisonwood (*Caeraria belizensis*). Various deciduous hardwoods grow in the rainforest along the Deep River to the south and Monkey River to the north. The park is uninhabited and there is only one family living on the coast between Punta Gorda and Punta Negra.

Regional survey and excavation revealed that sea level has risen more than one meter since the end of the Classic

period, inundating ancient sites, including salt works that are currently underwater in Punta Ycacos Lagoon. The sea-level rise was extensive and pervasive in the Port Honduras and Paynes Creek region, as demonstrated by the location a dozen radiocarbon-dated Late Classic Maya sites below sea level (McKillop 2002: 134-174, Table 5.3). There was more dry land on the coast and on the offshore cays and shallow offshore areas in the sea were dry land. The vegetation patterns were dramatically different. Whereas mangroves dominate the landscape since they tolerate salt water, plants and trees adapted to dry land and fresh water dominated the Classic and Postclassic landscape (McKillop 1994, 1996a): Native palms, including cohune (*Orbigna cohune*), coyol (*Acrocomia mexicana*), and poknoboy (*Bactris major*), were a significant feature of the coastal landscape, despite their modern rarity.

The research is part of a long-term project in the Port Honduras coastal area between Punta Gorda and Punta Gorda. Initial fieldwork beginning in 1981 focused on the Classic to Postclassic Maya trading port on Wild Cane Cay (McKillop 2005). Subsequent fieldwork investigated the coastal area to investigate the relationship between Wild Cane Cay and other discovered sites and the role of coastal areas in ancient Maya society (McKillop 2005; McKillop and Winemiller 2004; McKillop et al. 2004). Four salt works were discovered and excavated in 1991 and 1994 in Paynes Creek National Park (McKillop 1995, 2002). Stingray Lagoon, David Westby, and Orlando's Jewfish sites are underwater in the western arm of Punta Ycacos Lagoon. The sites were discovered by the presence of artifacts on the sea floor, observed while traversing the lagoon in the project vessels, and identified by jumping overboard to surface collect. A fourth site, Killer Bee, is in the adjacent mangroves and is identifiable by its distinctive ping-wing vegetation (wild pineapple). The underwater sites were mapped using a transit and then excavated by standing in the water and shoveling the mangrove mud from the wooden grid frame excavation units into screens.

A radiocarbon date on wood charcoal from a fire hearth at the Stingray Lagoon site of A.D. 770 ± 50 places the site in the Late Classic (McKillop 1995). The radiocarbon date is corroborated by the age assignment from analysis of ceramics from the four sites. They are single-component Late Classic sites. The top of Stingray Lagoon site at 90 cm below sea level provides a minimum indication of the extent of sea-level rise (absolute or relative) since the Late Classic. Since the Maya at Stingray Lagoon could not live directly at sea level, it was even lower. Sea level rose soon after the sites were abandoned, precluding the opportunity for post-depositional site trampling. This rapid sea-level rise is indicated by the larger size of pottery sherds at the inundated sites compared with land sites in the Port Honduras region.

The interpretation of the sites as salt works and the pottery as salt pots is based on ethnographic analogy. For example, at the modern inland salt spring at Sacapulas in highland Guatemala, some two-dozen pots are placed over a fire, with water jars used to refill the pots as the water evaporates (Reina and Monaghen 1981). This technique is common worldwide (Adshead 1992).

The artifact assemblages from the four sites were dominated by jar and bowl sherds from salt boiling pots and their solid clay cylinder vessel supports, named "Punta Ycacos Unslipped" following the type-variety system of Maya ceramic classification. In addition, there were two types of water jars used for storing seawater or brine that was poured into the pots, including undecorated "Mangrove

Unslipped" and "Warrie Red", a red-slipped type with distinctive unit-stamped decorations on the vessel shoulder, characteristic of inland cities in southern Belize and adjacent Guatemala.

The four sites were independent workshops where salt was produced by people who lived elsewhere. There was no household garbage at the workshops, only debris from the salt boiling process. There were no houses or burials, both typical of Maya settlements. There were few food remains, apart from a limited number of palm nut shells, in contrast to inundated Maya sites elsewhere in the area. With only 4 pottery types, the sites lacked the diversity of pottery types and range of vessel forms of Maya settlements in the Port Honduras region. Perhaps they lived at the nearest known Maya community, the offshore island site of Wild Cane Cay, which likely was the *entrepôt* for the coastal-inland trade of salt (McKillop 1996b, 2005). With limited survey in the lagoon and no survey on the land, the home base of the salt workers is undetermined.

With only 4 salt works, there were lingering questions about the contribution of the Punta Ycacos salt to the inland Maya diet and the organization of salt production and trade in the Late Classic in the Maya area. Did Belizean salt supply the Late Classic Maya inland salt needs? Alternatively, was salt imported at that time from the salt flats on the north coast of the Yucatan (Andrews 1980)? Certainly the Belize coast was closer to the heartland of the Maya area, but long-distance bulk transport of salt and other basic commodities is documented in other ancient and modern cultures. I developed a research plan in order to evaluate how much salt was produced. Firstly, I investigated whether the Paynes Creek salt was mass-produced, implying that it was beyond the level of household production. Secondly, I planned a systematic search of Paynes Creek National Park, to see if there were more salt works, if they all dated to the Late Classic or if there were earlier or later sites, and to find the salt workers' communities.

In order to evaluate whether or not salt was mass-produced, I evaluated if the salt pots were standardized in size and shape. I compared the salt pots with household pots that were not standardized from household middens at Wild Cane Cay, from the Bedford Unslipped pottery type. In evaluating standardization, I measured the diameter of the vessel orifices for jars and bowls and the diameter of the clay cylinder salt pot vessel supports. I used the average median variation. The average median variation reduces the effect of outlying values in a distribution, so it is better than the co-efficient of variation, often used in other standardization studies. In calculating the average median variation, each value (measurement) is subtracted from the median. The absolute value of the number is divided by the median. The average of the number is multiplied by 100. The lower the calculated value, the less variation, and hence more standardized. This statistic is appropriate for samples with distributions significantly different from normal.

The Punta Ycacos salt jars and vessel supports were significantly more standardized than the Wild Cane Cay jars (McKillop 2002). The average median variation of 9.6 for the salt pots and 11.9 for the salt vessel supports is much lower than the value of 20.6 for the Wild Cane Cay pots. The salt pots Orlando's Jewfish, with an average median variation of 2.1, were significantly more standardized than the 10.5 at Stingray Lagoon or the 10.9 at David Westby, suggesting there were distinct work parties or different times of use. The sample at Killer Bee site was too small to provide a separate calculation. There was no significant difference in the standardization

the salt pot vessel supports at the different salt works. The Mangrove Unslipped water jars were not standardized. Their average median variation of 20.6 is the same as that for the Wild Cane Cay pots, indicating both the Mangrove Unslipped vessels were general purpose water jars not exclusively used for storing seawater or brine at the salt works. In fact, they have been found at various settlements in the Port Honduras (McKillop 2001). The Warrie Red water jars, by way of contrast, were standardized since they were mold-made, as indicated by their average median variation of 8.2. The Paynes Creek salt pots were standardized, suggesting specialized production, even that they were mass-produced for salt making. The 4 sites provided tantalizing clues that Belizean salt was extensively used by the nearby Late Classic inland Maya, underscoring the need for further survey to see if there were more salt works.

Underwater survey in 2003 and 2004 indicates there are both more salt works and a high density of sites in Paynes Creek National Park. The ongoing survey includes the first systematic search of the lagoon, with a team using the land-based technique of pedestrian survey, walking or snorkeling in a line at arms' length and looking for artifacts on the seafloor. To date, we have discovered 45 salt works and only a small area of Punta Ycacos Lagoon has been systematically searched and land survey has not begun. Eight underwater sites were found in five days of survey in 2003, with one of the sites, the Eleanor Betty site, excavated on the sixth day. Four of the sites were discovered in the main channel leading into Punta Ycacos Lagoon, 2 were found in the western arm of the lagoon where the original sites were found, and one site was found in the eastern arm of the lagoon. The assemblages of artifacts at the new sites are the same as the previously reported sites, except there are more round-sided bowls than jars at the Eleanor Betty Site. Measurements of the salt pots and solid clay cylinder vessel supports from the 2003 and 2004 fieldwork will contribute to an understanding of inter-workshop variability in salt production.

What does the discovery of 45 salt works in Paynes Creek National Park tell use about the Late Classic political economy of southern Belize? The nearby inland cities of Nim Li Punit, Lubaantun, Uxbenka, and Pusilha farther south, are large sites with stone architecture and dominated the political and economic landscape. Three offshore island sites with stone architecture, including Wild Cane Cay, Frenchman's Cay, and Green Vine Snake, dominated the coastal region. Everyone needed salt. The inland urban Maya negotiated trade and marriage alliances with the coastal elite at island communities to obtain salt. It was transported overland by porters or up river by canoe. In addition to the inland urban Maya's biological need for salt, there is evidence of trade and communication between the coast and interior during the Late Classic: Inland trade goods, notably figurine whistles and unit-stamped pots, are found at coastal sites, including the salt works. Furthermore, the salt works were abandoned at the end of the Classic period, with the cessation of dynastic records at inland cities and virtual abandonment of the inland cities. With the inland market for salt gone, the salt works were abandoned, although salt continued to be produced at a household level at Postclassic communities in the Port Honduras coastal area, such as Wild Cane Cay and Frenchman's Cay (McKillop 2003).

Ongoing fieldwork includes a systematic underwater survey of Paynes Creek National Park, sediment cores to evaluate sea-level rise and to reconstruct the ancient topography and vegetation landscape, and ultimately, survey of the land

in search of settlements. In addition to the 8 sites discovered in 2003 and the 33 sites discovered in 2004, our 2004 fieldwork unexpectedly made a major discovery. The underwater survey focused on the eastern arm of Punta Ycacos Lagoon, at the edge of the proposed re-aligned boundaries of Paynes Creek National Park. The eastern arm of the lagoon is a peat bog that has preserved ancient wood at the salt works, including a full-size wooden canoe paddle radiocarbon dated to the Late Classic (Figure 2). The wood is fresh in appearance and plentiful, including hundreds of posts and other construction wood at 23 underwater sites. What more lies buried in the peat bog beneath the waters of Paynes Creek National Park?

What does salt production in Paynes Creek National Park tell us about the political economy of the Late Classic Maya and the organization of Maya society? First, there were at least three kinds of workshops in Late Classic Maya society. They included attached specialists at the royal courts (Inomata 2001), cottage industry production near natural resources such as the chert outcrops exploited at Colha (Hester and Shafer 1983), and independent workshops near natural resources, such as the Paynes Creek salt works (McKillop 2002). Secondly, the Paynes Creek salt works were geographically distant from urban centers and beyond the political and logistical control of the urban royal Maya. The independence of the salt works supports a decentralized –even segmentary– model of the organization of Maya society. A contrasting example is the economic and political centralized organization of Caracol, in which roadways integrated the suburban and central areas of the city, both politically and economically (Chase and Chase 2001). Who controlled the Paynes Creek salt works? While it remains to be discovered even where the salt workers lived, the maritime elite at offshore island communities, such as Wild Cane Cay, controlled the coastal economy of the Port Honduras. They controlled the inland transport of coastal goods and resources, including salt as well as seafood and ritual items (McKillop 1996b, 2002), and the trade of inland goods, such as figurine whistles and unit-stamped pottery vessels (McKillop 2002). The inland urban Maya formed trade and marriage alliances with their coastal counterparts in order to maintain a steady supply of salt.

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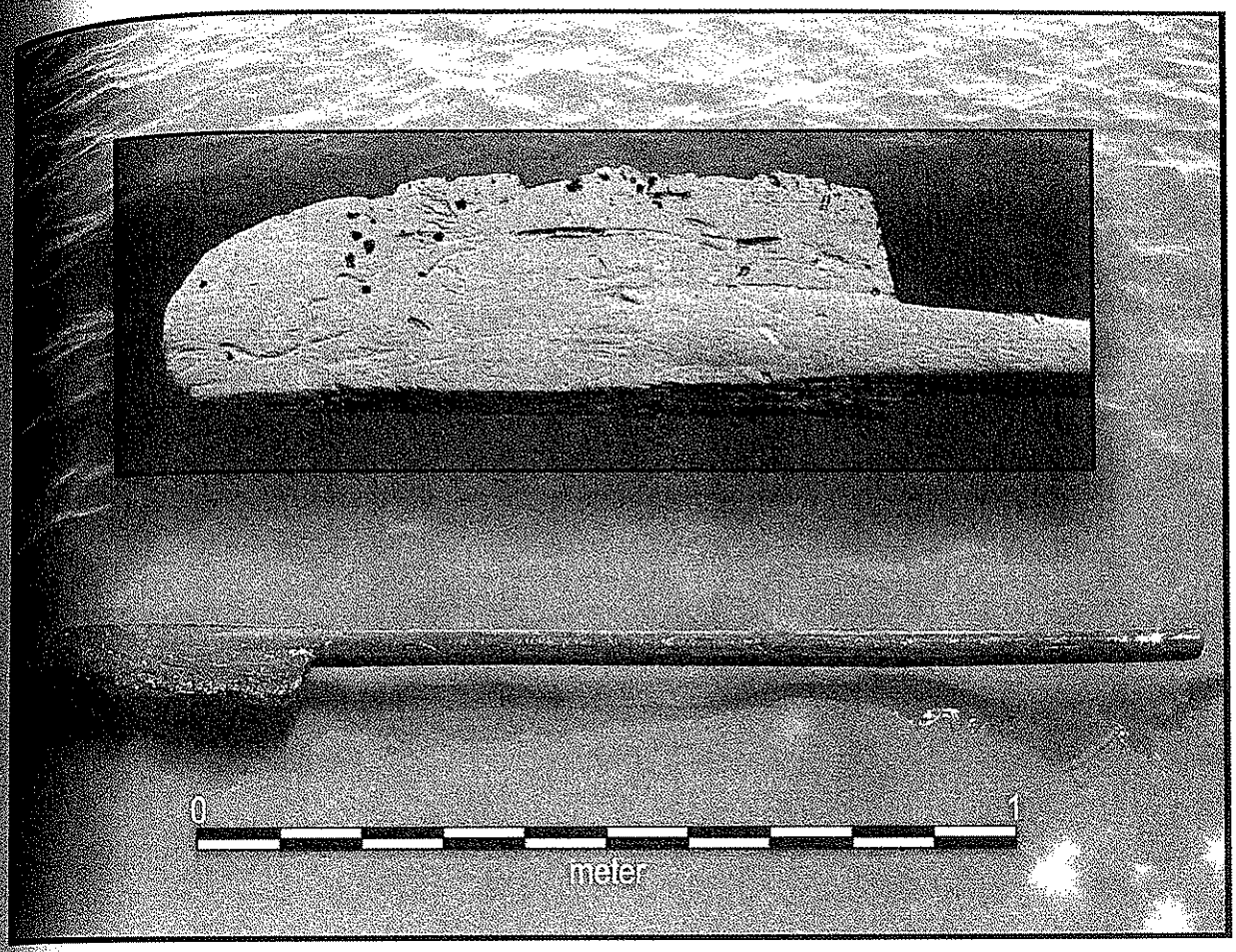

Figure 2. Late Classic Maya wooden canoe paddle discovered in 2004 at K'ak' Naab' underwater Maya site in Paynes Creek National Park (insert shows close-up of paddle blade). Photographs by H. McKillop.

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