MIDDLE PRECLASSIC LANDSCAPES AND AQUATIC RESOURCE USE AT CUELLO, BELIZE

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The aquatic animals identified among the vertebrate faunal remains recovered in the 1990-1993 excavations at the Maya site of Cuello, Belize, are examined. The detected patterns of aquatic resource use are comparable to those described by Elizabeth Wing and Sylvia Scudder in their faunal analysis from previous excavations. These zooarchaeological findings, combined with paleoecological data, suggest that the people of Cuello focused their aquatic resource procurement efforts primarily on local wetland habitats, which may have formed part of a managed landscape surrounding their community in the Middle Preclassic period.

Key words: aquatic resources, Belize, Cuello, Maya, Middle Preclassic, zooarchaeology

The archaeological site of Cuello in northern Belize (Fig. 1) has yielded abundant information on many aspects of ancient Maya life. Extensive excavations conducted over the past three decades, under the direction of Norman Hammond, have revealed a long occupational record, spanning the earliest Middle Preclassic through the Early Classic (ca. 1200 B.C.–A.D. 400). Cuello is especially important for having a substantial amount of material cultural remains dating to the Middle Preclassic, a time period poorly represented at most Maya sites. Of particular interest here are the faunal remains, which can provide insight into Maya use of animal resources during this period.

One of the insights to be gained from research at Cuello is an understanding of how the people of this community interacted with the landscapes and resources of their natural world. An important contribution to this understanding was provided by the work of Elizabeth S. Wing and Sylvia J. Scudder, who analyzed the vertebrate faunal remains from the 1976-1980 excavations at Cuello (Wing and Scudder 1991). Their study documented the use of aquatic as well as terrestrial resources at this inland farming community. They noted that aquatic animals were obtained from several kinds of habitats in the region and that the catchment area was extensive. Nevertheless, they felt that most of these animals were primarily collected in the vicinity of the site (p. 96). Furthermore, water turtles constituted a significant portion of the aquatic animal remains represented in their samples. Of particular interest was the abundance of the small mud turtle (*Kinosternon* spp.) throughout the Middle Preclassic (p. 85).

When Hammond et al. (1995) reopened excavations at Cuello in 1990-1993, they focused primarily on Middle Preclassic contexts, thus expanding the faunal database. When we were given the opportunity to study this new material, one of our primary objectives was to examine the aquatic animal remains in light of the previous findings. We were particularly interested in determining the specific habitats from which these resources were obtained. Additional paleoenvironmental data have become available since the time of the initial study. In this paper, we incorporate this information with our zooarchaeological data to examine and explain the overall pattern of aquatic resource use at Cuello.

MATERIALS AND METHODS

The vertebrate faunal samples considered here were recovered from two units within Platform 34, a locus at the center of the site. Most of our material came from the North Square, a 10 x 10 m area, which included the remains of household structures and the yard area behind them (Hammond 1991:15; Hammond et al. 1995:121). Some additional material came from the South Trench, a 20 x 3 m unit that primarily contained construction fill (Hammond et al. 1991:354; Hammond, personal communication 1993). Excavations were carried out by natural stratigraphic levels. The faunal remains were recovered by trowel excavation (Hammond, personal communication 2001).

Analysis of the animal remains followed standard zooarchaeological procedures (Reitz and Wing 1999:142-238). Specimens were identified to the lowest taxon

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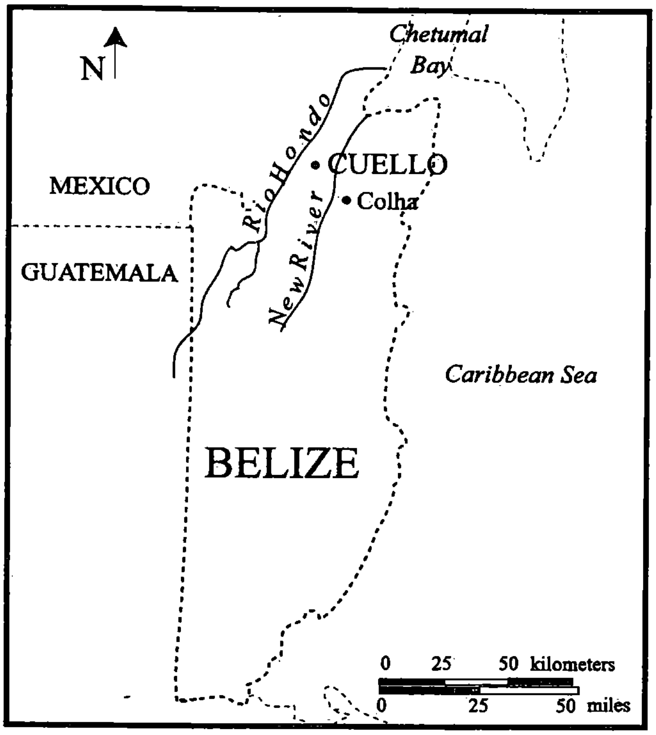

Figure 1. Location of the Cuello site.

possible by direct comparison with reference collections housed at the University of California Museum of Vertebrate Zoology in Berkeley, the California Academy of Sciences in San Francisco, and the Florida Museum of Natural History in Gainesville.

Quantification of the faunal materials included a count of the total number of fragments identified for each taxon (NISP) and calculated estimates of the minimum number of individual animals represented (MNI). The MNI figures were determined separately for each cultural context and were based on the concept of paired elements and individual size. Bone weights, which can provide information on the dietary contribution of each animal, were not determined. Our concern was the nature and location of aquatic resource procurement. Therefore, the materials examined here represent a subsample of the total faunal assemblage.

RESULTS

A total of 6,967 bone and tooth fragments representing 85 vertebrate taxa have been identified in the faunal assemblage. Of these totals, 2,458 fragments (35%) and 36 taxa (42%) represent aquatic animal remains. These taxa are listed in Table 1 and, with their most common habitats, in Table 2. Quantification of this subsample is presented in Table 3.

Aquatic or semiaquatic animals identified include turtles, fish, amphibians, several kinds of birds, and one crocodile. Of the turtle remains, the most abundantly represented is the small mud turtle (*Kinosternon* spp.), including the red-cheeked mud turtle (*Kinosternon scorpioides*). Other kinosternids present, though far fewer in number, are the narrow-bridged musk turtle (*Claudius angustatus*) and the northern giant musk turtle (*Staurotypus triporcatus*). Two emydid turtles (Emydidae), the common slider (*Trachemys scripta*) and the furrowed wood turtle (*Rhinoclemmys areolata*), are also well represented. A few large turtle shell fragments not clearly identifiable to the family level may possibly represent the Central American river turtle (*Dermatemys mawii*), which was identified as a minor constituent in two of the samples analyzed by Wing and Scudder (1991).

Fish constitute a small proportion of the total faunal assemblage. Freshwater species predominate and include cichlid (*Cichlasoma* spp.), swamp eel (*Synbranchus marmoratus*), and blue catfish (*Ictalurus furcatus*). We have also included in this group bigmouth sleeper (*Gobiomorus dormitor*), which usually is found in brackish waters, but in Belize occurs more often in fresh water (Greenfield and Thomerson 1997:230). The remaining kinds of fish, represented by only a few specimens each, are estuarine and/or marine forms and consist of tarpon (*Megalops atlanticus*), bonefish (*Albula vulpes*), sea bass (Serranidae), jack (Carangidae), snapper (Lutjanidae), mojarra (*Eugerres* sp.), and possibly grunt (Haemulidae) (see Table 1).

Amphibians identified in the assemblage include Mexican burrowing toad (*Rhinophrynus dorsalis*), giant toad (*Bufo marinus*), other *Bufo* specimens not identified to the species level, true frogs (*Rana* spp.), and one possible treefrog (*Hyla* sp.). Amphibians are potentially important as environmental indicators, although their cultural significance is less certain. Their presence in archaeological deposits may be incidental.

Several kinds of aquatic birds are represented. These include pied-billed grebe (*Podilymbus podiceps*), anhinga (*Anhinga anhinga*), green-backed heron (*Butorides virescens*), great blue heron (*Ardea herodias*), and possibly a sandpiper (Scolopacidae) and a rail/gallinule/coot (Rallidae).

Crocodile (*Crocodylus* sp.) is represented by one tooth. Although two species naturally occur in the region, we can only identify this tooth taxonomically to the genus level.

Overall, our sample of aquatic animal remains is comparable to that examined by Wing and Scudder for the Middle Preclassic period. The turtle remains are similar, although there is some variation in the relative proportions of different taxa and *Dermatemys* has not been positively identified in our collection. A consistent feature is the predominance of mud turtles. Fish remains, though admittedly a small proportion of both assemblages, demonstrate a preponderance of freshwater specimens with minor representation of marine forms. Birds are minimally represented and, in our sample, only aquatic species have been identified.

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The new faunal data from Cuello lend further support to the pattern of aquatic resource use described by Wing and Scudder for the Middle Preclassic. Moreover, additional paleoenvironmental information has since become available, providing insight into the nature of the landscape surrounding Cuello at that time and potentially explaining the patterns observed in the zooarchaeological record.

The site of Cuello is situated between two rivers, the New River and Rio Hondo (see Fig. 1), which are, respectively, 5 and 10 kilometers away. Nevertheless, there is evidence that other kinds of aquatic habitats may have been in closer proximity to the site.

A study of plant and molluscan remains recovered at Cuello by Charles Miksicek (1991) demonstrates the development of marsh, pond, or shallow lake habitats around the site during the course of the Middle Preclassic. In his samples of freshwater snails, he found large numbers of certain lake-dwelling forms, such as *Pyrgophorus*, whereas snails that prefer flowing water, such as *Pachychilus* (Feldman 1978:7), were rare (Miksicek 1991:74, Table 4.4). Furthermore, he noted an abundance of razor grass (*Cladium*) seeds, also indicative of a marsh habitat (Miksicek 1991:77,83). The composition of our faunal sample seems to indicate that the Cuello residents focused primarily on these more immediate wetland areas.

Turtles potentially provide the best information on aquatic habitats exploited because of their large numbers in our collection. Preeminent among the Cuello turtles are small mud turtles (*Kinosternon* spp.). These turtles typically live in quiet, mud-bottomed shallow water, such as that found in ponds, lakes, sluggish streams, and slow-moving backwaters of rivers. They are bottom-walkers rather than swimmers and, unlike some other turtles, do

Table 1. Taxonomic list of aquatic animals identified with scientific and common names.

SCIENTIFIC NAME	COMMON NAME
OSTEICHTHYES	BONY FISH
cf. *Megalops atlanticus*	tarpon
Albula vulpes	bonefish
Ictalurus furcatus	blue catfish
Siluriformes	catfish
Synbranchus marmoratus	swamp eel
cf. Serranidae	sea bass
Carangidae	jack
Lutjanidae	snapper
cf. *Eugerres* sp.	mojarra[1]
Gerreidae	mojarra[1]
cf. Haemulidae	grunt
cf. *Cichlasoma* spp.	cichlid/mojarra[1]
Cichlidae	cichlid/mojarra[1]
Gobiomorus dormitor	bigmouth sleeper
AMPHIBIA	AMPHIBIANS
Rhinophrynus dorsalis	Mexican burrowing toad
cf. *Bufo marinus*	giant toad
Bufo spp.	toad
cf. *Hyla* sp.	tree frog
Rana spp.	true frog
Anura	toad/frog
REPTILIA	REPTILES
Claudius angustatus	narrow-bridged musk turtle
Staurotypus triporcatus	northern giant musk turtle
Kinosternon scorpioides	red-cheeked mud turtle
Kinosternon spp.	mud turtle
Kinosternidae	musk/mud turtle
Rhinoclemmys areolata	furrowed wood turtle
Trachemys scripta	common slider
Emydidae	pond turtle
Testudines	turtle
Crocodylus sp.	crocodile
AVES	BIRDS
Podilymbus podiceps	pied-billed grebe
Anhinga anhinga	anhinga
cf. *Ardea herodias*	great blue heron
Butorides virescens	green-backed heron
cf. Rallidae	rail/gallinule/coot
cf. Scolopacidae	sandpiper

[1] In the study region, the common name "mojarra" is applied to both gerreids and cichlids.

Table 2. Habitats of aquatic animals identified.

Taxon	Inland Freshwater Habitats: Lakes/Ponds	Inland Freshwater Habitats: Rivers/Streams	Inland Freshwater Habitats: Wetlands	Coastal Habitats: Marine/Estuarine
FISH				
cf. *Megalops atlanticus*				x
Albula vulpes				x
Ictalurus furcatus		x		
Synbranchus marmoratus	x		x	
cf. Serranidae				x
Carangidae				x
Lutjanidae				x
cf. *Eugerres* sp.				x
Gerreidae				x
cf. Haemulidae				x
cf. *Cichlasoma* spp.	x	x	x	
Cichlidae	x	x	x	
Gobiomorus dormitor		x		x
AMPHIBIANS				
Rhinophrynus dorsalis	x		x	
cf. *Bufo marinus*	x			
Bufo spp.	x			
cf. *Hyla* sp.	x		x	
Rana spp.	x	x		
REPTILES				
Claudius angustatus	x		x	
Staurotypus triporcatus	x	x	x	
Kinosternon scorpioides	x	x		
Kinosternon spp.	x	x	x	
Rhinoclemmys areolata			x	
Trachemys scripta	x	x		
Crocodylus sp.	x	x	x	x
BIRDS				
Podilymbus podiceps	x		x	x
Anhinga anhinga	x	x	x	
cf. *Ardea herodias*	x	x	x	x
Butorides virescens	x	x	x	
cf. Rallidae	x	x	x	x
cf. Scolopacidae	x	x	x	x

not bask at the surface (Campbell 1998:104). Although they are not restricted to shallow waters, their bottom-dwelling habits would make them more difficult to collect in deep water. Consequently, large numbers of mud turtles argue strongly for shallow-water procurement. The related *Claudius* is similar in its behavior and habitat preferences, tending toward even smaller and shallower water bodies (Campbell 1998:105), while *Staurotypus* is found primarily in lakes and slow-moving parts of rivers but also enters marshes and flooded grasslands to forage, preying upon mud turtles, as well as other animals and some plants (Campbell 1998:104,107).

Among the emydids, the semiaquatic *Rhinoclemmys* is most common in savannas and at edges of clearings but also occurs in marshes (Campbell 1998:116; Lee 1996:165). On the other hand, the more aquatic *Trachemys* is found in larger freshwater bodies; in the tropics it is more riverine than elsewhere in its range (Ernst and Barbour 1989:205).

Table 3. Quantification of aquatic animal remains.

Taxon	NISP	%	MNI	%
FISH				
cf. *Megalops atlanticus*	1	0.04	1	0.27
Albula vulpes	1	0.04	1	0.27
Ictalurus furcatus	1	0.04	1	0.27
Siluriformes	1	0.04	1	0.27
Synbranchus marmoratus	30	1.22	19	5.05
cf. Serranidae	1	0.04	1	0.27
Carangidae	3	0.12	3	0.80
Lutjanidae	2	0.08	2	0.53
Lutjanidae/Haemulidae	2	0.08	1	0.27
Lutjanidae/Gerreidae	1	0.04	—	—
cf. *Eugerres* sp.	1	0.04	1	0.27
Gerreidae	3	0.12	2	0.53
Gerreidae/Haemulidae	1	0.04	1	0.27
Gerreidae/Cichlidae	1	0.04	—	—
cf. *Cichlasoma* spp.	3	0.12	3	0.80
Cichlidae	23	0.94	17	4.52
Gobiomorus dormitor	2	0.08	2	0.53
Osteichthyes	339	13.79	18	4.79
TOTAL FISH	416	16.92	74	19.68
AMPHIBIANS				
Rhinophrynus dorsalis	22	0.90	15	3.99
cf. *Bufo marinus*	2	0.08	2	0.53
Bufo spp.	25	1.02	9	2.39
cf. *Hyla* sp.	1	0.04	1	0.27
Rana spp.	5	0.20	5	1.33
Anura	35	1.42	15	3.99
Amphibia	6	0.24	1	0.27
TOTAL AMPHIBIANS	96	3.91	48	12.77
REPTILES				
Claudius angustatus	8	0.33	4	1.06
Staurotypus triporcatus	47	1.91	15	3.99
Kinosternon scorpioides	84	3.42	33	8.78
Kinosternon spp.	449	18.27	86	22.87
Kinosternidae	22	0.90	3	0.80
Rhinoclemmys areolata	74	3.01	33	8.78
Trachemys scripta	61	2.48	24	6.38
Emydidae	52	2.12	13	3.46
Testudines	1140	46.38	34	9.04
Crocodylus sp.	1	0.04	1	0.27
TOTAL REPTILES	1938	78.84	246	65.43
BIRDS				
Podilymbus podiceps	2	0.08	2	0.53
Anhinga anhinga	2	0.08	2	0.53
cf. *Ardea herodias*	1	0.04	1	0.27
Butorides virescens	1	0.04	1	0.27
cf. Rallidae/Scolopacidae	1	0.04	1	0.27
cf. Scolopacidae	1	0.04	1	0.27
TOTAL BIRDS	8	0.33	8	2.13
TOTALS	2458	100.00	376	100.00

Dermatemys is conspicuously absent from our sample and was minimally represented in the assemblage analyzed by Wing and Scudder. This turtle is distinct from others in the region in that it is so fully aquatic that it is barely able to move on land, being primarily a denizen of large rivers and lakes, spending long periods submerged (Campbell 1998:111-112).

When compared to contemporary ethnographic accounts, the relative abundance of the various turtles in the Cuello zooarchaeological record is, interestingly, almost a mirror image of their relative food value today. The larger, meatier riverine turtles occur in fewer numbers, whereas the very small turtles, typically found in shallow lakes and ponds, are far more common.

The rarest turtle, *Dermatemys*, the largest freshwater turtle in the region, has meat that is highly esteemed today. A single individual provides a substantial amount of meat. Almost as large, *Trachemys* is also highly sought after and consumed. *Staurotypus*, slightly smaller, is eaten, despite its musky flavor. The smaller turtles, *Rhinoclemmys* and *Claudius*, contain much less meat but are still eaten today. *Kinosternon*, though eaten by some people, is not as widely consumed because of the overpowering odor of musk it produces during cooking (Campbell 1998:104-117).

Interviews conducted by Carr (1986:191-194) with Maya archaeological workers in northern Belize substantiate ethnographic accounts. Except for *Kinosternon*, all kinds of turtles are consumed. The most plausible explanation for the abundance of these very small mud turtles and for the lesser representation of larger, meatier turtles in the faunal remains is that Cuello people obtained aquatic resources primarily from seasonally fluctuating local marsh and pond environments rather than from the more distant riverine habitats.

The kinds of freshwater fish identified also suggest that fishing focused on nearby marsh wetlands. The swamp eel, as its common name implies, is present in stagnant water habitats. It is well suited to seasonal wetlands and withstands temporary dry spells by burrowing into mud (Burgess and Franz 1989:265; Greenfield and Thomerson 1997:138-139). Belizean cichlid species are found in a variety of waters, ranging from rivers to warm, murky wetlands and ponds (Greenfield and Thomerson 1997:184-206; Konings 1989). Blue catfish, a large, meaty fish typically occurring in large rivers in Belize (Greenfield and Thomerson 1997:78), is represented in our sample by a single specimen, further indicating infrequent use of this habitat. One other habitat occasionally exploited was quite distant from the site. The several estuarine or marine fish most likely were brought in from the coast, approximately 35 km away.

The presence of amphibians in fairly significant numbers also suggests the proximity of moist habitats. The two identified toad genera, *Rhinophrynus* and *Bufo*, frequent open habitats and breed in temporary ponds (Lee 1996:56, 77-80). Hylids occupy a variety of habitats and most also breed in temporary bodies of water (Lee 1996:92-97). The more aquatic *Rana* frogs are most often found near lakes, ponds, and sluggish portions of streams (Campbell 1998:94-98; Lee 1996:123-127).

The aquatic birds in the Cuello assemblage have broad habitat tolerances. In Belize, grebe, anhinga, blue heron, and green-backed heron are found in or alongside ponds and streams (Russell 1964:35-38). Similarly, crocodile can occur in a variety of waters, including inland lakes, rivers, and marsh wetlands as well as brackish coastal waters (Campbell 1998:283-289).

The procurement of animal resources from local wetlands could have been integrated into the overall subsistence economy in several ways. One scenario is suggested by the savanna fishing practiced today in northern Belize. This takes place late in the dry season when shrinking pools concentrate the fish and the water is shallow enough to wade through (Pascual Mesh, Johnny Montalvo, and Valeriano Tun, personal communication 1981). As a dry-season activity, savanna fishing complements the rainy season focus on swidden cultivation and garden hunting (Johnny Montalvo, personal communication 1981). Some support for dry-season use of wetlands is indicated by the presence of grebes and blue herons, birds that are winter (dry season) visitors to Belize (Russell 1964:35,38).

On the other hand, mud turtles and amphibians are most visible in the rainy season, virtually disappearing in the dry season, when they may burrow into mud to aestivate (Campbell 1998:46,104; Lee 1996:56,163). The successful capture of large numbers of mud turtles thus could argue for rainy season procurement. Alternatively, the harvesting of mud turtles could have been facilitated by keeping a controlled population in a limited area. These turtles are nocturnal and can be difficult to find by day even where they are plentiful (Campbell 1998:109). Penning off flooded lands as the waters began to recede would be a convenient way to keep turtles within a known area, where they could be collected by digging in the mud. Both Hammond (1991:239) and Scudder (personal communication 2001) have speculated that such management techniques could have been practiced at Cuello.

Wetland margins may also have been a locus of farming activity. To date, there is no evidence at Cuello of raised- or drained-field farming (Hammond 1991:239). Nevertheless, as suggested by Pohl et al. (1996:366), a form of dry-season cultivation could have been practiced along wetland margins without creating formal field and canal features. Thus, crops and aquatic animals would have been in close association so that farming and collecting activities could have taken place simultaneously. Indeed, the entire complex of fields and wetlands may have been a managed landscape.

Evidence of wetland resource procurement in the Middle Preclassic is not restricted to Cuello. At Colha, another inland site 27 km to the southeast, Leslie Shaw (1999) shows considerable use of aquatic animals in the Middle Preclassic. Like the freshwater fishes at Cuello, most fish remains were not identifiable, but they were generally of small size (Shaw 1999:88, 91). Of the other aquatic and semiaquatic animals that were more precisely identified and assigned to a habitat category, wetland animals greatly exceeded riverine animals in the Colha samples (Shaw 1999: Fig. 4.3).

CONCLUSIONS

Our study of the aquatic animal remains recovered from recent excavations at Cuello corroborates the findings of Wing and Scudder (1991) concerning patterns of resource use in the Middle Preclassic. The most frequently collected animals were water turtles, in particular mud turtles. Although some of the aquatic resources were obtained from habitats at varying distances from Cuello, the majority were collected in close proximity to the site. According to paleoenvironmental information, marsh, pond, or shallow lake habitats existed nearby during the Middle Preclassic. The general pattern of aquatic resource use documented at Cuello shows similarities to that of Colha during the same period.

As part of Maya economic practices, wetland foraging was coordinated with farming activities. The collection of certain small animals, such as mud turtles, could have been facilitated by the construction of pens. We believe that this overall pattern was a common aspect of Maya subsistence economies wherever appropriate wetlands were part of the surrounding landscape.

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