Chapter 19

Archaeological Evidence for Ancient and Historic Resource Use Associated with the El Edén Wetland, Northern Quintana Roo, Mexico

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INTRODUCTION

Since the early 1970s, an increasing amount of evidence has indicates that the ancient Maya of southern Mexico and Central America (Figure 19.1) made use of wetlands for agricultural production (e.g., Siemens and Puleston 1972; Gliessman et al. 1983; Turner and Harrison 1983a; Culbert, Levi, and Cruz 1990; Pohl 1990; Pohl et al. 1996; Culbert et al. 1997). The kinds of wetland cultivation strategies employed by the ancient Maya ranged from the simple planting of crops in the moist soils left behind by receding waters to the labor-intensive transformation of wetland landscapes through channelization and the construction of raised planting platforms (Turner 1983; Siemens 1996). It has been suggested that the earliest pioneer settlers of the

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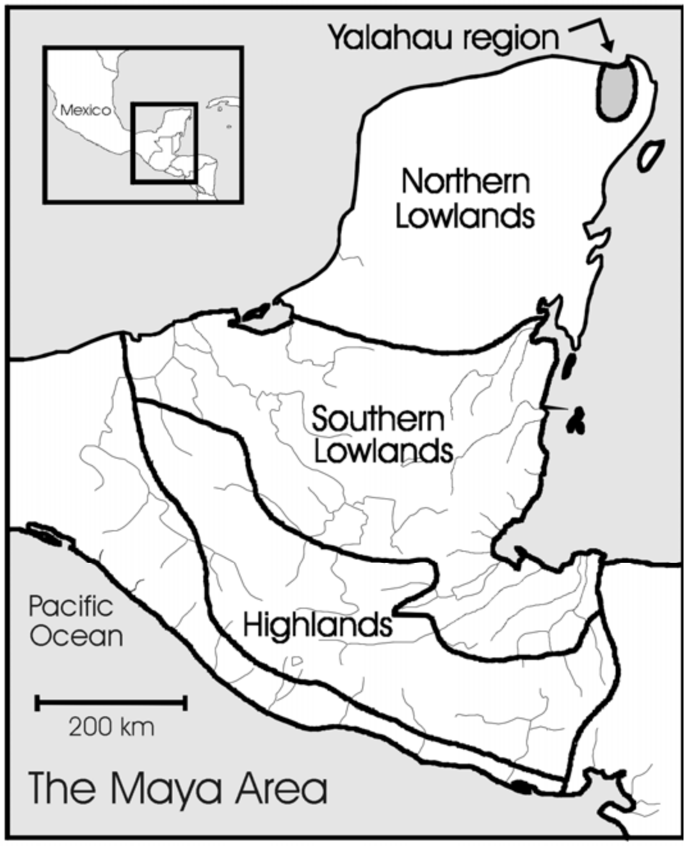

FIGURE 19.1. Location of the Yalahau region within the Maya area of Mexico and Central America.

interior lowlands practiced nonintensive dry-season cultivation of riverine wetlands, combined with wet season slash-and-burn cultivation of adjacent uplands, as they moved up river courses from the coastal margins (Puleston and Puleston 1971; Wilk 1985; Pohl et al. 1996). The largest labor investment in wetland landscape engineering, and the greatest extent of wetland cultivation, is often attributed to the Late Classic period (ca. A.D. 600–900) when population levels reached their pre-Hispanic maximum (Turner and Harrison 1983b). There is, however, a great deal of debate concerning the chronology of wetland cultivation, the economic significance of wetland food production, and the amount of labor invested in the construction of agricultural engineering features such as raised planting platforms. The geographic distribution of wetland manipulation, and the range of wetland ecosystems that were used for agricultural production, are also topics of disagreement. (To understand more about the wetland debate, see Pope and Dahlin 1989; Fedick and Ford 1990; Turner 1993; Fedick 1996a,b.)

Evidence for ancient Maya cultivation of wetlands has previously been restricted to the southern Maya lowlands, where wetlands comprise a significant portion of the landscape. The Yalahau region, located in the extreme northeast corner of the Maya lowlands (Figure 19.1), is a unique environmental region containing numerous freshwater wetlands. An archaeological survey conducted in one of the Yalahau wetlands (contained within the El Edén Ecological Reserve in northern Quintana Roo, Mexico) has provides evidence for a previously unreported form of ancient wetland manipulation in a little-known region of the northern Maya lowlands. The survey also provides archaeological evidence for forest-resource extraction in the region during the Historic period (after European contact).

WETLANDS OF THE YALAHAU REGION

The Maya lowlands consist of a vast limestone shelf that tilts downward to the north (Figure 19.1). The northern Maya lowlands, located above lat 19º N latitude, is an area that is generally characterized as lacking rivers or surface water except where the water table is exposed by sinkholes or natural wells referred to locally as cenotes. In comparison with the southern lowlands, the north also receives significantly less rainfall, has lower elevation and more level terrain, less soil cover, and a lower forest canopy (Isphording 1975; Wilson 1980; Gómez-Pompa 1998). The Yalahau region of northern Quintana Roo, Mexico, stands in sharp contrast to the rest of the northern lowlands, receiving substantially more precipitation due to a localized rainfall anomaly that contributes to the formation of wetlands along a north-south oriented system of linear karstic solution features which follow a geological fault system (Weidie 1982, 1985; Southworth 1985; Tulaczyk 1993; Tulaczyk et al. 1993).

Wetlands cover about 40 percent of the terrain in the southern Maya lowlands, but are very rare in the northern lowlands. In the north, brackish-water wetlands dominated by mangrove forest are found along the coast, reaching farthest inland in southern Quintana Roo within what is now the Sian Ka’an Biosphere Reserve (Morales Barbosa 1992). The Yalahau region contains the largest area of freshwater wetlands in the northern Maya lowlands.

The Yalahau region contains about 300 separate wetlands that cover a total area of approximately 134 square kilometers (km^2) (Figure 19.2). In general, the Yalahau wetlands are seasonally inundated, with only small areas containing open water throughout the year. In the eastern and southern portions of the Yalahau region, the wetlands tend to be relatively steep sided, with very narrow transitional zones separating the wetlands from upland areas that are not subject to flooding. In the eastern and northern areas, there tends to be a much wider transitional zone of land between the wetlands and the uplands which is subject to occasional flooding during years of particularly

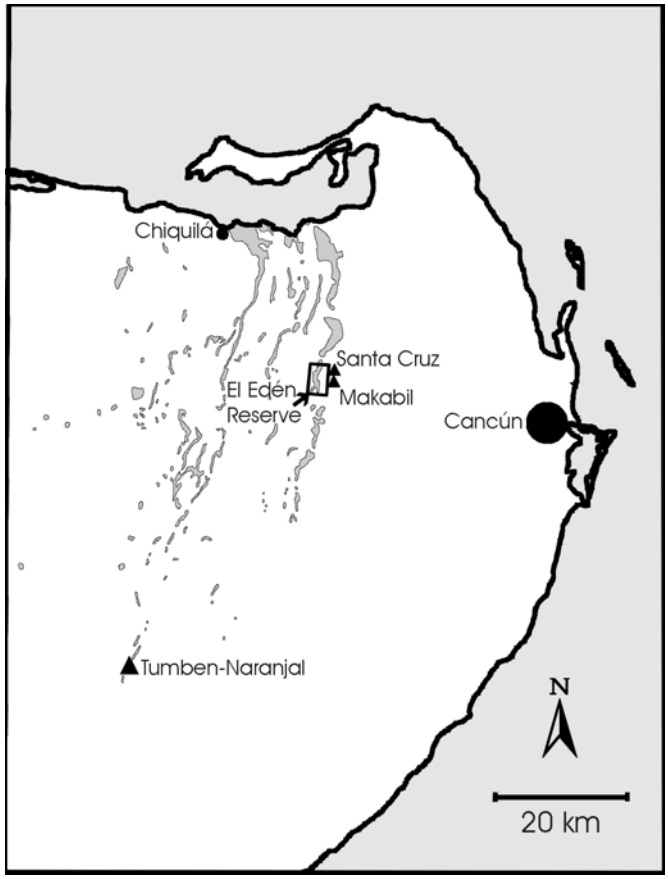

FIGURE 19.2. The Yalahau region with places mentioned in the text. Wetlands are shown as shaded areas.

high rainfall. Soils within the wetlands tend to be relatively thin, sandy silts, and silty clay, about 20 centimeters (cm) over bedrock. The lower areas within the wetlands contain soils up to about 50-cm deep with peaty deposits over silty to sandy clay.

The wetlands support a variety of distinct vegetation zones that differ depending on the duration of annual flooding. Zones that contain water throughout the year are dominated by cattail (*Typha dominguensis*), with water lily (*Nyphaea* sp.) found in open ponds. Zones subject to regular flooding, and that remain moist through the dry season, are dominated by dense stands of sawgrass (*Cladium jamaicense*). As terrain rises slightly and the duration of flooding consequently decreases, the stands of sawgrass thin and are mixed with tasiste palm (*Acoelorraphe wrightii*) and the calabash tree (*Crescentia cujete*). Relatively higher ground within the wetland is dominated by a swamp forest or tintal association characterized by the palo tinto (*Haematoxylon campechianum*), with an abundance of black chechem (*Metopium brownei*), ya'axnik (*Vitex gaumeri*), nance (*Byrsonima bucidaeifolia*) and a stunted variety of sapote (*Manilkara zapota*).

PREVIOUS STUDIES OF WETLAND USE IN THE NORTHERN MAYA LOWLANDS

The ancient Maya made use of the northern coastal wetlands for salt production (Andrews 1983; Kepecs and Boucher 1996:81–82; Sierra 1999:43), and numerous canals of both historic and ancient origin cross the coastal wetlands, apparently serving as access routes for watercraft traveling between the interior and the ocean (Matheny 1976, 1978; López 1983; Millet 1984). Prior to the survey (see next section) of the wetland at the El Edén Ecological Reserve, the only evidence for ancient agricultural use of the freshwater wetlands in the Yalahau region, or anywhere in the northern lowlands, was the spatial association of ancient settlements with wetlands in the Yalahau region, and a single rock-alignment feature constructed within the margin of a wetland adjacent to the ancient civic-ceremonial of Tumben-Narnanjal, in the southern end of the Yalahau region (Figure 19.2; see Fedick and Hovey 1995). In 1994, Gómez-Pompa (personal communication) reported that a rock-alignment feature had been found well within a wetland at El Edén, on the east-central side of the Yalahau region (Figure 19.2). Visits to El Edén by the author in 1994 and 1995 indicated that a system of rock alignments was present throughout the wetland, and plans were made for a full-scale survey.

SURVEY METHODS

The El Edén wetland is approximately 5.5 kilometers (km) long (N–S) by 0.8 km wide (E–W) and covers 3.5 km^2. The margin of the wetland is marked along most of the perimeter by a narrow band of exposed bedrock that contains virtually no soil. Outside of the wetland the terrain raises very gradually, leaving a broad transitional zone at least 2 km in width, which is subject to occasional flooding associated with severe hurricanes (see Morrison and Cozatl-Manzano, this book).

Prior to the initiation of the survey, a 1:75,000-scale aerial photograph of the wetland (INEGI 1985) was enlarged, and the Universal Transverse Mercator (UTM) grid, based on the published topographic map (INEGI 1988), was superimposed on the enlarged photograph. The archaeological survey covered the entire wetland and a narrow band of land extending approximately 25 meters (m) beyond the wetland margin.

The survey was conducted by a crew of four to six archaeologists who walked parallel transects that were separated by about 10 to 20 m, depending on the density of vegetation cover. The crew member walking one of the outside transects along a compass bearing marked the trail with bio-degradable paper flagging. When a transect across the wetland was completed, the crew pivoted at the end of the flagged transect and started back in the opposite direction with one outside surveyor keeping the previously marked transect in sight, while the crew member on the other end of the line of surveyors flagged the new transect. A satellite-based Global Positioning System (GPS) was used by the field crew to keep track of their location during the survey.

When a feature was encountered, it was marked with orange plastic flagging tape and assigned a provisional field number until the crew completed the transect. Once several features were identified in an area, the crew returned to map them. Mapping was accomplished with a Brunton pocket transit and tape measure. A written description of each feature was recorded, and most were photographed with still or video cameras. Each feature was marked with a permanent aluminum tag inscribed with a sequential number, and a GPS reading was taken to aid in marking the location of the feature on the aerial photograph.

RESULTS

A total of 78 rock-alignment features were recorded as a result of the survey (Figure 19.3). In addition, an historic rail line was found to cross the El Edén wetland on an east-west (E-W) orientation (Figure 19.3), extending for at least several kilometers from the wetland to the west, and running to the east for several kilometers toward an abandoned historic settlement known as Santa Cruz.

Rock alignment features

The 78 rock-alignment features recorded within the El Edén wetland varied in length from a few meters to about 700 m in length (Figure 19.3). The alignments consist of limestone cobbles, boulders, and slabs that range in size from about 15 cm to over 1 m in diameter (Figure 19.4). The alignments are arranged in single to double rows and are rarely more than two courses high. The rock alignments vary quite a bit in shape and length in relation to the physiographic setting in which they were constructed. Five different types of alignments have been defined (following Fedick et al. 2000).

- *Type 1*: Two long alignments (Alignments 41 and 48) spanned the northern end of the wetland, dividing higher, broken, limestone terrain to the north from a broad saw grass-dominated depression to the south. These are the longest alignments recorded during the survey, with

Alignment 41 measuring about 700 m in length, and Alignment 48 measuring about 390 m.

- *Type 2*: To the north of Alignment 41, and in the southern end of the wetland, is a series of natural depressions about 10 to 25 m in diameter. Rock alignments were constructed so as to block the lowest margin of each depression (e.g., Alignments 36, 38–40, 42–47, and 51). These alignments generally follow the curvature of the depressions, forming fairly regular circular to ovoid basins.
- *Type 3*: Within higher terrain of the wetland, in areas dominated by thinly scattered sawgrass and swamp forest with relatively deep soil, are alignments that run perpendicular to very slight slopes (Alignments 35, 53, 54, 57, and 77). Three of these alignments—35, 57, and 77—have distinctive zigzag shapes.
- *Type 4*: Numerous alignments are scattered along the margins of the larger depressions within the wetland. These features run perpendicular to slight slope gradients and generally mark the boundary between higher land dominated by swamp forest, and the lower depressions dominated by sawgrass (e.g., Alignments 1–11).
- *Type 5*: Within the wetland, numerous shallow channels can be discerned, running into the larger depressions, particularly along the western and southern sides of the wetland. These channels represent low, wet areas that are dominated by cattail. Numerous rock alignments cross these channels at perpendicular angles, forming check dams at fairly regular intervals (e.g., Alignments 32, 52, and 63–68). The rock alignments, and the channels they span, range from 10 m to 60 m across.

Historic features, artifacts, and sites

The narrow-gauge rail line that runs across the El Edén wetland is laid on top of a cobble and gravel bed about 1.5 m in width (Figure 19.5). The height of the road bed varies from about 10 cm on level ground to about 1 m in areas where the natural ground surface dips. Within the wetland, there are two places where the rail line was apparently once supported by bridges that crossed channels, the largest of which is about 20 m wide. Wooden ties slightly over 1 m long are still present along some parts of the road bed, spaced at intervals of about 1–1.5 m. Within the wetland, these ties are of un-hewn lengths of palo tinto (*Haematoxylon campechianum*) logs that range from about 5–10 cm in diameter.

Three broken bottles found along the side of the track about 1.5 km east of the wetland have embossing that provides dates, or datable marks. One embossed bottle reads “PATENTATA OCTUBRE 5 oe 1910 No 4338,”

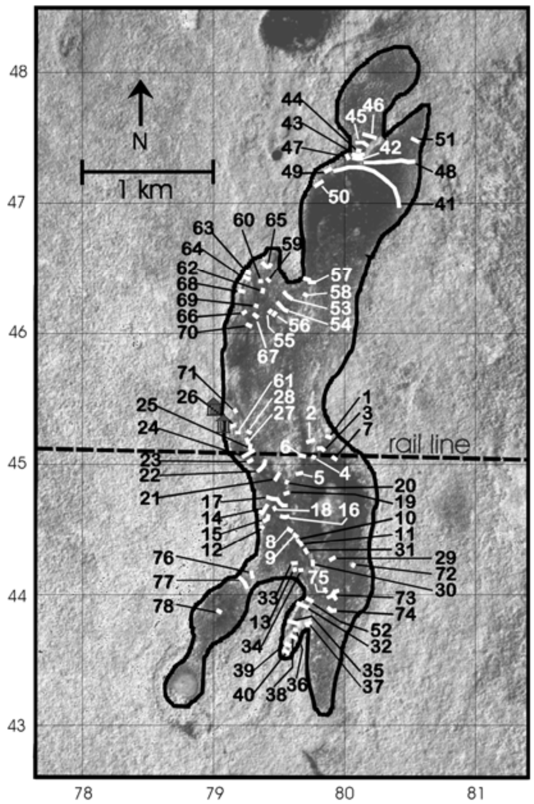

FIGURE 19.3. Air photo of the El Edén wetland with 1 km UTM grid superimposed, and corresponding kilometer designations along the south and west sides. A solid line encloses the area of the wetland survey. Rock-alignment features are numbered 1 through 78.

indicating a manufacture date that probably post-dates 1910. The second bottle is embossed “WF and S / 37 / MIL,” and was manufactured by William Franzen and Son, of Milwaukee, Wisconsin between 1900 and 1929 (Toulouse 1971:536–538). The third bottle reads “GIFFORD and CO. / H.H.H. LINAMENT / CHICAGO” on the front, with “THE CELEBRATED” embossed on one side, and “D.D.T. 1868 . . .” on the other side. This bottle contained “Indian Vegetable Pain Extractor for Horses,” which was developed and introduced in 1868 by Daniel D. Tomlinson (D.D.T.) of Stockton, California (Fike 1987:147). The formula was sold to L. L. Gifford in 1880, and the medicine was bottled in Chicago and sold under the names of both the H.H.H. Medicine Company and Gifford and Company at least through 1907, and as Tomlinson’s H.H.H. Liniment as late as 1948 (Fike 1987:147). Contemporary advertisements noted that the liniment contained 65 percent alcohol and could be taken orally as a “reliable remedy for those ailments, both of mankind and of all domestic animals, for which it is recommended,” such as coughs, colds, stomach-cramps, and diarrhea (Fike 1987:147).

FIGURE 19.4. A section of rock Alignment 41 near the north end of the El Edén wetland.

Near where these bottles were found, the rail line turns slightly north of east, in the direction of an abandoned settlement indicated on the 1:50,000 topographic map (INEGI 1988) as Santa Cruz (see Figure 19.2). Local residents identify Santa Cruz as a former logging or chicle camp. Chicle, the sap of the chicozapote tree (*Manilkara zapota*), was the main ingredient used in the production of chewing gum before being replaced by artificial ingredients after World War II (Urrutia de Bulajich and Bezaury 1993). A reconnaissance visit to the location of Santa Cruz identified a large area that had been cleared of trees and is currently dominated by a dense stand of tall, probably non-native grass. A cenote, or natural well, was present and measuring about 40 m in diameter, it was largely choked with rubble and vegetation, but contains some standing water along the margins. On the west side of the cenote is a large ancient platform, about 30 m on each side and about 1 m high.

In addition to prehistoric ceramics, a dense accumulation of historic trash is present on and around the platform. An embossed bottle found on the platform reads "SBand C Co," and was manufactured by the Streator Bottle and Glass Company, of Streator, Illinois, between 1881 and 1905 (Toulouse 1971:461–463). Loose sections of rail and a Decauville cart were present at Santa Cruz, and have been moved to the El Edén research station for preservation and display (Figure 19.6). Embossed metal work on the cart reads "DECAUVILLE / AINE / PETIT-BOURG / B. 107."

FIGURE 19.5. A section of rail line within the El Edén wetland.

INTERPRETATION

Chronology of activities associated with the El Edén wetland

Assigning dates for the construction and use of the rock-alignment features remains somewhat problematic, while the historic materials can be placed in time and socio-economic context. The only known historic activities in the immediate area of the El Edén wetland are associated with a corpration known as the Compania Colonizadora de la Costa de Yucatán (Colonizer Company of the Coast of Yucatan), which operated throughout northern Quintana Roo between 1896 and 1936, as discussed by Andrews (1985:140–141). The company, owned by the Banco de Londres y México (Bank of London and Mexico), was involved in the extraction of lumber and chicle, cattle ranching, and the development of plantations for corn, tobacco, and vanilla (Andrews 1985:141). The company is known to have installed a number of Decauville rail lines to facilitate the transport of raw materials and supplies (Andrews 1985:140–141). Although Andrews makes no specific mention of a rail line or company activities that could definitely be associated with the El Edén area, he does state that Decauville lines were laid out from Yalikin, which he tentatively identifies as Chiquilá (see Figure 19.2), into the interior (Andrews 1985:140–141). Such a route could account for the historic rail line and activities at El Edén and Santa Cruz. The embossed bottles found in association with the rail line at El Edén and the trash deposit at Santa Cruz

FIGURE 19.6. The Decauville cart in front of the El Edén research station.

are consistent with the dates of operation for the Compania Colonizadora de la Costa de Yucatán, as is the presence of the Decauville cart from Santa Cruz.

Dating of the rock-alignment features is more problematic. It is highly unlikely that they are associated with any activity of the Historic period. No historic artifacts were found anywhere in the El Edén wetland, except in direct association with the rail line. Unfortunately, prehistoric artifacts are also lacking in the wetland, or at least have not been recovered as yet. Therefore, dating of the rock alignments is assumed to be associated with the numerous ancient sites that have been identified in the area. The closest site to the El Edén wetland identified to date is the small ancient community of Makabil, discussed by Morrison and Cozatl- in a separate chapter of this volume (see also Morrison 2000; Fedick et al. 2000). Ceramics recovered from Makabil are assigned to the Late Preclassic period (ca. 100 B.C.–A.D. 350). This chronological placement is consistent with other sites in the region, although there is evidence for continuing occupation into the early part of the Early Classic period (until about A.D. 450), and a later reoccupation of some sites during the Late Postclassic period (ca. A.D. 1250–1520) (see Fedick et al. 2000; Lorenzen 1999). While recognizing that the chronological placement of the rock-alignment features is in need of further investigations, they are considered most likely to have been constructed and used during the Late Preclassic period and transition to the Early Classic (ca. 100 B.C.– A.D. 350/450).

Hydrologic and Edaphic Function of the Rock-Alignment Features

The rock-alignment features most likely functioned to control the movement of water and soil within the wetland. It is difficult to imagine a cultivation system that would work under today's hydrological conditions, as much of the wetland lies under nearly 1 m of water during much of the wet season. It is significant to note, however, that current hydrological conditions are probably different from prehistoric times when the alignments are likely to have been built. Recent studies of a sediment core taken from Punta Laguna, about 80 km southwest of El Edén, indicate a decrease in precipitation that began at about A.D. 250 and returned to levels comparable to today at about A.D. 1100 (Curtis, Hodell, and Brenner 1996). Numerous studies demonstrate that sea-level rise has been slow but progressive since the close of the Pleistocene epoch, which would, in turn, raise the water table in the interior of the Yucatán Peninsula (Folan, Fletcher, and Kintz 1983; Fairbanks 1989; Coke, Perry, and Long 1991; Dunn and Mazzullo 1993; Alcala et al. 1994:43–48; McKillop 1995). It is likely that the water table was at least 0.75 to 1.0 m lower during the Late Preclassic, implying that the El Edén wetland did not flood to the extent it does currently. A lower water table in the past would mean the El Edén wetland was probably a wetland during Late Preclassic times, but was only saturated or partly flooded during the height of the rainy season.

Variation in the form and physiographic setting of the rock alignments suggests that the various types of features functioned in different ways. The deepest soils of the El Edén wetland are located within the large, sawgrass-dominated depressions in the north, north-central, and south-east areas of the wetland (Figure 19.3). The rock alignments are placed so as to block or slow water flow into these areas. Protecting crops from in-rushing water would have been an important function of the rock alignments if the large depressions had been cultivated. If the alignments had once been covered with soil (that has since eroded away), the features would have formed efficient dikes. The long alignments that close off the north end of the wetland (Alignment Type 1) may have served such a function, slowing the rush of rainwater into the northern depression from the channels and higher ground farther to the north. Staff members of the El Edén Ecological Reserve have reported strong flows of water in that area moving from the north and into the depression to the south. The smaller alignments along the margins of the large depressions (Alignment Type 4) may have served similar functions.

The rock alignments that close off the lower margins of small depressions (Alignment Type 2) appear to have a distinctly different function, in that they seem intended to retain water. Several of these features still function in this manner, where soil build-up behind the alignments retain water in the depression well into, or throughout, the dry season. Alignments that form check dams (Alignment Type 5) are similar in form to the ones that help retain ponds, but are situated in channels and would seem to function more like traditional check dams, slowing the flow of water and building up a terrace of soil behind them that could potentially be cultivated.

The long, and often sinuous alignments (Alignment Type 3) found on higher ground supporting swamp forest/tintal vegetation appear intended to function in slowing sheet wash and encouraging moisture retention, as similar features do in other part of the world (e.g., Masse 1991; Van West and Altschul 1997). Today, these parts of the wetland are inundated only during periods of heavy rain; given a lower water table in the past, it is likely that these settings were not formerly part of the wetland.

Potential cultivars/products of the wetland

Recovery of pollen and other plant remains from wetland contexts in the southern Maya lowlands document the cultivation of maize, cotton, and other domesticates (Miksicek 1983; Wiseman 1983; for a recent summary of plant remains recovered from Maya sites, see Lentz 1999). Future pollen studies may identify cultivation of these traditional crops within the El Edén wetland, but it is also productive to consider other species that are native to the wetland that could potentially have been cultivated. While not an exhaustive treatment, some of the more common plants and animals of the El Edén wetland are discussed as follows.

Cattail (*Typha dominguensis*) is an amazingly useful plant that has been used by cultures in many parts of the world, providing nutritious food from its rhizomes, shoots, and pollen (Harrington 1967; Morton 1975). Cattail pollen has been recovered from ancient Maya sites; interestingly, however, it has not been discussed as a potential food source (Lentz 1999:9). Cattail grows today in abundance behind the check-dam alignments in the El Edén wetland and in some of the ponds retained by alignments in natural depressions. If these features were maintained, and soil was not allowed to build up too deeply behind them, a result could have been an increase in cattail production. Sawgrass (*Cladium jamaicense*), found in slightly better drained settings than cattail, also have edible shoots, but in general are not as productive a food source as cattail. Sawgrass remains have been identified from ancient Maya sites, but the possible use of the plant has not been specified (Lentz 1999:7).

The annona tree (*Annona* sp.) is another plant that thrives in seasonally inundated areas of the El Edén wetland that contain deeper soils. Several wild and domesticated species produce edible fruit (e.g., *Annona cherimola*, see Andrés Agustín and Regollar Alviter 1996; Flores Guido and Flores Serrano 2000), and have been recovered from ancient Maya sites (Lentz

1999:6). Manipulation of the wetland hydrology could promote annona growth.

The nance tree (or shrub) (*Byrsonima bucidaefolia*) is a delicacy of Maya cuisine that thrives in the swamp forest habitat of the El Edén wetland. Although found today throughout the drier parts of the wetland, its distribution at El Edén could have been more widespread in the past because of a lower water table.

A variety of palms have recently been suggested as significant subsistence resources of the ancient Maya (Lentz 1990, 1999; McKillop 1994, 1996). The tasiste palm (*Acoelorraphe wrightii*) grows in abundance within the El Edén wetland, and is a consistent producer of numerous edible berries; the palm can also be used as construction and thatching material. The nutritional value and productivity of the tasiste palm is currently under investigation by the author, but is another species that could be encouraged by manipulation of the wetland hydrology.

One of the more common animals of the El Edén wetland is the apple snail (*Pomacea flagellata*) that thrives in areas of the wetland that contain water throughout the year. Apple snails are known to have been exploited by the ancient Maya as a food resource (see Andrews 1969; Moholy-Nagy 1978) and they could have been collected or even cultivated as food at El Edén. The ponds that form within the small natural depressions hold water that is deeper or present for a longer period of time, when built up along their lower margins by artificial retaining walls formed by the rock alignments. These habitats may encourage the growth and reproduction of the apple snail.

The final wetland resource to be considered is perhaps the most intriguing, consisting of the algae mat (periphyton) that grows in profusion across most of the El Edén wetland (fig. 7). Periphyton is a complex community of microbiota—primarily algae—that attaches to larger plants or inorganic materials, forming a nearly continuous mat of growth across the wetland. There are many varieties of periphyton communities present in the El Edén wetland, and these are currently under investigation by a group of colleagues working at the El Edén Ecological Reserve (see chapters in this volume by Novelo and Tavera, and by Palacios et al.). Edible species of freshwater algae are known to have been components of ancient Aztec and Inca diets, particularly the blue-green algae of the genuses *Spirulina* and *Nostoc* (Coe1994:100–104, 186). While both of these genuses are represented in the periphyton communities of the El Edén wetland (see chapter in this volume by Novelo and Tavera), they are part of a mixture that includes many non-edible varieties. The economic value of the periphyton is likely to have been its potential use as an agricultural fertilizer rather than as an edible food resource. Some varieties of the El Edén periphyton have very high levels of phosphorus and nitrogen, both essential plant nutrients that are generally low

FIGURE 19.7. Periphyton growth in the El Edén wetland.

or easily depleted in agricultural systems of the Yucatán Peninsula (see chapters in this volume by Novelo and Tavera, and by Palacios et al.). It is possible that the ancient Maya harvested periphyton, or the nutrient-enriched muck soil from the wetlands, to incorporate into gardens and fields (Fedick 1998; Morrison 2000). Archaeological evidence for this practice is presented in a chapter in this volume by Morrison and Cózatl-Manzano.

CONCLUSIONS

The El Edén wetland was subjected to fairly intensive management in the past, most likely by the ancient Maya of the Late Preclassic to Early Classic period (ca. 100 B.C.–A.D. 350/450). While direct evidence is currently lacking on the function of rock-alignment features recorded within the El Edén wetland, they probably served as water- and soil-control devices in a cultivation system for either domesticated crops such as maize and cotton, or to promote the growth of economically valuable wetland resources. Reconnaissance has identified rock-alignment features similar to those at El Edén in other wetlands of the Yalahau region. For unknown reasons ancient communities associated with the El Edén wetland, and other wetlands of the

Yalahau region, were for the most part abandoned by the beginning of the Early Classic period. Changes in climatic conditions, particularly a rising water table, made cultivation of the wetlands impractical.

After many centuries of abandonment, there is limited evidence for reoccupation of some areas within the Yalahau region during the Late Postclassic (i.e., after A.D. 1250). There is little documentary or archaeological evidence for occupation in the Yalahau region after European contact until the *Compania Colonizadora de la Costa de Yucatán* began operations in the area about 1900. In the El Edén area, the Decauville rail line indicates extractive activities were conducted, most likely of timber and chicle. Although the palo tinto tree (*Haematoxylon campechianum*) that grows in abundance in the El Edén wetland was once a highly valued source of fabric dye, by the early 1900s the widespread availability of synthetic dyes had negated the economic value of palo tinto; these formerly valuable trees were instead cut for use as railroad ties. For the Historic period forestry industry, the wetland was an obstacle to be crossed during the exploitation of upland forest resources.

The Yalahau region has recently entered a new cycle of human activity. With the development of the Cancún resort community in the late 1970s, the rich groundwater resources of the Yalahau region were tapped as the primary source of water for the resort development. Access roads for the wells, pumping stations, and water lines began attracting agricultural immigrants to the area, who were actively encouraged by government agricultural-development programs. The immigrants who settled in the area—many unfamiliar with the practice of slash-and-burn cultivation—have often been blamed for the numerous wildfires that have swept through the region in recent years. A number of large cattle ranches were also established in the 1980s. The ranches cleared vast tracts of land, many of which have been abandoned and taken over by fire-resistant bracken fern. In recent years, both ranchers and farmers have found the Yalahau region to be a difficult environment in which to survive, let alone prosper. Even the ancient Maya, who apparently occupied the region in great numbers during the Preclassic, did not stay very long. Why is the Yalahau region such a challenging environment? Perhaps the region represents one of the most interesting and productive natural laboratories in the Maya lowlands for the study of the human-wildland interface.

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