

Chapter 19

Ancient Maya Perceptions of Soil, Land, and Earth

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19.1 Introduction

The worldviews and religious beliefs of many agrarian societies of prehispanic Mesoamerica, including the Maya who occupied parts of present-day southern Mexico and upper Central America, emphasized soil concepts, especially soil fertility. Cosmic beliefs about how the world operates were materialized through cults of gods and spirits associated with agriculture and the earth. Soil was understood, not as the product of biogeochemical processes involving erosion and weathering, but as a gift from the ancestors that must be reciprocated with human blood.

In this chapter, we examine ancient Maya perceptions of soil, land, and earth from the perspective of indigenous and early Spanish documents, including prehispanic pictorial manuscripts (native screenfolds made from bark paper), creation mytho-histories recorded at or near the time of Spanish contact, early Spanish chronicles, and Colonial era Mayan/Spanish dictionaries. These diverse accounts provide unique insights into how the Maya perceived soil evolution and how they used this understanding to model their relationship with tropical soil resources prior to the arrival of Europeans in the 16th century. Our study reveals that environmental worldview (*i.e.*, one's understanding of how the world works or should work and what the appropriate ways are to interact with the biophysical environment; Wells and Davis-Salazar 2008, p. 191) and ecological knowledge are important factors that shape how the Maya interacted—and continue to interact—with soils, past and present.

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19.2 Folk Soil Taxonomies among the Contemporary Maya

In many cultures, knowledge about how to care for the environment is transmitted through oral traditions including stories, parables, and songs. Historically, in some cultures, such as those occupying the Maya region, formal writing and symbolic systems transferred information about soils and land use. However, since most prehispanic Maya manuscripts were destroyed by the Spanish in the 16th century, we know very little about the ways and extent to which soils and their attributes were remembered and shared prior to Spanish contact. In contrast, we have detailed information about contemporary Maya indigenous soil knowledge. Barbara Williams and Carlos Ortiz-Solorio (1981) provide an extensive review and discussion of these and other Mesoamerican cases. More recently, Antoinette WinklerPrins and Narciso Barrera-Basso's (2004) review has extended this survey to include several new studies, especially in the Maya region.

It is clear from recent work that we know a good deal about soil management in agroforestry, home-gardening, and cultivation practices among the Maya of today (e.g., Faust 1998; Graefe 2003; Terán and Rasmussen 1994), but very little about their local soil taxonomies. This could be the case because many such taxonomies appear to be based on macroscopically observable morphological attributes of surface appearances, without reference to subsurface variability. As a result, compared to other Mesoamerican groups, soil taxonomies in the Maya region tend to be restricted to a small number of primary classes (e.g., Williams 2006). For example, Christopher Jensen and colleagues (2007) report five soil types in use among the Itzá Maya of the southern lowlands around Lake Petén Itzá in Guatemala. These include *ek luum* ("black soil"), *saknis* ("white earth"), *ek luk* ("black clay"), *chachak luum* ("red/colored soil"), and *kan luum* ("yellow soil"). A sixth class, *tierra mezclada* ("mixed earth"), is sometimes used to refer to mixed soil classes. Similar soil types have been identified by Peter Ewell and Deborah Merrill-Sands (1987), who report four primary soil types, derived from locally perceived differences in color, inclusions, and texture, for swidden cultivation systems (use of temporary agricultural plots produced by cutting back and burning off vegetative cover) among the Yucatec Maya of the northern lowlands in Mexico. One possible exception to the apparent abbreviated nature of Maya soil taxa is that reported by William Carter (1969), who documented 24 distinct categories for soils used by the K'ekchi Maya of highland Guatemala. However, many of these "categories" are probably informal descriptive phrases (see Wilk 1981, pp. 138-141) that attempt to account for intra-pedon variability.

In contrast to these taxonomies, Narciso Barrera-Bassols and Víctor Toledo (2005) have identified 12 main soil types currently in use in northern Yucatan. Most of these are consistent with those reported by Nicholas Dunning (1992a, pp. 36-45; see also Dunning 1992b; Dunning and Beach 2004, p. 9) in his study of contemporary knowledge of Puuk soils in western Yucatan. The types are based on a wide range of topsoil attributes, including color, relief, position, depth, stoniness, drainage, moisture retention, consistence, texture, fertility, and workability. In

addition to the main soil types, Barrera-Bassols and Toledo (2005, p. 18) found that the Yucatec Maya have more than 80 descriptive terms referring to soil characteristics—more than any other Mesoamerican group surveyed to date (Barrera-Bassols and Zinck 2000; Williams and Ortiz-Solorio 1981; Wilshusen and Stone 1990). Variation in local soil taxonomies reflects the diversity in ecology and soil-forming factors, even though most of the Maya lowlands are underlain by the same parent material, limestone (Dunning and Beach 2000, p. 183).

The observation that many Maya farmers recognize a great deal of variation *within* but not *between* primary soil classes suggests that Maya taxonomies may hold significance beyond their utilitarian function. Barrera-Bassols and Toledo (2005, pp. 26-28), for instance, suggest that Yucatec Maya soils have strong symbolic significance in local worldview (or the “kosmos sphere”), wherein soil colors have associations with the cardinal directions and thus are linked to cosmic structure and organization. They also propose that subsurface soil is seen as a womb, since it gives rise to humans and other forms of life. As Nicholas Dunning and Timothy Beach (2004, p. 10) point out, for many traditional Yucatec farmers, soil is believed to impart *itz*, “the holy substance of life” for growing plants. Such associations are intriguing, but surely represent a synthesis of information and attitudes from prehispanic, Colonial, and modern knowledge sources. To what extent, then, do these kinds of symbolic associations and metaphors have prehispanic roots? To answer this question, we need to examine first the soil resources of the prehispanic Maya and then consider how the Maya described these resources and represented them in their worldview.

19.3 The Ancient Maya and their Soil Resources

The ancient Maya world, encompassing southern Mexico, Guatemala, Belize, and parts of Honduras and El Salvador, is one of the most physiographically, biologically, and culturally diverse places on Earth (Fig. 19.1). The region encompasses a varied landscape, generally divided into three zones. The Maya highlands, dominated by both extinct and active volcanoes (some reaching up to 13,000 feet in altitude), include all of the elevated terrain in southern Guatemala and the Chiapas highlands of southern Mexico. Highland soils, derived from Pleistocene and Holocene volcanic activity, are rich and fertile, though divided between steep hillslopes and a few broad valleys, including those of Guatemala City, Quetzaltenango, and Comitán.

The lowlands consist of a vast limestone plateau that rises slightly toward the south, ending where the mountainous highlands zone interrupts the plain. The southern lowlands lie just north of the highlands and incorporate the Petén rainforest of northern Guatemala, Belize, and the southern portions of the Mexican states of Campeche and Quintana Roo. Soils in the south tend to be deep and varied in texture and consistence. The northern lowlands cover the remainder of the Yucatan Peninsula, including the Puuk hills. Soils in the north tend to be shallow, well drained, and calcareous, but



Fig. 19.1 The ancient Maya world, encompassing the modern nation states of southern Mexico, Guatemala, Belize, and parts of Honduras and El Salvador

also more leached than those in the south. Geologic structure varies throughout the lowlands, producing variation in many soil-forming factors and leading to the development of a range of soil types, including Rendolls, Vertisols, Histosols, Mollisols, and Oxisols (see Furley 1974). Timothy Beach and colleagues (2006) provide a detailed picture of the soil history of this and adjacent regions.

The peoples who occupied this region can be traced back at least 5000 years before the arrival of the Spanish in the 1500s, though it is unclear when exactly linguistic and cultural patterns that can be recognized as “Maya” were first established and from where they emerged. Villages and communities seem to have been settled by about 1800 BC, soon followed by the massing of large cities, such as El Mirador in the southern lowlands, with populations on the order of tens of thousands. Equally complex societies flourished in the highlands, such as at Kaminaljuyú, which underlies present-day Guatemala City. New findings over the past decade, such as

those at San Bartolo near El Mirador, show that, by the turn of the millennium, the Maya had a fully developed pantheon of gods (emphasizing the Maize God), which was integrated into a complex and probably pan-Maya creation story.

The period from about AD 250-900, generally referred to as the “classic” era of Maya society, represents the time when the Maya reached intellectual and artistic heights, as well as large populations, a flourishing economy, and complex adaptive agrosystems that incorporated swidden cultivation with raised and drained-field agriculture, terracing, and other intensive farming technologies (*e.g.*, Fedick 1996; Flannery 1982; Harrison and Turner 1978). Nicholas Dunning and colleagues (1998) provide a thorough overview of lowland agricultural systems, showing how Maya farmers adapted their strategies to different environments and how these strategies changed over time in relation to environmental fluxes as well as regional political and economic shifts. The variety and complexity of agricultural systems demonstrate that the ancient Maya held a deep understanding of soils and their properties, management, and care.

Unlike other societies that flourished throughout the Americas before the arrival of the Spanish, the Maya left us richly detailed written accounts about many aspects of their lives, which were recorded in hieroglyphic inscriptions on monuments, architecture, artifacts, and bark-paper books. These historical sources of information, as well as those created just after the arrival of the Spanish in the early 16th century, provide us with unique particulars about a wide range of social and political matters, religious rites and rituals, and even the names of specific individuals and some of their activities along with the dates when such actions and events took place. Nancy Farriss (1984) has documented how, and to what extent, the Yucatec Maya cosmos survived Colonial Spanish intrusion, arguing that the transformation of Maya gods into Catholic saints helped to preserve the core of the Yucatec Maya worldview. It is to these and other early sources that we now turn to examine what the Maya had to say about soil, what they thought was important to record, and what has survived and changed over the past 500 years of colonial and economic intrusions.

19.4 Maya Creation Stories and the Origins of Soil

The most notable source of information on ancient Maya beliefs is the *Popol Vuh*, the so-called “council book” of the Quiché Maya of the Guatemalan highlands. The book, written by members of the lordly lineages of the Quiché in the mid-16th century, is a transcription of a complex oral history that stretches back hundreds, if not thousands, of years. The book begins with an account of activities that took place “before the first sunrise,” and record how the universe, including the *cahuleu*, or “sky-earth” (“world”), and everything in it came into existence. This account is followed by the story of the Hero Twins, Hunahpu and Xbalanque, who move back and forth between the surface of the earth and the underworld to play the ancient Maya ball game with the Lords of the Underworld. These activities are steeped in metaphor and symbolism of the movements of the sun, moon, planets, and stars.

According to the *Popol Vuh* (as translated by Tedlock 1996), in the beginning there only existed an empty sky and a calm sea below. Out of this, the gods of the primordial sea (Maker, Modeler, Bearer, Begetter, Heart of the Lake, Heart of the Sea, and Sovereign Plumed Serpent) join those of the primordial sky (Heart of Sky, Heart of Earth, Newborn Thunderbolt, Raw Thunderbolt, and Hurricane) to envision and conceive of the earth:

For the forming of the earth they said "Earth." It arose suddenly, just like a cloud, like a mist, now forming, unfolding. Then the mountains were separated from the water, all at once the great mountains came forth. By their genius alone, by their cutting edge alone they carried out the conception of the mountain-plain, whose face grew instant groves of cypress and pine...Such was the formation of the earth when it was brought forth by the Heart of Sky, Heart of Earth, as they are called, since they were the first to think of it. (Tedlock 1996, pp. 65-66)

According to Dennis Tedlock's (1996, pp. 31-32) analysis, the gods set in motion a process they sometimes refer to as "sowing" and "dawning," which includes "the sowing of seeds in the earth whose sprouting will be their dawning," the sowing of human beings in the womb whose birth will be their dawning, and finally the sowing of humans in the earth at death that is followed by "dawning when their souls become sparks of light in the darkness." Thus, human beings are as old as the earth itself and the existence of the two is intimately related.

The gods' attempts to make humans are fraught with failure, however, especially when they tried to create humans from soil:

So then comes the building and working with earth and mud. They made a body, but it didn't look good to them. It was just separating, just crumbling, just loosening, just softening, just disintegrating, and just dissolving. Its head wouldn't turn, either. Its face was just lopsided, its face was just twisted. It couldn't look around. It talked at first, but senselessly. It was quick dissolving in the water. (Tedlock 1996, pp. 68-69)

Although this being talks, its words make no sense. Since its body is poorly made, it could not reproduce. Eventually, it dissolves into nothing.

After several attempts, humans are finally fashioned from cornmeal that is mixed with water when Xmucane, a mystic diviner (and mother/grandmother of the Hero Twins) who the gods consult for help, washes her hands after grinding maize. The resulting humans (the Quiché Maya in this account) represent apical ancestors ("mother-fathers") to everyone in the Quiché lineages. Here again, there is an inextricable connection between people and the earth, this time mediated through people's manipulation of soils—with the help of gods and ancestors—to produce maize, which is perceived as both the flesh and sustenance of humans.

From the very beginning, humans have needed help making corn. Because the first humans were modeled from corn dough, the gods must be consulted before planting or harvesting, for only they know the propitious times in which to do so. This knowledge is encoded in the *Popol Vuh* in the story of the Hero Twins, ball players who travel to the Underworld, called *Xibalba* or "Place of Fear." The principal mission of the Hero Twins is to bring maize through the soil to the surface of the earth. In scenes depicted on Late Classic (ca. AD 600-800) pottery vessels from the southern lowlands, Hun Hunahpu (the Maize God) is shown being

resurrected by his Hero Twin sons, Hunahpu and Xbalanque, or by Chaak beings (rain gods), who brandish lightening weapons to help him emerge from the earth, which is represented as a giant tortoise carapace (e.g., Coe 2005, p. 219; Taube 1993, p. 66). In this and other prehispanic imagery, the Hero Twins are shown receiving help from gods in their efforts to grow maize.

Apart from the *Popol Vuh*, which explains the creation of the earth and humans and the relationship between them, the handful of prehispanic documents still in existence (primarily historical-genealogical manuscripts and ritual-calendrical documents) offer very few insights into Maya perceptions of soil genesis. There are, however, frequent mentions in these sources of the general concept of “earth” or “land” in reference to both cosmology and agrarian ritual; no entries specifically mention “soil.” The principal prehispanic pictorial manuscript to mention “earth/land” is the Madrid Codex (also known as the Trocortesiano Codex), which contains approximately 250 almanacs of scheduled rituals grouped thematically into sections explaining ceremonies for rain and the ritual calendar, planting and harvesting, deer hunting, beekeeping, and other topics. The codex is a compilation of pictures and hieroglyphic texts written in a script that was used throughout the Maya lowlands from the 2nd to 15th centuries AD in a region occupied by Yucatec and Ch’olan speaking populations.

The Madrid Codex (Villacorta and Villacorta 1976) shows four primary deities associated with the manipulation of the earth to produce crops: K’awil (god of sustenance), Chaak (god of rain), Nal (god of maize), and Itzamnaaj (god of earth). The deities associated with sustenance, maize, and earth are depicted in succession on Folio 24a (Fig. 19.2a), each grasping a plant sprouting out of a *kab’* glyph, representing the earth or soil (Villacorta and Villacorta 1976, p. 272). The hieroglyphic text accompanying each of these figures reads, in part, *nah?/na?-nik-na/li?*, “first?/honored? flower” (question marks indicate uncertainty in the translation; Vail and Hernández 2005), giving each god the title of “first” or “honored” “flower.” This could be an honorary title or perhaps a metaphorical reference to the season’s first harvest.

The principal god is Itzamnaaj, who has several aspects or guises. One of these is a caiman (*itzam*), which is called Itzam Kab Ain, the great earth caiman, by the Colonial Yucatec Maya (Craine and Reindorp 1979, p. 118; Thompson 1970, p. 216). In the Madrid Codex, Itzamnaaj is shown seated or lying on the earth, represented by the *kab’* glyph or with *kab’* markings, conducting a variety of rituals (folios 24a, 62b, 79b, 88b, 91b, 99b, 100b, 109b, 110b). In one scene (Fig. 19.2b), he is shown patting the earth, represented by a strip filled with *kab’* markings, below which is a god mask or figurine (Villacorta and Villacorta 1976, p. 442). The hieroglyphic text records, *mu-ku-uh/k’uh/itzamna-na/nah?/na?-nik-li*, “Itzamnaaj, first?/honored? flower, is burying [the] idols” (Vail and Hernández 2005). A similar scene on Folio 99b shows God M, god of merchants and warriors, holding a maize seed or tortilla while seated on or behind the buried idol (Villacorta and Villacorta 1976, p. 422). Here, the gods (or humans impersonating them) are apparently participating in a deity renewal ceremony honoring Chaak. Bishop Diego de Landa (Tozzer 1941, p. 161) describes this ceremony (*Oc Na*) in some detail, noting that, “they celebrated this festival every year, and besides this, they renewed the idols of clay and their braziers...”

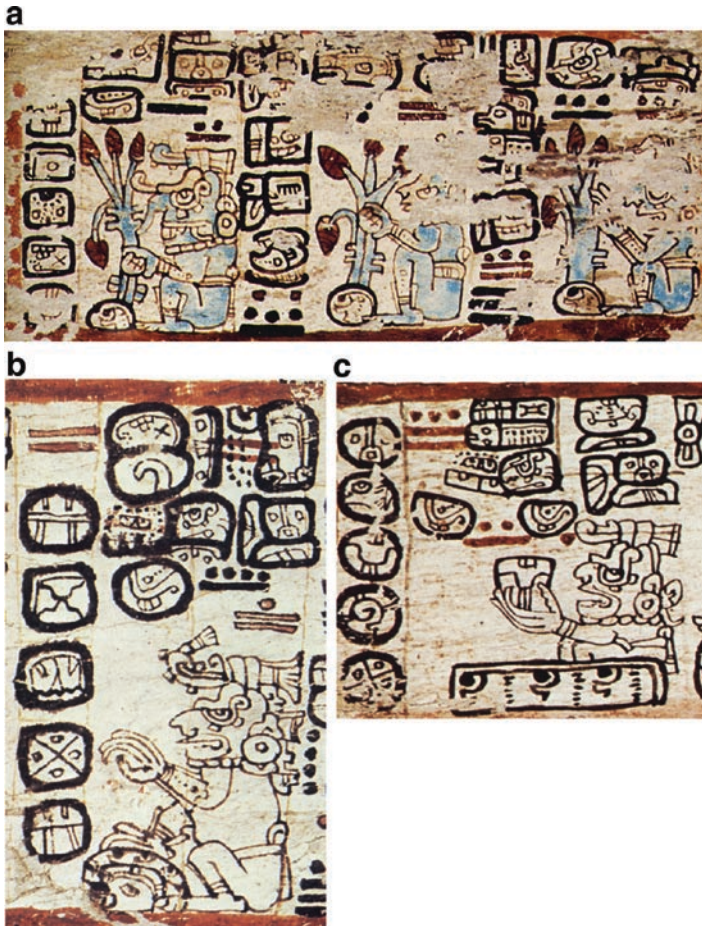


Fig. 19.2 (a). Folio 24a from the Madrid Codex, showing (from left to right) Chaak (or K'awil), Nal, and Itzamnaaj, each grasping a plant sprouting out of a *kab'* glyph (*Codex Trocortesiano*; illustration courtesy of Museo de América, Madrid, Spain). (b). Folio 109b from the Madrid Codex, showing Itzamnaaj burying a god mask or figurine in the earth, probably during a deity renewal ceremony honoring Chaak (*Codex Trocortesiano*; illustration courtesy of Museo de América, Madrid, Spain). (c). Folio 91b from the Madrid Codex, showing Itzamnaaj seated on the earth possibly holding a maize seed (*Codex Trocortesiano*; illustration courtesy of Museo de América, Madrid, Spain) (see as color plate following Index)

The ceremony was in honor of the Chaaks, “whom they regarded as the gods of the cornfields” (Tozzer 1941, p. 161).

In another scene (Fig. 19.2c), Itzamnaaj is seated on the earth and appears to be holding a maize seed, possibly with the intention of planting it (Villacorta and Villacorta 1976, p. 406). The accompanying hieroglyphic text reads, *ahaw-le//tzi-li-yu//itzamna//nah?/na?-nik-li*, “[in] rulership; Itzamnaaj, first?/honored?”

flower's goodness" (Vail and Hernández 2005). He is also shown in some frames (Folios 65-72, 73b), along with other deities, holding a sprouting maize plant. Gabrielle Vail and Victoria Bricker (2004, pp. 186-187, 192-193) have interpreted these scenes as representing the same seasonal event in the month of Kumk'u over many years in the Maya's 260-day ritual calendar.

Other deities are depicted relative to *kab'* (earth) markings. For instance, an image of the sun god (K'inich Ahaw) emerges from the mouth of a serpent, which ascends from a *kab'* glyph (Folios 65-72, Frame 20; Villacorta and Villacorta 1976, p. 356). In most cases, however, the glyph is used to identify the location of a ritual or other activity as taking place in relation to the earth. For example, the Underworld God (Folio 50a; Villacorta and Villacorta 1976, p. 324), and the Maize God (Folio 51b; Villacorta and Villacorta 1976, p. 326) are shown standing on an earthen platform inside of a thatched building. In another folio depicting the Underworld God (Folio 87c; Villacorta and Villacorta 1976, p. 398), the *kab'* glyph is pictured above the thatched structure, indicating that the scene takes place inside the earth.

While the prehispanic Maya did not place the Western notion of "soil" at center stage in their creation story or in their almanacs, it is evident that they had a clear concept of soil, whether in the context of the Hero Twins' search for maize in the Underworld or as represented in the use of *kab'* markings for situating the actions of deities. Moreover, Maya ideas of creation, growth, and reproduction (physical and social) as attested in the *Popol Vuh* and the Madrid Codex interlink the creation of humans with the creation of the earth and with the underlying belief that humans are made from maize. Since maize is a product of the earth, and the earth is owned by the gods and operated by the ancestors, humans must seek permission and approval to interact with the biophysical environment, including soil.

19.5 Early Colonial Perspectives on Maya Soil Perceptions

Much of what we know about the activities and beliefs of the early Colonial Maya come from the account of Fray Diego de Landa, a Spanish clergyman based at the monastery of Izamal in the northern Yucatan Peninsula during the mid-16th century and who served as the Bishop of Yucatan from 1571 to 1579. His *Relación de las cosas de Yucatan* ("Relation of the things of Yucatan") is a socio-historical ethnography largely devoted to the religious rituals of the protohistoric Maya, although he reports on other, more secular, aspects of their lives as well. According to Landa,

Yucatan is the country with least earth that I have seen, since all of it is one living rock and has wonderfully little earth, so that there are few places where one can dig down an *estado* [depth of five feet, seven inches] without striking great layers of very large rocks...It is very good for lime of which there is a great deal, and it is marvelous that the fertility of this land is so great on top of and between the stones, so that everything that there is and that grows in it grows better and more abundantly amongst the rocks than in the earth, because on the earth which happens to be in some parts, neither do trees grow nor are there any, nor

do the Indians sow their seeds in it, nor is there anything except grass. And among the stones and over them they sow and all their seeds spring up and all the trees grow and some so large and beautiful that they are marvelous to see. The cause of this is, I believe, that there is more moisture and it is preserved more in the rocks than in the earth. (Tozzer 1941, p. 186)

This curious description of Yucatan's "earth" (or soils) suggests that the Maya had their work cut out for them. To deal with low soil moisture and fertility, the early Colonial Maya pursued a number of measures that we might find practical today, such as the use of rock mulch mentioned in the quotation above and adding ash to plant roots to increase the soil's fertility: "the Indians grow [wormwoods] for their sweet smells and their pleasure, and I have seen them made more beautiful when the Indian women put ashes at their roots" (Tozzer 1941, p. 194). But by far, most effort was given to conducting agrarian rituals—for planting, harvesting, sufficient rain, and bountiful harvests—designed to attract the attention and beneficence of the ancestors (e.g., Tozzer 1941, pp. 28, 54, 97, 111-112, 116, 154, 161-162, 180-181, 184). The most notable of these is the Ch'a-Chaak "rain" ceremony, which is still actively practiced today (Freidel et al. 1993, pp. 29-33). In addition, the Yucatec Maya also practice(d) the *hetz lu'um* ritual for "feeding the land" and the *loh* ritual for "curing the land" (Barrera-Bassols and Toledo 2005, pp. 30-31; Redfield and Rojas 1934, p. 175). The first is practiced as a petition when a farmer wants to clear a forest plot for agriculture—an activity that is thought may drastically disturb the "world balance" and thus offend certain deities (such as Chaak) who would then punish the farmer. The second aims to restore a field if an agricultural plot is not performing well. For prehispanic times, Patricia McAnany and colleagues (2003, pp. 75-78) have unearthed 9th and 10th century ritual deposits from cenotes and caves in the Sibun Valley of central Belize, which may refer to these kinds of agrarian rites.

Maya environmental worldview is clearly embedded in agricultural ritual (see McAnany 1995, pp. 64-110; see also Taube 2003). The underlying premise is that landscapes are animated by ancestral spirits who must be consulted or placated to produce crops, just as the Hero Twins had done. For the contemporary highland Maya of Chiapas, Mexico, Evon Vogt (1976, p. 56) writes that agricultural field rituals represent reciprocal transactions between the Maya and the Earth Lord, Yahval Balamil, or "owner of the earth," who must be compensated "for incursions into and utilization of materials from his domain." In agrarian rituals, "compensation has concrete meaning: only with appropriate offerings will the Earth Lord permit sufficient rain to fall on the crops and control destructive winds" (Vogt 1976, p. 57). Robert Redfield (1932, pp. 304-306) argued for a similar relationship between the Maya and the earth in northern Yucatan, noting that humans must appease the *aluxes*, or spirits of the fields, with offerings of food and drink, or else the spirits might bring harm to the crops or community.

If human interactions with soils were mediated by deities and ancestors, then we might expect to find that the ways in which the Maya conceived of soil were linked to broader themes in their belief system. For example, several of the contemporary folk soil taxonomies discussed earlier classify soils according to color, principally yellow, red, white, and black. According to Landa (Tozzer 1941, p. 137), these

specific colors have directional associations, which are probably associated with the path of the rising and setting sun and zenith and nadir (Vogt 1992, p. 118); yellow (*kan*) is associated with the south (*kimi*), red (*chac*) with east (*chuwen*), white (*sac*) with north (*kib'*), and black (*ek*) with west (*imix*). Each color is also associated with a deity in Maya religion: *kan* (yellow), *chaak* (red), *sacal* (white), and *hosan-ek* (black). These links are not always clear and appear to vary somewhat from region to region. Still, from the perspective of the early Colonial sources, soil was understood and classified in the same terms as other nonmaterial phenomena.

Of these soil/color associations, Landa (Tozzer 1941, pp. 18, 171) only specifically mentions “*sac cab*,” which he describes as “white earth, excellent for buildings.” However, he notes that soil and clay were used for certain religious ceremonies:





The priest gave incense prepared beforehand for the host, who burned it in the brazier, and so they say the evil spirit fled away. This done, with their accustomed devotion they appointed the first step of the heap of stones with mud from the well, and the other steps with a blue paste, and they scattered smoke from the incense many times, and invoked the Chacs and Itzamna... (Tozzer 1941, p. 164)

Beyond Landa’s report, early Colonial Mayan/Spanish dictionaries provide entries for “soil” and related concepts in the Yucatec Mayan language. Two Yucatec Mayan vocabularies mention “soil,” namely the *Calepino Maya de Motul* (referred to as the “Motul dictionary,” authored in ca. 1580-1614) and the *Bocabulario de Maya Than* (also known as the “Vienna dictionary,” written in ca. 1570s). In addition to the “white earth” described by Landa (appearing in the dictionaries as *zahcab*, *zac cab*, *zacab*, *zah cab*, and *zazcab*), the Vienna Spanish/Mayan dictionary (Acuña 1993) lists *puz kan luum*, which can be translated as “dry yellow earth.” The Motul Mayan/Spanish dictionary (Acuña 1984) similarly lists *puz luum*, but without the color referent: “tierra seca sin piedras” (dry earth without rocks). This soil type contrasts with *yax-cab* (“green earth” or “fresh earth”), mentioned in the *Popol Vuh* (as *rax ulew*, “green [or raw] earth; Tedlock 1996, pp. 116, 272) and the late 18th-century manuscript, *Ritual of the Bacabs* (Roys 1965, p. 127), a Yucatec Maya book of incantations. Comparisons between soils and colors most likely represent continuations of these ideas and observations from prehispanic times, as such associations were explicitly made in the Madrid Codex (Folios 24c-25c, 27c-28c, 35, 36, 58c-62c) and the Dresden Codex (Folios 65b-69b, 74) (Vail and Hernández 2005).

Other entries provide descriptions for soils rather than formal soil types. For instance, the Motul dictionary lists *akacnac luum* as “moist earth” (Bolles 2001, p. 30v), and the *Ritual of the Bacabs* describes *yax-kax* as “a certain soil between red and black” (Roys 1965, p. 127). The Motul dictionary additionally lists the phrase *ah took chuk kab*, transcribed as “he of the burnt charcoal earth” (Clark and Houston 1998, p. 44), which probably refers to an individual who makes lime for plaster. Contemporary Itza Maya also use the phrase *lu’um ma’lo*, or “good land,” (Hofling 1991, p. 201) as it is used in the following: *a’ ek=lu’um-ej, jach ma’lo’ ti’ij päk’-aJ-al*, “The black earth is good for planting” (Hofling 1997, p. 237).

While there are various ways of describing soil using color and other properties, the Maya appear to have been careful in distinguishing soils based on attributes of cohesion and adhesion, or consistency. Table 19.1 shows the hieroglyphs used to

Table 19.1 Examples of Classic Maya Hieroglyphs Denoting Soil Concepts

| Glyph ¹ | Transcription ² | Meaning | Reference |
|---|-------------------------------------|---------|---|
|  | KAB' (<i>kab'</i>) | earth | Stuart 2005 |
|  | lu-mi (<i>lum</i>) | soil | Lacadena and Wichmann 2004, Houston et al. 1998 |
|  | lu-k'u (<i>luk'</i>) | mud | Lacadena and Wichmann 2004, Houston et al. 1998 |
|  | tz'i-ku (<i>tz'iik</i>) | clay | Houston et al. 1998 |

¹adapted from entries in Montgomery (2002) and Boot (2005)

²typeface in bold indicates hieroglyphic spellings, typeface in italics represents transcriptions

note the general concept of earth or land (*kab'*), compared to the more specific ideas of soil (*lum*), mud (*luk'*), and clay (*tz'iik*). These differences suggest that the amount of moisture, or perhaps more specifically of stickiness and plasticity, was of signal importance to the Maya for distinguishing soils and their utility.

The specific ways in which soils are discussed, both by Landa and by the Maya themselves, suggest that the Maya drew on their worldview (manifest in creation stories and other parables of existence) to understand and describe the physical universe around them and to help make decisions about how to use their environment. This is perhaps most evident in the blending of colors, directions, and gods for classifying soils. Given that the early Colonial sources also attest to certain soils or sediments being used in particular ceremonial practices suggests that earth materials played a role in activating and expressing—and possibly altering—that worldview. This would seem to indicate that, in certain instances, soils had as much agency as humans.

19.6 Toward a Holistic Approach for Understanding Maya Soils

In this chapter we have considered some of the ways that aspects of Maya worldview intersected with soil knowledge, complementing the work of Nicholas Saunders (2004) who has considered the relationship between minerals and the

cosmos among various groups throughout the Americas. Our approach has been partly as an extension of, and partly as a reaction to, the insightful essay by Verena Winiwarter and Winifred Blum in *Footprints in the Soil* (2006). Winiwarter and Blum consider the role of soils in belief systems through an historical and cross-cultural survey of worldviews in small-scale and pre-industrial societies. They observe that, in such societies, soils are often conceptualized as part of a world that is controlled by invisible beings representing ancestors, spirits, and other “higher, unseen powers” (Winiwarter and Blum 2006, p. 108). While soils have “immaterial qualities, they were—to some extent—objects of religious reverence and corresponding ritual practices to ensure their sustained fertility existed” (Winiwarter and Blum 2006, p. 108).

Here we have pursued this idea—of “souls and soils,” as Winiwarter and Blum phrase it—among the ancient Maya of southern Mesoamerica. However, we have departed from the notion that premodern societies perceived soils as “objects” and instead have shown how soils were often viewed as active cultural agents that contributed to fashioning and fixing worldview, values, and beliefs. The contemporary Maya, like many of the cultures discussed by Winiwarter and Blum, hold pantheistic beliefs about the biophysical environment (Vogt 1969, pp. 297-306). Such beliefs perceive cultivated soils as animate—inhabited by ancestors that demand supplication and recompense (Vogt 1969, pp. 455-461). This notion, which situates humans as a part of (not apart from) nature, encourages a high degree of mutualism between people and their environments. Decisions that impact the landscape thus represent consensus between terrestrial and celestial beings, both of which have legitimate environmental agency (*e.g.*, Wells and Davis-Salazar 2008). In this way, people and soil interact in highly complex ways that draw on worldview to make sense of these relations and to guide future actions, which, in turn, may change worldview.

The holistic approach we have taken leads us to consider soils as active participants in human processes of meaning making. Such a perspective suggests that a broader concept for soils is needed for understanding both the material and spiritual aspects of soil use and management. The concept of “cultural soilscape” which can be defined most broadly as “a given area of the earth’s surface that is the result of spatially and temporally variable geomorphic, pedogenic, and *cultural* processes” (Wells 2006, p. 125, emphasis ours) is useful because it views soil as a physical embodiment of human-environmental interactions. The cultural soilscape is an analytical domain that reveals for study the “complex and multilayered dialectic between human behavior and soil bodies over long periods” (Wells 2006, p. 125) and emphasizes the social and historical frameworks that have shaped soil bodies. For instance, Jonathan Sandor (1987, 1992; Sandor and Gersper 1988; Sandor et al. 1986) has studied cultural alterations to soilscares in the form of agricultural terraces. Sandor (2006, p. 521) argues that “the placement, construction, and soil characteristics of agricultural terraces are the physical manifestations of what cultures have learned in working with their environments.” Thus, agricultural terraces are cultural soilscares because they manifest worldview and belief and also structure and organize the built environment in which human societies operate.

Because of the close connection between people and their environments, environmental worldview and local knowledge are central to investigating cultural soilscares (see Sandor et al. 2006). For the ancient Maya, reciprocity between humans and ancestors was a fundamental principle guiding human/soil interactions. Reciprocal relations informed by a worldview that placed soil partially in the domain of gods and partially in the domain of humans conditioned the possibilities for soil use and change over time.

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References

- Acuña R (ed) (1993) *Bocabulario de Maya Than [Vocabulary of Than Maya]*. Universidad Nacional Autónoma de México, Mexico, DF.
- Acuña R (ed) (1984) *Calepino Maya de Motul [Maya dictionary of Motul]*. Universidad Nacional Autónoma de México, Mexico, DF.
- Barrera-Bassols N, Toledo VM (2005) Ethnoecology of the Yucatec Maya: Symbolism, knowledge and management of natural resources. *Journal of Latin American Geography* 4:9–41.
- Barrera-Bassols N, Zinck JA (2000) *Ethnopedology in a worldwide perspective: An annotated bibliography*. International Institute for Aerospace Survey and Earth Sciences, Enschede, The Netherlands.
- Beach T, Luzzadder-Beach S, Dunning NP (2006) A soils history of Mesoamerica and the Caribbean Islands. In: McNeill JR, Winiwarter V (eds) *Soils and societies: Perspectives from environmental history*. White Horse Press, Isle of Harris, UK, pp. 51–90.
- Bolles D (2001) Combined Dictionary–Concordance of the Yucatecan Mayan Language. Foundation for the Advancement of Mesoamerican Studies, Crystal River, Florida. <http://www.famsi.org/reports/96072>. Cited 10 Sep 2008.
- Boot E (2005) A preliminary overview of common and uncommon Classic Maya vessel type collections in the primary standard sequence. <http://www.mayavase.com>. Cited 10 Sep 2008.
- Carter WE (1969) *New lands and old traditions: Kekchi cultivators in the Guatemalan lowlands*. University Press of Florida, Gainesville.
- Clark JE, Houston SD (1998) Craft specialization, gender, and personhood among the post-conquest Maya of Yucatan, Mexico. In: Costin CL, Wright RP (eds) *Craft and social identity*. American Anthropological Association, Arlington, Virginia, pp. 31–46.
- Coe MD (2005) *The Maya*. Seventh edition. Thames and Hudson, New York.
- Craine ER, Reindorp RC (1979) *The Codex Pérez and the Book of Chilam Balam of Maní*. University of Oklahoma Press, Norman.
- Dunning NP (1992a) *Lords of the hills: Ancient Maya settlement in the Puuc region, Yucatán, Mexico*. Prehistory Press, Madison, Wisconsin.
- Dunning NP (1992b) The implications of soil folk taxonomies for agricultural change in Middle America. *Yearbook, Conference of Latin American Geographers* 17/18:243–247.
- Dunning NP, Beach T (2000) Stability and instability in prehispanic Maya landscapes. In: Lentz DL (ed) *Imperfect balance: Landscape transformations in the Precolumbian Americas*. Columbia University Press, New York, pp. 179–202.

- Dunning NP, Beach T (2004) Fruit of the *lu'um*: Lowland Maya soil knowledge and agricultural practices. *Mono y Conejo* 2:1–25.
- Dunning NP, Beach T, Farrell P, Luzzadder-Beach S (1998) Prehispanic agrosystems and adaptive regions in the Maya lowlands. *Culture and Agriculture* 20:87–101.
- Ewell PT, Merrill-Sands D (1987) Milpa in Yucatan: A long-fallow maize system and its alternatives in the Maya peasant economy. In: Turner BL, Brush S (eds) *Comparative farming systems*. Guilford, New York, pp. 95–129.
- Farriss NM (1984) *Maya society under Colonial rule*. Princeton University Press, Princeton, New Jersey.
- Faust BB (1998) *Mexican rural development and the plumed serpent: Technology and Maya cosmology in the tropical forest of Campeche, Mexico*. Bergin and Garvey, Westport, Connecticut.
- Fedick SL (ed) (1996) *The managed mosaic: Ancient Maya agricultural and resource use*. University of Utah Press, Salt Lake City.
- Flannery KV (ed) (1982) *Maya subsistence: Studies in memory of Dennis R. Puleston*. Academic Press, New York.
- Freidel D, Schele L, Parker J (1993) *Maya cosmos: Three thousand years on the shaman's path*. William Morrow and Company, New York.
- Furley PA (1974) Soil-slope-plant relationships in the northern Maya Mountains, Belize, Central America: I. The sequence over metamorphic sandstones and shales. II. The sequence over phyllites and granites. III. Variations in the properties of soil profiles. *Journal of Biogeography* 1:171-186, 1:263-279, 3:303-319.
- Graefe S (2003) Crop and soil variability in traditional and modern Mayan maize cultivation of Yucatan, Mexico. *Journal of Agriculture and Rural Development in the Tropics and Subtropics*. Beiheft No. 75. Kassel University Press, Kassel, Germany.
- Harrison PD, Turner BL (eds) (1978) *Pre-Hispanic Maya agriculture*. University of New Mexico Press, Albuquerque.
- Hofling CA (1991) *Itzá Maya texts*. University of Utah Press, Salt Lake City.
- Hofling CA (1997) *Itzaj Maya-Spanish-English Dictionary*. University of Utah Press, Salt Lake City.
- Houston S, Stuart D, Robertson J (1998) Disharmony in Maya hieroglyphic writing: Linguistic change and continuity in Classic society. In: Ciudad Ruiz A, Fernández Marquín Y, García Campillo JM, Iglesias Ponce de León MJ, Lacadena García-Gallo A, Sanz Castro LT (eds) *Anatomía de una civilización: Aproximaciones interdisciplinarias a la cultura maya [Anatomy of a civilization: interdisciplinary approaches to Maya culture]*. Sociedad Española de Estudios Mayas, Madrid, Spain, pp. 275–296.
- Jensen CT, Moriarty MD, Johnson KD, Terry RE, Emery KF, Nelson SD (2007) Soil resources of the Motul de San José Maya: Correlating soil taxonomy and modern Itzá Maya soil classification within a Classic Maya archaeological zone. In: Wells EC, Terry RE (eds) *Advances in geoarchaeological approaches to anthrosol chemistry, part I: Agriculture. Geoarchaeology: An International Journal* 22:337–357.
- Lacadena A, Wichmann S (2004) On the representation of the glottal stop in Maya writing. In: Wichmann S (ed) *The linguistics of Maya writing*. University of Utah Press, Salt Lake City, pp. 100–164.
- McAnany PA (1995) *Living with the ancestors: Kinship and kingship in ancient Maya society*. University of Texas Press, Austin.
- McAnany PA, Berry KA, Thomas BS (2003) Wetlands, rivers, and caves: Agricultural and ritual practice in two lowland Maya landscapes. In: Iannone G, Connell SV (eds) *Perspectives on ancient Maya rural complexity*. Cotsen Institute of Archaeology, University of California, Los Angeles, pp. 71–81.
- Montgomery J (2002) *Dictionary of Maya hieroglyphs*. Hippocrene Books, New York.
- Redfield R (1932) Maya archaeology as the Mayas see it. *Sociologus* 8:299–309.
- Redfield R, Villa-Rojas A (1934) *Chan Kom: A Maya village*. Publication 448. Carnegie Institution, Washington, DC.

- Roys RL (1965) *Ritual of the bacabs: A book of Maya incantations*. University of Oklahoma Press, Norman.
- Sandor JA (1987) Initial investigation of soils in agricultural terraces in the Colca Valley, Peru. In: Denevan WM, Mathewson K, Knapp G (eds) *Pre-Hispanic agricultural terraces in the Andean region*. British Archaeological Reports, International Series 359(1):163–192.
- Sandor JA (1992) Long-term effects of prehistoric agriculture on soils: Examples from New Mexico and Peru. In: Holliday VT (ed) *Soils in archaeology: Landscapes evolution and human occupation*. Smithsonian Institution Press, Washington, DC, pp. 217–245.
- Sandor JA (2006) Ancient agricultural terraces and soils. In: Warkentin BP (ed) *Footprints in the soil: People and ideas in soil history*. Elsevier, Amsterdam, The Netherlands, pp. 505–534.
- Sandor JA, Gersper PL (1988) Evaluation of soil fertility in some prehistoric agricultural terraces in New Mexico. *Agronomy Journal* 80:846–850.
- Sandor JA, Gersper PL, Hawley JW (1986) Soils at prehistoric agricultural terracing sites in New Mexico: I. Site placement, soil morphology, and classification. II. Organic matter and bulk density changes. III. Phosphorus, selected micronutrients, and pH. *Soil Science Society of America Journal* 50:166–180.
- Sandor JA, WinklerPrins AMGA, Barrera-Bassols N, Zinck JA (2006) The heritage of soil knowledge among the world's cultures. In: Warkentin BP (ed) *Footprints in the soil: People and ideas in soil history*. Elsevier, Amsterdam, The Netherlands, pp. 43–84.
- Saunders, NJ (2004) The cosmic Earth: Materiality and mineralogy in the Americas. In: Boivan N, Owoc MA (eds) *Soils, stones and symbols: Cultural perceptions of the mineral world*. University College London Press, London, pp. 123–141.
- Stuart D (2005) *Sourcebook for the 29th Maya hieroglyph forum*, March 11–16, 2005. Department of Art and Art History, University of Texas, Austin.
- Taube K (1993) *Aztec and Maya myths*. British Museum Press, London.
- Taube K (2003) Ancient and contemporary Maya conceptions about field and forest. In: Gómez-Pompa A, Allen MF, Fedick SE, Jiménez-Osornio JJ (eds) *The lowland Maya area: Three millennia at the human-wildland interface*. Ford Products Press, New York, pp. 461–492.
- Tedlock D (1996) *Popol Vuh: The Mayan book of the dawn of life*. Simon and Schuster, New York.
- Terán S, Rasmussen C (1994) *La milpa de los mayas: La agricultura de los mayas prehispánicos y actuales en el noroeste de Yucatán [The milpa of the Maya: Agriculture of the prehispanic and modern Maya of northwest Yucatán]*. Daanish International Development Agency, Mérida, Yucatán, México.
- Thompson JES (1970) *Maya history and religion*. University of Oklahoma Press, Norman.
- Tozzer AM (1941) *Landa's Relación de las cosas de Yucatan: A translation*. Peabody Museum of American Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts.
- Vail G, Bricker VR (2004) Haab dates in the Madrid Codex. In: Vail G, Aveni A (eds) *The Madrid Codex: New approaches to understanding an ancient Maya manuscript*. University Press of Colorado, Boulder, pp. 171–214.
- Vail G, Hernández C (2005) The Maya Hieroglyphic Codices, Version 2.0. <http://www.mayacodices.org>. Cited 10 Sep 2008.
- Villacorta JA, Villacorta CA (1976 [1930]) *Códices mayas [Maya codices]*. Tipografía Nacional, Guatemala.
- Vogt EZ (1969) *Zinacantan: A Maya community in the highlands of Chiapas*. Harvard University Press, Cambridge, Massachusetts.
- Vogt EZ (1976) *Tortillas for the gods*. Harvard University Press, Cambridge, Massachusetts.
- Vogt EZ (1992) Cardinal directions in Mayan and Southwestern Indian cosmology. In: Esponda Jimeno VM, Pincemin Deliberos S, Rosas Kifuri M (eds) *Antropología Mesoamericana: Homenaje a Alfonso Villa Rojas [Mesoamerican anthropology: Homage to Alfonso Villa Rojas]*. Consejo Estatal de fomento a la Investigación y Difusión de la Cultura, Chiapas, Mexico, pp. 105–127.
- Wells EC (2006) Cultural soils. In: Frossard E, Blum WEH, Warkentin BP (eds) *Function of soils for human societies and the environment*. Geological Society, London, pp. 125–132.

- Wells EC, Davis-Salazar KL (2008) Environmental worldview and ritual economy among the Lenca of Honduras. In: Wells EC, McAnany PA (eds) *Dimensions of ritual economy*. Research in Economic Anthropology, Vol. 27. Emerald Group Publishing Limited, Bingley, UK, pp. 189–217.
- Wilk RR (1981) *Agriculture, ecology, and domestic organization among the Kekchi Maya*. Doctoral dissertation, Department of Anthropology, University of Arizona, Tucson. University microfilms, Ann Arbor, Michigan.
- Williams BJ (2006) Aztec soil knowledge: Classes, management, and ecology. In: Warkentin BP (ed) *Footprints in the soil: People and ideas in soil history*. Elsevier, Amsterdam, The Netherlands, pp. 17–41.
- Williams BJ, Ortiz-Solorio CA (1981) Middle American folk soil taxonomy. *Annals of the Association of American Geographers* 71:335–358.
- Wilshusen RH, Stone GD (1990) An ethnoarchaeological perspective on soils. *World Archaeology* 22:104–114.
- Winiwarter V, Blum WEH (2006) Souls and soils: A survey of worldviews. In: Warkentin BP (ed) *Footprints in the soil: People and ideas in soil history*. Elsevier, Amsterdam, The Netherlands, pp. 107–122.
- WinklerPrins AMGA, Barrera-Bassols N (2004) Latin American ethnopedology: A vision of its past, present, and future. *Agriculture and Human Values* 21:139–156.