11

Water Sources at Mayapan, Yucatán, Mexico

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Mayapan, the Late Postclassic cultural capital of Maya society (c. AD 1200–1450), is in the arid northwestern corner of the Yucatán Peninsula (fig. 11.1). This region is pitted with several kinds of cenotes that are the sole sources of water and were the focus of ancient settlement and ritual. As axes of the sacred landscape, the cenotes were the keys to the political and spatial organization of the site. The nearby lakes of the Cenote Zone probably supplied various resources and would have been important to the local economy.

This chapter is about the water sources in and around Mayapan (fig. 11.1). I begin by presenting historic evidence suggesting that the name Mayapan was related to water sources. Then I discuss aspects of the environment, climate, hydrology, geology, and geomorphology of the area related to water sources and their connections to settlement. I describe the two different types of water sources. Next, I review the historic and archaeological evidence for the economic and religious significance of these water sources. Finally, I appraise their influence on the social structure and settlement patterns at Mayapan.

Mayapan

Mayapan was the political capital of most of northern Yucatán and the largest Maya settlement during the Late Postclassic period. The city was the seat of a "joint government" (*mul tepal*), or political confederacy, that ruled the region for about two hundred years. To the Maya and Spaniards of the Colonial period the rise and fall of Mayapan formed the most salient drama in Maya history. Archaeologically, Mayapan is the premier center in the region: the ruins encompass 4.2 square kilometers inside a 9-kilometer-long defensive wall within which over four thousand ancient

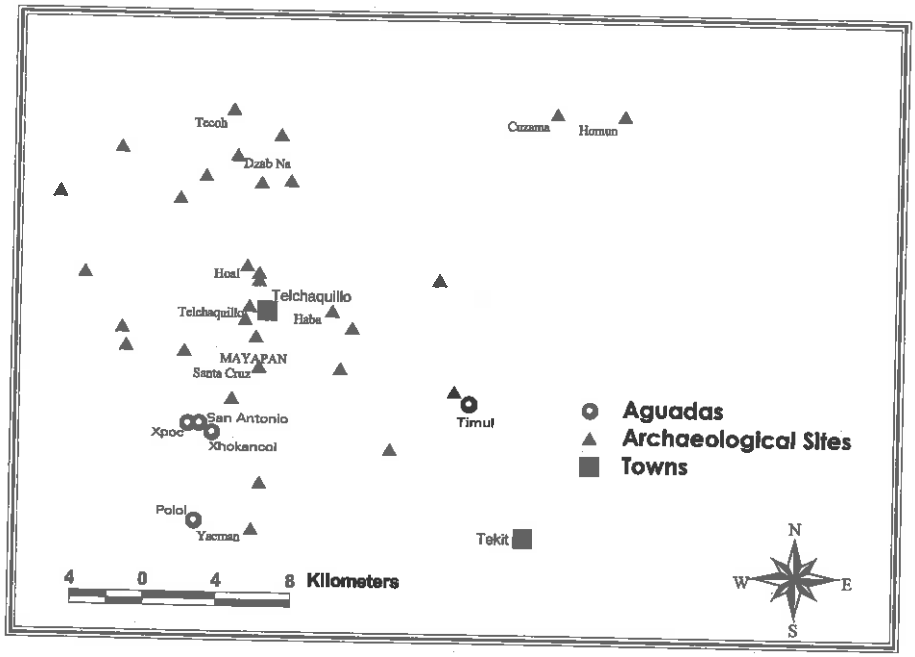

Fig. 11.1 Mayapan and vicinity, showing towns, archaeological sites, and the small lakes mentioned in the text.

structures are densely packed. Mayapan's lofty political and economic status probably also conferred upon it preeminence in art and literature.

Mayapan was the archetype of the Late Postclassic Maya city. The name Mayapan, Bishop Landa tells us, "means *Pendant of the Maya*, because the language of the land is called *Maya*; and the Indians call the city *Ychpa*, which means *within the walls*" (1986:13, my translation). The metaphor of Mayapan as the walled city (*ich paa Mayapan*) was ubiquitous in Colonial Maya literature. Thus, this central place and political capital was also the trope and mirror of Maya urban life. Landa's statement implies that */-pan/* came from *pantli*, Nahuatl for "flag" (Karttunen 1992:186). Landa's testimony about Mayapan is highly credible because he interviewed the children and grandchildren of the city's rulers. Pantli, though, has a homonym that means "wall" (Karttunen 1992:187). If we read Mayapan as the "Wall of the Maya," then *ich paa Mayapan* (e.g., in the Books of Chilam Balam [Edmonson 1982:9, 10, 1986:53, 54, 91]) becomes a bilingual kenning or couplet in which "wall" is the repeated element (see Edmonson 1982, 1986; Edmonson and Bricker 1985 on kennings and couplets in these texts). Edmonson (1982:9–10 n. 144), in contrast, suggested that Mayapan

should be scanned as *may*, Yucatec Maya for "cycle," and *-apan*, Nahuatl for "water place." This idea gains support from a passage in the Book of Chilam Balam of Chumayel: "Hol tun ake acanqueh ti cooh ti ch'ah-il ti-chac mayapan ych paa y-ok-ol haa" (Bricker 1990a:596; cf. Edmonson 1986:91), which can be glossed as "Holtun, Ake, Acanceh, Tecoh, Tich'ahil, Telchaquillo, Mayapan in the walls, over the water." The capitalized words are place-names, in a general north–south geographical order, except Tich'ahil, which could be an as-yet-unrecognized toponym. So Mayapan may have been known for its water sources. Yucatecan towns were often named after their water sources (Brown 1999:526–31); some even think that Yucatec phrases like "the caves, the wells" also meant "the towns, the villages" (Edmonson 1982:89).

Environment and Rainfall

Mayapan lies some 40 kilometers south-southeast of Mérida, Yucatán. This northwest sector of the Maya Lowlands is hot, dry, and flat. Precipitation in the lowlands decreases progressively to the north and west; the northwest tip of the peninsula is a virtual desert. Around Mayapan annual precipitation is estimated by the Instituto Nacional de Estadística, Geografía e Informática (INEGI) to be 1,081.37 millimeters, with a range of 686–1,366.20 millimeters. These statistics derive from twenty-six years of observations made in Telchaquillo, a Maya village 2 kilometers from the ruins (INEGI 1985b). The rain is enough, usually, for traditional swidden agriculture, which is practiced throughout the area. In Telchaquillo about 200 millimeters of rain falls in the dry "winter" from November to April (INEGI 1983a); the balance, about 900 millimeters, falls in the wet season "summer," between May and October (INEGI 1983b). The corn, especially the fast-growing *x-mehen-nal* race, is watered by summer thundershowers that distribute rain in a patchy way across the landscape. One cornfield can enjoy plentiful rains and yield a bumper crop, while only a couple of kilometers away a similar milpa may dry up completely. For this reason, among others, a *milpero* may plant in more than one place to improve the chances of having at least a partial crop. Later in the year significant precipitation comes from cold fronts that drift slowly across the peninsula, bringing chill winds and long rainy days. These "northers" water the slow-ripening corn, called *x-nuk-nal* in Mayan, and the beans in the milpa. More late-season rain comes from tropical storms and hurricanes.

As the statistics show, the dry season at Mayapan is quite arid. During two or three months between December and March it may not rain at all. High temperatures *average* 30°C from November to April (INEGI

1983a), and extreme temperatures above 40°C occur. In this climate reliable water sources are indispensable for sedentary settlement.

Water Sources

The Yucatán Peninsula is a karstic limestone shelf blessed with few streams and almost none in the north. Because of the karst most drainage is internal, with rapid infiltration and little runoff. In general, the limestone is lower, flatter, and younger in the north of the peninsula and higher, older, and rougher in the south (Sharpton et al. 1993:fig. 1; West 1964:68–73). The heat, the dryness, and the young, thin soils of the north lead to the growth of a low, scrubby thorn forest. Notwithstanding the low level of relief, the land is actually sharp, stony, and broken. At Mayapan elevation varies only about 5 meters (see Jones 1952), but it varies continually: ubiquitous ridges, knolls, and cockpits make for high average slopes, which contribute to the thinness of the soil and the difficulty of travel. This tumbled, broken landscape is created by the solution and corrosion of the limestone. The collapse dolines—sinkholes formed by the collapse of the caprock into underground voids—at the site are deeper than the solution dolines—depressions formed by chemical dissolution of limestone. The former are up to 13 meters deep.

In general, all the water sources in the Mayapan area are karstic solution features of one kind or another. In one sense, then, all are "cenotes." The word "cenote" comes from the Yucatec Maya word *ts'ono'ot*, meaning "sinkhole" or "doline" (Bricker, Po'ot Yah, and Dzul de Po'ot 1998). The broad use of the term "cenote," however, masks variability related to the geomorphology, function, and significance of these features. I prefer to divide water sources into at least two groups: *ch'e'eno'ob'*, or "wells," and the small lakes of the Cenote Zone. In the first category I include all collapse dolines and caves that have water in them. These are common, nearly ubiquitous, features throughout Yucatán, and they are the only kind of water source within the wall of Mayapan. One can subdivide this group into solution caverns, vertical ("true") cenotes, and funnel-shaped dolines (West 1964:72) using morphology or hydrologic history. The small lakes of the Cenote Zone are often called cenotes by both the local Maya and geologists, but compared to the ch'e'eno'ob' they have a distinctive geologic history, morphology, hydrology, distribution, and social function. Therefore, I discuss these lakes separately, after which I talk about the ch'e'eno'ob' of Mayapan.

The use of the words *ts'ono'ot*, *ch'e'en* (literally, "well"), and *'áaktun* (literally, "cave") in modern Yucatec is complicated enough to merit com-

ment (Bricker, Po'ot Yah, and Dzul de Po'ot 1998:2, 54, 82). The ranges of denotation for these words appear to overlap considerably. The term *ch'e'en* refers not only to some natural caves and cenotes that have water in them but also to modern artificial wells. One might hypothesize that a ch'e'en is open to the sky, whereas an 'áaktun is a natural tunnel or chamber that is roofed. But some caves with water in them are called ch'e'eno'ob', falsifying that hypothesis. The word 'áaktun is also used to denote caves with water in them as well as dry caves. On several occasions I have attempted to elicit systematically the differences among these terms from native Yucatec speakers, and I have also tried to observe the different usages in modern spoken Yucatec discourse. I have not, however, succeeded in deciphering the ethnotaxonomy underlying this semantic domain or relating it to a geomorphic classification.

Lakes of the Cenote Zone

The Chicxulub Crater is the major geological structure nearest to Mayapan. It is one of the largest craters in the inner solar system (Sharpton et al. 1993) and has been dated to the end of the Cretaceous period, 65 million years ago (Swisher et al. 1992). The aftermath of the impact evidently caused the extinction of the dinosaurs (Alvarez et al. 1980; Alvarez 1997). The crater, a complex structure, is buried under 300–1,000 meters of Tertiary (i.e., post-Cretaceous) limestone deposits (Pope, Ocampo, and Duller 1993). Most of the inferences about the morphology of the crater come from gravity measurements (Hildebrand et al. 1995; Morgan, Warner, and the Chicxulub Working Group 1997; Sharpton et al. 1993) and observations of secondary surface features. The crater's diameter has been a topic of much debate. It may have multiple rings and a central peak (Sharpton et al. 1993; Morgan, Warner, and the Chicxulub Working Group 1997).

The carbonates (i.e., limestones and dolomites) inside the crater differ from those outside it. The surfaces outside the crater are higher in elevation than those inside. Possibly, the crater was not completely infilled by the later marine carbonates, so it still forms a slight depression. Also, ejecta seem to have landed around the crater's edges. The limestone outside the crater is older than that inside because the former (being higher) was exposed by marine regression earlier than the limestone that formed in the depression within the crater. The limestone outside the crater is both eroded (by solution, corrosion, and weathering) and fractured, whereas the deposits within the crater exhibit less fracturing and erosion. The soils and their degree of development also provide evidence

that the geomorphic units inside the crater are younger than the surfaces outside it (Pope, Ocampo, and Duller 1993; Pope et al. 1996). The differing characteristics of the interior and exterior carbonates, particularly the degree of fracturing, mean that the boundary between the two dramatically affects the local hydrology.

Along that boundary is a semicircular ring of cenotes, called the Cenote Zone on INEGI maps. These cenotes lie within a topographic trough several meters deep (Pope, Ocampo, and Duller 1993). The Cenote Zone has a complicated impact on the regional hydrology. The water level declines in the area of the Cenote Zone, and the ring of cenotes captures groundwater flow and shunts it to the sea (Perry et al. 1995). Mayapan lies on the inner edge of the trough (Kevin Pope, personal communication, 2001). At least a dozen cenotes of the Cenote Zone lie about 5 kilometers south of Mayapan (INEGI 1985c). As mentioned earlier, these are not typical Yucatecan cenotes but more like small lakes in depressions that are much larger than the typical collapse dolines in the area.

These lakes, their hydrology, and the general environment of the Cenote Zone influenced the archaeological settlement patterns and cultural landscape of the area. Since these lakes are the only open bodies of water in the vicinity of Mayapan, we must consider the possibility that their presence influenced the decision to found Mayapan in the spot where it lies today. Furthermore, the resources offered by the lakes very likely formed part of the economy of Mayapan. Thus, my review of the water sources at Mayapan would be incomplete if I did not include an appraisal of these lakes. Therefore, I discuss below the historical and archaeological evidence for human settlement and economic exploitation of the Cenote Zone.

The water quality in these cenotes varies but is generally poor. INEGI (1985a) found that some are highly saline. The cenote Polol, for example, one of the largest, is about 12 kilometers south-southwest of Mayapan; it is highly saline and apparently impotable. The water is the hardest tested ($CaCO_3$ concentration = 1,129 mg/l) of some 330 samples. The U.S. government classifies anything over 180 mg/l as very hard. The level of total dissolved solids is also very high (3,351 mg/l). Farther west, the cenote Nicanche is also very hard, highly saline, and impotable, as is an unnamed lake (sample 157) geographically intermediate between the previous two. The cenote Xpoc, one of the nearest of these lakes to Mayapan, is listed as having "tolerable" water quality (total dissolved solids [sample 169] = 1,288 mg/l). It is also hard ($CaCO_3$ concentration = 533.5 mg/l). The water of all the lakes tested is reported to be poor for irrigation and is generally used for animal husbandry. The poor water quality may be caused by the

lack of outlets in these lakes. The high heat and low humidity in the area lead to high evaporation rates that help concentrate salts and solids.

Predictably, the people in Telchaquillo report that the water in these lakes is poor and generally impotable. People fish in some lakes, while cattle are watered at others. Most lakes seem to have wells dug near the water's edge. I have visited several of these lakes, and they have remarkably diverse characteristics. The cenote San Antonio is the lake nearest to Mayapan, about 5 kilometers south-southwest of the site, halfway between Xkanchakan and Mahzucil. It produces small, tasty fish for the occasional fisherman. Within its depression the water is surrounded by wild groves of *caña brava*, a large variety of native bamboo. Like bamboo elsewhere, caña brava has many possible uses (e.g., construction, furniture, spear and arrow shafts, etc.).

Across the road small rings of unsquared stones surround the cenote Xpoc. These rings are 2 or 3 meters wide and 30 or 40 centimeters high (just a few courses of rough stone) and are filled with soil. Several concentric circles of these rings surround the lake, although none were visible along a precipitous portion of the shoreline. The inner circles are partly inundated, and all are close to the water. We know nothing about the function of these features or even if they are prehistoric. The ruins of a historic ranch or hacienda lie above the lake near the edge of the depression, so the circular features may be historic. It is not unreasonable to speculate that they might have been used either as planters for raising an economically important tree crop such as cacao (see Kepecs and Boucher 1996 for a parallel example from northeast Yucatán) or as pens for raising animals (see below).

The cenote Xhokancol is a few hundred meters farther south on the road to Mahzucil. It is seasonally dry, and when it is dry, grass grows across its flat bottom. The foundations of a small structure with an unusual plan are visible in the bottom of the basin near a shallow well that reaches the water table. I briefly discuss this structure later.

The cenote Timul is about 11 kilometers southeast of Mayapan, west of the old hacienda road between Tekit and Tecoh, south of San Isidro Ochil. Timul is the largest of the lakes in the vicinity, with the exception of Polol. As its name suggests (*mul* = "mound, pyramid"), Timul has a modest ruined pyramid on its edge. The pyramid has been robbed for stone, probably for the nearby ranch. The ancient building is now a shapeless hulk.

The role of these water sources in pre-Hispanic Maya society can be inferred in part through the descriptions of them that appear in the *Relaciones histórico-geográficas de la gobernación de Yucatán*, which were written only some thirty years after the Spanish Conquest. The *Relación de*

Mama y Kantemo quite accurately describes six lakes that are obviously the lakes of the Cenote Zone that are closest to Mayapan. The *Relación* states that the lakes have fish in them and also mentions that the lakes have "alligators" (probably iguanas) that were "put there by hand" (de la Garza, Izquierdo, and León y Tolita Figueroa 1983:112). I say "iguanas" because elsewhere in the *Relaciones* iguanas are described as "lagartos" (e.g., de la Garza, Izquierdo, and León y Tolita Figueroa 1983:96). Clearly, the Maya exploited the lakes in surprising ways. The *Relación de Tekit* also describes some of the lakes, emphasizing the unhealthy quality of the water (de la Garza, Izquierdo, and León y Tolita Figueroa 1983:287). The *Relación de Tiab y Tiek* makes a similar comment and goes on to say that the natives used the lakes to raise small turtles for food (de la Garza, Izquierdo, and León y Tolita Figueroa 1983:320). The historical use of these lakes for raising turtles and iguanas is surprising. Perhaps the small stone circles at the cenote Xpoc were part of a turtle hatchery, or maybe the odd stone foundation in the cenote Xhokancol was related to iguana farming. The economic potential of these lakes seems to have been overlooked by archaeologists.

Each of the lakes I have visited is noticeably different. This diversity, the unusual topography, and the restricted distribution of resources offered by these lakes should have led to the development of a distinctive pattern of ancient settlement. Part of the area, especially to the east of Mayapan, is poorly surveyed, so we cannot draw firm conclusions. The *Atlas arqueológico del estado de Yucatán* (Garza Tarazona and Kurjack Basco 1980) shows us very few sites in the Cenote Zone. The site of Timul (16Qd(7):166), mentioned above, appears to be an exception. Unfortunately, little is known about its age or function. There may well be other small sites in the Cenote Zone, but it seems unlikely that there are really large ones that remain unknown. Thus, the most salient feature of settlement in the Cenote Zone is its absence. The author of the *Relación de Sotuta y Tibolon* reached the same conclusion (de la Garza, Izquierdo, and León y Tolita Figueroa 1983:148) and ascribed the lack of settlement to the bad water of the lakes.

Ch'e'eno'ob'

All the water sources within the great wall of Mayapan fall into the category of ch'e'eno'ob', which, as I explained earlier, literally means "wells" (fig. 11.2). In geomorphological terms they are either natural collapse dolines that reach the water table or karst solution caverns that have pools of water in them. None of the cenotes at Mayapan look much like the Cenote of Sacrifice at Chichén Itzá: a round depression with vertical sides

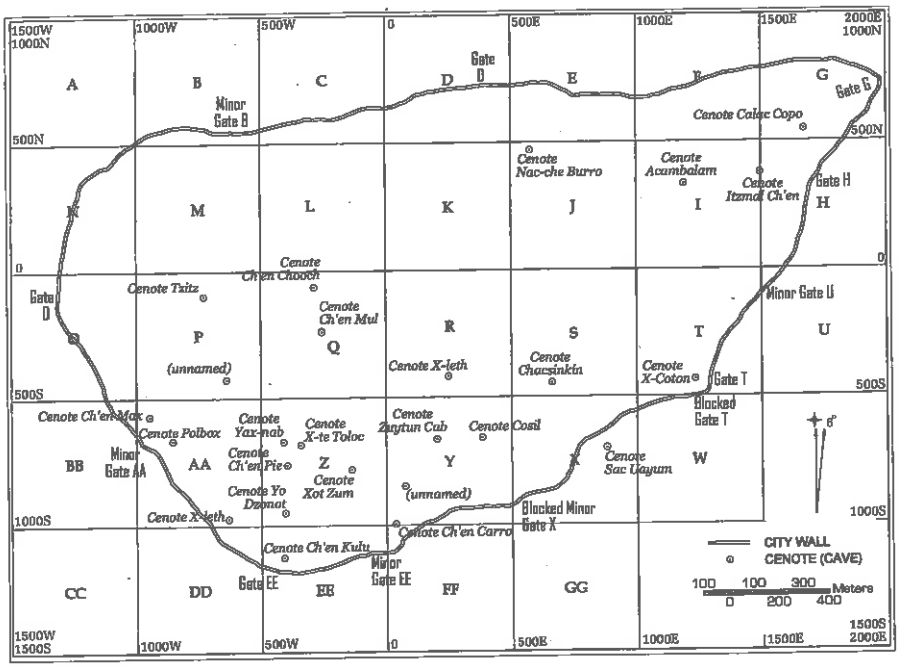

Fig. 11.2 The site of Mayapan, showing the site grid, the Great Wall, and the cenotes marked on the Carnegie Institution's map. (Based on an original map in Jones 1952).

and water-covered bottom. To be clear, I should specify that despite the term *wells*, none at Mayapan were artificially excavated. Ch'e'eno'ob' are also common in the vicinity of Mayapan, outside the Great Wall.

The cenotes/wells of Mayapan had both sacred and mundane functions in prehistory. Among the profane functions there is evidence that they supplied raw materials, including possibly pottery clay, cave travertine for ceramic temper, stalactites for construction of altars, and perhaps fish.

In the cenote Ch'en K'ulu, which has extensive subterranean passageways, the clay in some tunnels looked like potting clay, or *k'at lu'um*. I collected a small sample of this clay and made pots from it. The ceramic paste did not resemble that from the archaeological ceramics of Mayapan, but the vessels seemed functional. Clay may have been mined historically or prehistorically in Ch'en K'ulu.[1]

In one excavation, Pit 4 near Structure AA-46 (Brown 1999:199–202), I recovered several small fragments of cave travertine displaying large clear

calcite crystals. An elder from Telchaquillo told me that this *ch'aak xiix* was ground up and used as temper in ceramics. There is little clear calcite temper in the ceramics of Mayapan, but various kinds of clear calcite temper are common in the Late and Terminal Classic ceramics of the Cehpech and Sotuta complexes (Smith 1971).

Adams (1953:153, 171, 175) reported that stalactites were used as vertical tenons or supports to form three modeled stucco statues in front of Structure Q-71, a shrine in the ceremonial center. The small figures were evidently modeled and painted. The stalactites must have come from a cave or cenote, and in some of the caves of Mayapan, such as Ch'en K'ulu, most of the stalactites have been cut off or broken off.

Caves were also used for interments. I observed human remains in Ch'en Mul, Ch'en K'ulu, and Yo Dzonot and in the main cenote in the plaza of Telchaquillo. The Carnegie Institution also found burials in caves, including the cenotes X-Coton (Shook 1952a; Smith 1953a, 1971:116) and Ch'en Mul.

Fish live in Yucatecan cenotes, particularly *Cichlasoma* sp., which is eaten by the local people; the same species apparently live in the lakes of the Cenote Zone (Pollock and Ray 1957:649–51). These were among the most common fishes that were excavated by the Carnegie Institution at Mayapan. Although they were recovered in only a couple of lots, the minimum number of individuals was the highest of all the fishes found (Pollock and Ray 1957). Little, however, is known about the Carnegie's recovery methods, although they were surely not systematic; therefore, it is difficult to evaluate Pollock and Ray's quantitative conclusions. The archaeological remains also include large numbers of turtles and iguanas that may have come from cenotes or lakes. In my excavations in residential middens, in which the soil matrix was systematically screened, fish bones occurred in small numbers. It is fair to infer from these data that the water sources of Mayapan provided material and resources that influenced the economy of the community.

The ritual and religious use of cenotes at Mayapan influenced the spatial organization of the site and probably its social and political organization as well. Three important cenotes were associated with ceremonial architecture: Ch'en Mul, X-Coton, and Itz'mal Ch'en. The cenote Ch'en Mul is located in the heart of the ceremonial center at the foot of the Temple of Kukulcan. This location has clear symbolic significance in the context of Mesoamerican religion. It incarnates the link between the cave, the water, and the pyramid-mountain, which in Mesoamerican thought was a single idea—*alteptl*—of community or town (Bierhorst 1985; Broda et al. 1987:93; Lopez Austin 1997; Stark 1999a; see also French, Stuart, and

Morales and Fash and Davis-Salazar, this volume). The juxtaposition embodies the geography of the heavens, the underworld of the cavern, and the multilayered firmament. The religious center of the city is thus an *axis mundi*, representing the levels of the Maya cosmos (Eliade 1954:12). Moreover, the Temple of Kukulcan is a radial temple, likely associated with completion, specifically with calendrical termination rituals, such as katun endings and New Year ceremonies (Brown 2005; Carlson 1981; Coggins 1980, 1983). The temple also presents an astronomical hierophany on the winter solstice (Aveni, Milbrath, and Peraza Lope 2004), which highlights the building's ritual significance as the center of the community.

There is direct evidence that the Temple of Kukúlcan at Mayapan acted as an axis mundi that united the heavens, the earth, and the underworld. Like its analog at Chichén Itzá, the Temple of Kukulcan at Mayapan had nine terraces (Shook 1954:93), equal to the number of levels in the Maya underworld (Carrasco 1990:67). The connection to the underworld is made explicit, however, by the presence of a natural cave below the temple. Robert Smith reported that an arm of the cenote Ch'en Mul extended approximately west-northwest beneath the Temple of Kukulcan (1953b:280, 1954). It has since been discovered that caves or tunnels occur beneath several major pyramids in Mesoamerica, including the Temple of the Sun at Teotihuacan (Heyden 1975, 1981, 1989), the Temples of K'ucumatz and Tojil at Utatlan (Fox 1991), and the El Duende pyramid at Dos Pilas (Brady 1997). These tunnels and caves appear to be related symbolically to the Central Mexican creation myths and to the Maya underworld, Xibalba, of the Quiche Maya Popol Vuh. The cave beneath the Temple of Kukulcan probably possessed similar mythic significance.

My exploration of the cenote Ch'en Mul indicates that the tunnel that passes beneath the Temple of Kukulcan departs from the southwestern edge of the collapse doline and runs southwest and then west, apparently near the southern edge of the temple. Looking at my measurements, taken casually years ago, and comparing them to the existing maps (fig. 11.3) (Smith 1954; ceremonial center map drawn by Proskouriakoff, in back pocket of Pollock et al. 1962), I first noted that Smith's map was inaccurate. The tunnel marked with an arrow as going "to the West Water Hole" is the one that passes below the Temple of Kukulcan. On Smith's map it is not drawn in but appears to be oriented north of west. In fact, my notes show this tunnel running from the southwest corner of the collapse doline and bearing slightly south of west, with an average azimuth of about 257° (mag.) for more than 30 meters. I used the U.S. National Oceanic and Atmospheric Administration's online calculator (http://www.ngdc.noaa.gov/cgi-bin/seg/gmag/fldsnth1.pl) to calculate the changes in magnetic

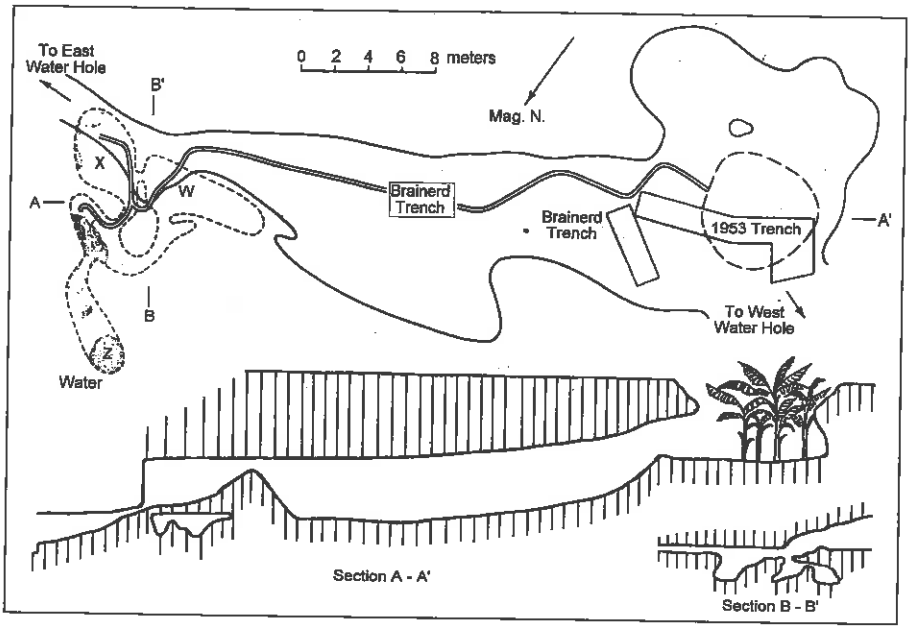

Fig. 11.3 Partial plan and profile of the cenote Ch'en Mul, located in the ceremonial center of Mayapan. (After Smith 1954; courtesy of the Carnegie Institution of Washington)

declination since the Carnegie Institution's work, which is necessary because Smith's map is oriented to magnetic north. All things considered, I believe that at least part of the western tunnel passes beneath the southern edge of the Temple of Kukulcan. A careful survey would, however, be required to be certain. I do not believe that the precise orientation of the tunnel or its exact spatial relationship to the overlying pyramid alters the interpretation of the spot as an axis mundi. The placement of the pyramid at the edge of the cenote is evidence enough of the Maya's symbolic message.

Scholars have missed a similar phenomenon of equal or greater interest, although Pugh (2001) recently noted this. The main tunnel of Ch'en Mul runs about 40 meters northeast, and a side branch ends in a group of small lobate pools of water directly beneath the platform of Structure Q-152, the largest round temple at the site, sometimes called the Caracol or Observatory after its analog at Chichén Itzá. Thus, Structure Q-152, the second most prominent religious construction and the stela platform of the site, is another axis mundi, perhaps associated with rituals differ-

ent from those of the Temple of Kukulcan (Pollock et al. 1962:113–17). In the Maya area round temples seem to be evidence of Central Mexican influence, as they may be at Mayapan. Among the Aztec in Central Mexico round temples were dedicated to Ehécatl, lord of the wind and an avatar of Quetzalcoatl (Aveni 1980:262; Carrasco 1990:72). Since Kukulcan is the Maya incarnation of Quetzalcoatl, the principal temples at Mayapan may celebrate different aspects of the same deity. That two tunnels of the same cave extend beneath both structures may be an allusion to this parallelism.

While Ch'en Mul may be the most significant sacred cenote at the site because of its central location, X-Coton and Itz'mal Ch'en also exhibit evidence of sacredness. X-Coton has human burials and a small platform within it. Proskouriakoff (Pollock et al. 1962:130) thought that the city wall had been extended to encompass this cenote. Two small ceremonial buildings sit on the rim of the cenote, Structures T-70 and T-72. Structure T-70 is a rare double temple (Shook 1952a, 1953), reminiscent of Central Mexican ones, which are best exemplified by the Templo Mayor of Tenochtitlan. Itz'mal Ch'en is a dramatic hole in the ground. The men of Telchaquillo have held their *ch'a'ah-chaak* rain-bringing ceremony at Itz'mal Ch'en for many years (Shook 1952a).

Two cenotes also have an evil supernatural reputation. Sac Uayum is a large cenote located just south of the city wall. I have suggested (Brown 2005) that the exclusion of the cenote from the city was intentional and that the course of the wall was deflected for this purpose. Sac Uayum is held to be the home of a feathered serpent that eats children. Yucatecan mythology is filled with caves (Burns 1983:244–57). In these legends they are often the homes of serpents. Sometimes the flying serpent, called Hapai Can, eats children (Dzul Poot 1985:47–53). Other stories emphasize the cave serpent's role as protector of the cenotes and the sacred *zuyha*, or "virgin water," used in ceremonies such as the ch'a'ah-chaak (Tec Chí et al. 1992:22–24). The cenote Cosil is also considered a dangerous place. My employees refused to enter it with me. These facts bespeak a storied sacred landscape heavy with meaning.

Water, Ritual, and Ancestors

Equally important is the relationship among water sources, ritual, and kinship. Vogt (1969, 1976, 1981) and others (e.g., Brady 1997; Collier 1975) have meticulously documented the geographic and ritual interconnections among lineages, ancestor worship, and settlement in the highlands of Chiapas and Guatemala. Similar systems are documented poorly

among the Yucatec Maya. I have noted (Brown 2005) passages in the Books of Chilam Balam that imply that a similar association of lineages, rituals, and caves existed at Mayapan. The clearest passage on this theme is from the Book of Chilam Balam of Tizimin:

Tutz'oc ucuch katun	The burden of the katun is finished
Ti to uil yokol *Mayapan*	Which is one moon over Mayapan,
Ti uchom may cu	The cycle seat,
Uyetz'	His setting,
Uch'ibal	His lineage,
Tuch'enil	At the wells,
Ti yactunil	At the welling fountains.
Tix uchom cimcehil	And there occurred deer death
Ma ya cimlal	And painless death.
(Bricker 1990b)	(Edmonson 1982:110)

This passage indicates that caves and cenotes were ritually and religiously associated with lineages at Mayapan. The translation has some problems, such as the rendering of *yactunil* as "welling fountains" rather than as "cave," its literal, commonplace meaning. Edmonson does, however, provide the basic meaning. A nearly identical passage appears in the Pérez (Miram 1988, 3:90).

Considerable evidence suggests that the government of Mayapan was organized around the kinship system, which was certainly patrilineal and probably bilineal (Brown 1999). Therefore, political power and legitimacy must have been interwoven with cenote rituals and ancestor worship. As the principal lineages, the Cocom and Xiu may have vitalized their power through their association with certain water sources and the deities who dwelled in them. Perhaps Ch'en Mul was affiliated with the ancestors, tutelary deities, and political power of the Cocom, the city's founding lineage, or the Xiu, who also claimed to have been a paramount lineage at the site.

Many ch'e'eno'ob' occur outside the great wall, but their density is unknown. They are common, but without reliable survey data we will never know whether the cenote density within Mayapan is exceptional. The Carnegie Institution investigated almost eighty caves and cenotes within a radius of about 19 kilometers of Telchaquillo. Over sixty caves contained Mayapan-type ceramics, and some have Mayapan period architecture nearby. The survey was not exhaustive; some nearby cenotes were not included. For example, the cenote Chaak, which is in Telchaquillo and gives the town its name, is not listed. The number of cenotes visited hints at both their ubiquity and the density of Mayapan period settlement in the region.

Conclusion

Water sources played several important roles in the culture of Mayapan. They supplied water in a dry land. They offered food and raw materials for pottery and construction. The small lakes of the cenote zone were sources of food and perhaps other materials, although the water is poor. The lakes were used for raising iguanas and turtles. Many cenotes had sacred or supernatural associations. In Mayapan residential settlement was related to cenotes. Given a patrilocal and patrilineal kinship and residence system, the cenotes would have been associated with specific patrilineages, as they are in the Maya Highlands. Passages from the Books of Chilam Balam suggest there were specific rituals and sacrifices related to lineages that took place at cenotes. The ethnohistorical data clearly imply that government at Mayapan was organized around principles of kinship (Brown 1999). Therefore, the cenotes were tightly integrated into the system of political power and legitimacy.