CHAPTER 3

Valuing Local and Indigenous Communities as Key Stakeholders in Forest Management and Conservation

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Exploring Solutions Past: The Maya Forest Alliance, USA

Abstract

It is no accident that the dominant Maya forest plants are all useful. Generations, centuries, and millennia of occupation by the ancient Maya have created a managed mosaic landscape. Today, there are tenacious Maya farmers who maintain forest gardens based on rich traditional knowledge creating the most diverse domestic system in the world. Understanding the value of the Maya farmers and the knowledge of the traditional smallholders is a requisite for conservation designs for the future, one that we are applying directly at the El Pilar Archaeological Reserve for Maya Flora and Fauna of Belize and Guatemala. The revolutionary practice of *Archaeology Under the Canopy* safeguards ancient monuments from erosion-causing elements, preserves the ecology of the surrounding Maya forest garden, and reveals structures within their natural forest garden context. Heterogeneous and biodiverse, forest gardens constituted the strength of the Maya community in the past, relying on the traditional knowledge of local farming households. Today, Maya forest gardeners' intimate knowledge of their landscape is a model of a sustainable co-creative process between people and their environment that can provide inspiration for people all over our planet.

Resumen

No es accidental que todas las plantas dominantes del selva maya sean útiles. Las generaciones de sabios mayas que ocuparon la zona durante siglos y milenios lograron crear un paisaje en mosaico muy bien distribuido. En la actualidad, existen tenaces campesinos mayas que mantienen jardines forestales gracias a su vasto conocimiento de las tradiciones, creando así el sistema doméstico más diverso del mundo. Entender el valor de estos productores y la destreza de los pequeños agricultores tradicionales es un requisito para los diseños conservacionistas del futuro, mismo que se cumple directamente en la Reserva Arqueológica El Pilar para Flora y Fauna Mayas de Belice y Guatemala. La práctica revolucionaria de *arqueología bajo el dosel* protege los monumentos ancestrales de los agentes erosivos, preserva la ecología de los jardines circundantes del bosque maya y revela estructuras dentro del mismo contexto de jardín forestal natural. Por su naturaleza heterogénea y biodiversa, los jardines forestales solían ser el pilar de la comunidad maya en el pasado, ya que giraban en torno a la erudición tradicional de las familias de agricultores locales. Hoy en día, el conocimiento exhaustivo que tienen los jardineros forestales mayas de su propio paisaje forma el modelo de un proceso sostenible donde hay creación mutua entre la comunidad y su entorno, una inspiración para la población de todo el planeta.

Valuing the Maya Forest as a Garden

Inspiration for the Forest and the Maya

Meso-America and the Maya forest have been recognized as a conservation hotspot. With more than 24,000 plants, it is the most biodiverse tropical forest in the Northern Hemisphere (Table 1). Dominated by plants that are useful to people (Table 2), it should come as no surprise that the Maya forest is in fact a garden. And how did it become this veritable garden? This quality could only be achieved by a millennia of selection by its human inhabitants. This obvious conclusion has been corroborated by studies that show that, from the tallest trees down to the smallest shrubs and herbs, the forest's qualities reflect uses that are still commonly known to the region's traditional families. Furthermore, the active gardens found around Maya forest villagers' homes show that it is the most diverse domestic system in the world (Campbell, 2007). After the great Columbian Exchange, today the variety of plants of Maya home gardens are a bewildering array of fruits, wood, spices, fodder, medicine, ornamentals and more that draw from every continent on Earth. This inspiring evidence of selection and enrichment is a fundamental part of the forest and the Maya people.

Region	Plant Diversity
West Africa	9,000
South-East Asia	12,000
Meso-America	24,000
Amazon	48,000

Table 1. Tropical Biodiversity Hotspots (Mittermeier, 2000)

Over the course of 12,000 years of habitation in Meso-America, populations expanded along the coast and overland from the Asian continent, bringing with them stone tool manufacture and fire management skills. Native Americans's expertise lies in sophisticated simplicity, and their competence and knowledge accumulated over time are fundamental to their adaptations (see Anderson, 2005). They expanded rapidly from the Arctic Circle to Tierra del Fuego as hunter-gatherers, dispersing across the continents in about 2,000 years (Figure 1). During the time that these early migrants established themselves in the Americas, they constantly had to adjust to the changing

Scientific Name	Common Name	Pollinator	Uses
Alseis yucatanensis	wild mamey	moths	food
Aspidosperma cruentum	malerio	insects	construction
Attalea cohune *	corozo	insects	food
*Brosimum alicastrum**	ramon	wind	food
*Bursera simarouba**	chaca	bees	medicine
Cryosophila stauracantha	escoba	beetles	production
Licania platypus	succotz	moths	food
Lonchocarpus castilloi	manchich	insects	construction
*Manilkara zapota**	chicle	bats	food
Piscidia piscipula	jabin	bees	poison
Pouteria campechian	zapotillo	insects	food
Pouteria reticulata	zapote negro	insects	food
*Sabal morrisiana**	escoba	insects	production
*Simira salvadorensi**	palo colorado	moths	construction
Spondias radlkoferi	jocote	insects	food
Swietenia macrophylla	mahogany	insects	construction
Tabebuia rosea	macuelizo	bees	construction
*Talisia oliviformi**	kinep	bees	food
Vitex gaumeri	yaxnik	bats	construction
Zuelania guidonia	tamay	bees	medicine

Table 2. Dominant Plants of the Maya Forest. * Dominant in home gardens.

climatic conditions that ranged from the cold Ice Age to the warm Holocene Thermal Maximum. It was not until around 8,000 years ago that the warm wet tropical forest conditions we are familiar with dominated the lowlands of Meso-America.

The rich tropical Maya forest landscape is like a cloak over a limestone foundation that has an impact on water distribution, soil formations, plant habitat and animal dispersal. While the origins of the tropical forest are traced to the Mid-Holocene, the structure of the habitats was established by its geological substrate. While averaging 1,000 to 2,000 mm rainfall annually, today surface water remains unpredictable across most of the Maya forest. Porous and fractured, water is drawn into underground rivers and caves, opening as lakes in the south and cenotes in the north, and moving as rivers in the south-east and south-west. These factors had an impact on the earliest mobile ancestors who came into an arid and cold environment around 10,000 years ago before the warm wet period of the Holocene Thermal Maximum (8,000 to 4,000 years ago) (Ford and Nigh, 2014). The

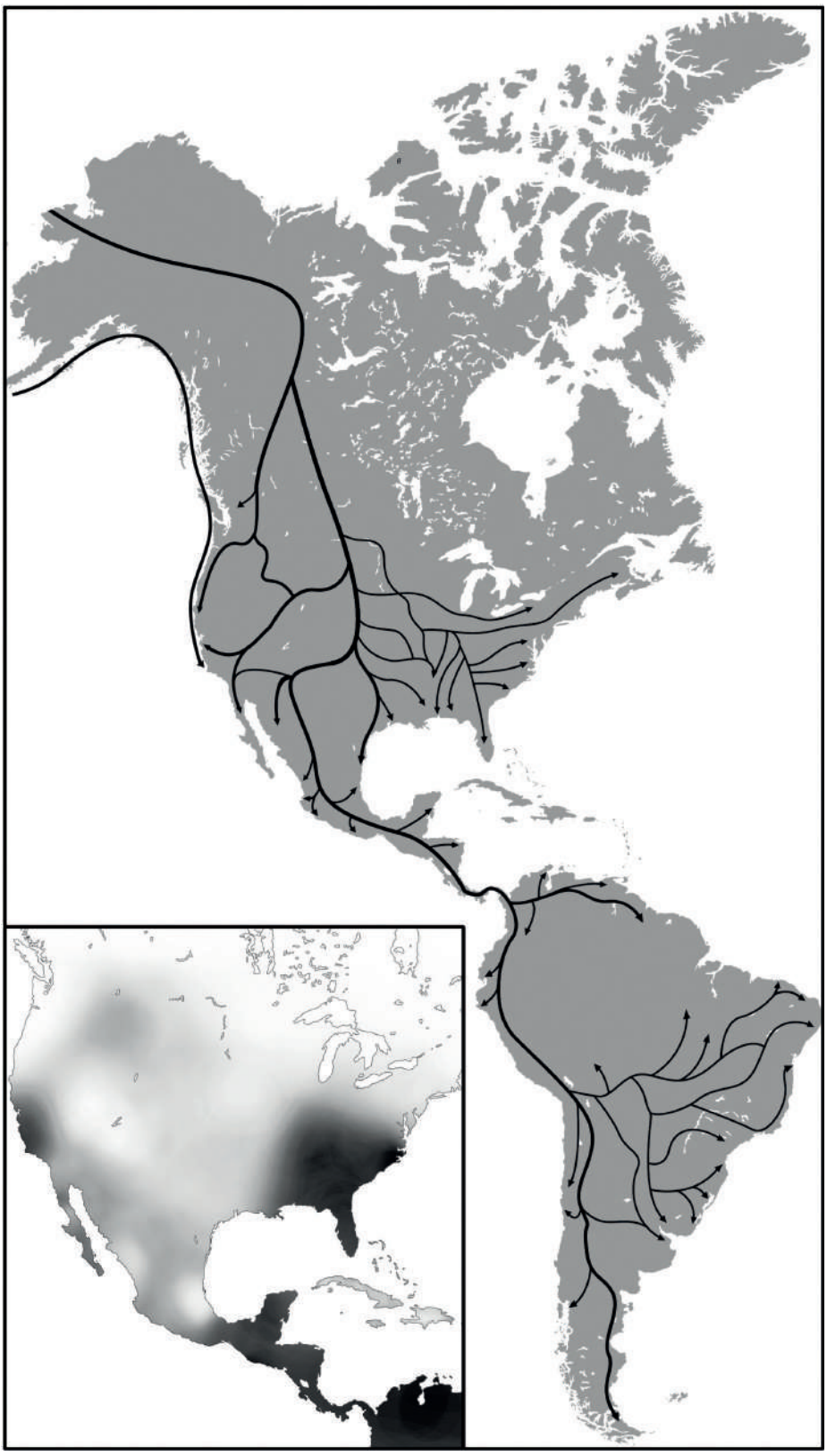

Figure 1. Populating the Americas more than 12,000 years ago. Inset of proposed distribution after 2,000 years of occupation (according to Steele et al., 1998). © MesoAmerican Research Center, UCSB.

woodlands we now know as the Maya forest were shaped by the change from temperate to tropical and this can be seen in the fossil pollen cores with the burst of *Brosimum* type pollen (Figure 2). These changes transpired in the context of human occupation. Thus, while the forest expressed its nature, it was influenced from the start by humans. Today, the Maya forest is threatened as a result of this dynamic interaction between humans and the environment.

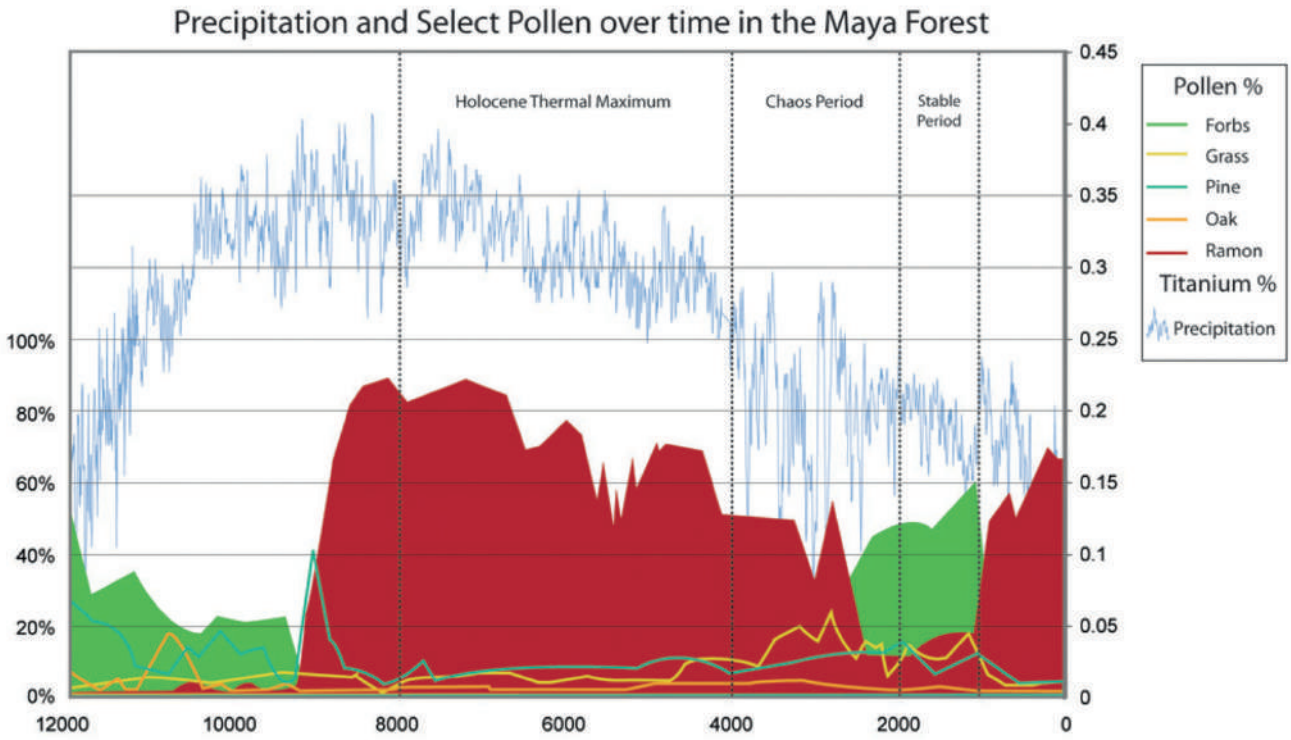

Figure 2. Relationship between precipitation and pollen in the Maya forest over 12,000 years. © MesoAmerican Research Center, UCSB.

As we look at the relationship between the ancient Maya settlements at the peak of the Classic Period within the tropical woodland environment (Ford and Nigh, 2015), we recognize strong relationships between forest qualities and Maya residential patterns. The same factors are on display in the traditional, high performance milpa and forest-garden cycle that are still practised among tenacious traditionalists and can be seen in the relics of the ancient Maya settlements (Hernández Xolocotzl et al., 1995; Nigh and Deitmont, 2013; Schwartz and Márquez, 2015; Terán and Rasmussen, 1995). Preferring the hills and ridges of the uplands, the numbers of ancient domestic remains are greatest in the well-drained undulating zones (Ford and Clarke, 2016). This is where farmers first settled, where later civic centres emerged (Figure 3) and where the largest and most long-lived ancient residential units can be found (see Robin, 2012). These rolling hills with friable, but shallow and rocky soil are some of the most fertile of the tropical world, and are perfect for being cultivated by hand, as Maya farmers farm (Fedick and Ford, 1990). Farming of the hills preceded the development of civic centres and the hallmarks of Maya civilization, and these hills were where the farmers continued to live after the demise of the centres (Ford and Nigh, 2015). These lands, preferred by Maya farmers, were not arable and are strictly inappropriate for the plough. This is a critical fact in understanding Maya settlement patterns.

With one of the world's most treasured tropical forests, what are we doing to honour this Maya forest landscape? Very little. Ecological imperialism, in which Western and European views eschew the milpa cycle as primitive and destructive without examination, blindly follows Western European objectives, without concern or consideration for local practice (see Cosby, 1986). Ignoring the importance of the milpa forest-garden cycle has a long 500-year history, beginning with the

Figure 3. Central Maya Lowlands with El Pilar and Major Centres indicated. © MesoAmerican Research Center UCSB.

cataclysmic Spanish conquest that brought the first European notions to the Maya forest. The 1552 Viceroy Ordinance gives a glimpse of Spanish impact on the lives of the Maya:

> *… se prohibió la presencia de monte dentro espacios urbanos, que todos los pueblos se poblasen al modo de los españoles, [sin milpas en el pueblo] afín que estuviesen limpios, sin sementeras ni arboledas, y si algunas habían se quemasen (Yam, 2009 quoting from the 1552 ordinance issued by Tomás Lopez Medel)*

> *… having forests in urban spaces is prohibited, all the towns will construct houses the way the Spaniards do [close to one another] … [They should not sow any milpa within the town] so that all urban spaces be clean, without sown land or groves; and if there were any, they should be burnt. (Translation based on Roys, 1952).*

From this Royal Spanish law, we can tell that people lived spread out from one another, similar to preferences today, in towns where houses were on pieces of land that included milpa fields and orchards. Houses were spaced out to provide in-field

home gardens and a varied landscape of open patios, diverse maize dominated fields and orchards with an array of useful trees, weaving together utility and biodiversity. This living landscape of the Maya forest provides for basic household needs at the same time as conserving soil and water, which are fundamental to everyday life (Ford and Nigh, 2015, pp. 52-64). The prevalence of ecological imperialism continues to push the region's development from a European perspective, subsidizing large monocrop farming strategies that threaten the Maya forest instead of diverse smallholder designs that have evolved in the context of the forest (Ford and Nigh, 2015). Would it not be valuable to look at what has worked? What is preventing us? We now have the opportunity to ask and discuss.

Links from the Present to the Past

Strangely, the records of the Spanish at the time of the conquest and colonization are clear about Maya land use—forest and fields filled the landscape, edible foods lists were extensive and home gardens were complex. Today, however, the links of the

Figure 4. Milpa cycle with forest landscape dynamic from forest to open field to forest again. © Kippy Nigh.

present milpa cycle to the ancient past are denied. Economic botany has brought attention to the important uses of the Maya forest based on local knowledge, and agroforestry has demonstrated the sophistication of the milpa forest-garden cycle (Figure 4). It is these observations and studies that are the most fertile sources of the linkage that allow us to consider how the Maya milpa cycle supported the dense populations of the past and has the potential to contribute to its conservation in the future (Caballero, 1992; Campbell et al., 2006; Ford, 2008; Netting, 1977; Ross, 2011; Schwartz and Márquez, 2015).

The nature of settlement and the connection to the agricultural system is a starting point for farmers. Maya farmers, like subsistence farmers throughout the world, maintain a primary home base along with several secondary bases that benefit different fieldwork areas developed to hedge the uncertainties of weather and crops (Zetina and Faust, 2011). Known as the home infield, the home base operates as the core related to multiple secondary outfields (Netting, 1989). With annual variability in precipitation, as well as how the annual cycle of precipitation might be delivered, farmers today, and certainly in the past, favour established locales for their intensive labour investment and dispersed areas to improve the production challenges of too much or too little rain (Conklin, 1954). This system builds food sovereignty for the farmer.

This infield-outfield pattern of land use contributes to a complex landscape that sequences from forest to field and back to forest again with each family, generation, century and millennial cycle. Working within the environmental system and intervening in the succesion process (see Chazdon, 2014), the Maya agricultural cycle became integral to the forest. Built on a 20 to 30-year cycle, the Maya milpa cycle mirrors the succession process to direct or stock the production of the landscape to its own ends: the forest gap becomes the diverse cropped milpa field, the early succession becomes devoted to building useful perennials and with the early investment in the perennials, the culminating field becomes an orchard of valuable fruit, spice and construction trees that make up the structure of the forest canopy. It was not a compromise. The fields cycled into forests creating the opportunity to manipulate the plant species to the benefit of the Maya, leaving at least half the area as managed forests (Ford and Nigh, 2015, pp. 146-147). In fact, the Maya could not fight the exuberant growth of the forest. They devised an agricultural system that anticipated, selected and managed that growth. This was the orchard of ancestors that Pakal, the ruler of ancient Palenque, refers to on his sarcophagus (Schele and Matthews, 1998).

The Milpa Cycle: from Field to Forest and Field Again

Milpa, broadly classified as swidden or shifting cultivation, as with other similar systems around the tropical world (Conklin, 1954), is gravely misunderstood. This is not unique and can be seen in worldwide examples from the Philippines, South-East Asia, to East Africa to the Amazon (Viera et al., 2009). Disparagingly called slash and burn, it has been referred to as simple, damaging and unproductive.

From the ecological imperialist's perspective, it is shifting agriculture based on the locations of open cropped fields (Snook and Capitanio, 2012). The investments in the perennial components of the system that direct succession towards the forest-garden are ignored and areas without crops are described as abandoned or worse, fallow (borrowed from arable systems where a ploughed field is left unseeded for a 'rest'). The Maya forest-garden is an intensive perennial system. These so-called abandoned fields are areas of significant investment to build the economic needs of a family, community, area and region. These perennial 'fields' are the source of products used for food, construction, medicine and as a habitat for animals that all contribute to the well-being of the inhabitants (Roys, 1931). In fact, for every four-year field, there needs to be at least 12 to 16 years of perennial management (Ford and Nigh, 2015, pp. 46-47). Far from abandoned, these dynamic spaces represent intensive investments over time and across space, providing the source of the vital requirements of everyday life.

The cycle is far from primitive or destructive. European prejudice assumes that to produce more food, one needs more fields (see Malthus, 1978). The Maya cycling system is one where lands are developed by labour mediated with practical skill and inherited knowledge, often leaving no physical trace of the investment (Hernández Xolocotzl et al., 1995; Terán and Rasmussen, 2009). With skill and knowledge, labour can be invested to produce domestic requisites. Maya poly-cultivation practices highlight diversity, which prevails in the tropics. This diversity not only applies to food, but to all materials, supplies and necessities of life. This embedded system developed as an integral complement of the forest in a dynamic depending on labour investment (Ford and Nigh 2015, pp. 121-122), where only 12 to 15% of the landscape would be in open forest gap fields while the remaining 50 to 60% of the landscape would be forest managed for essential household uses (Figure 5).

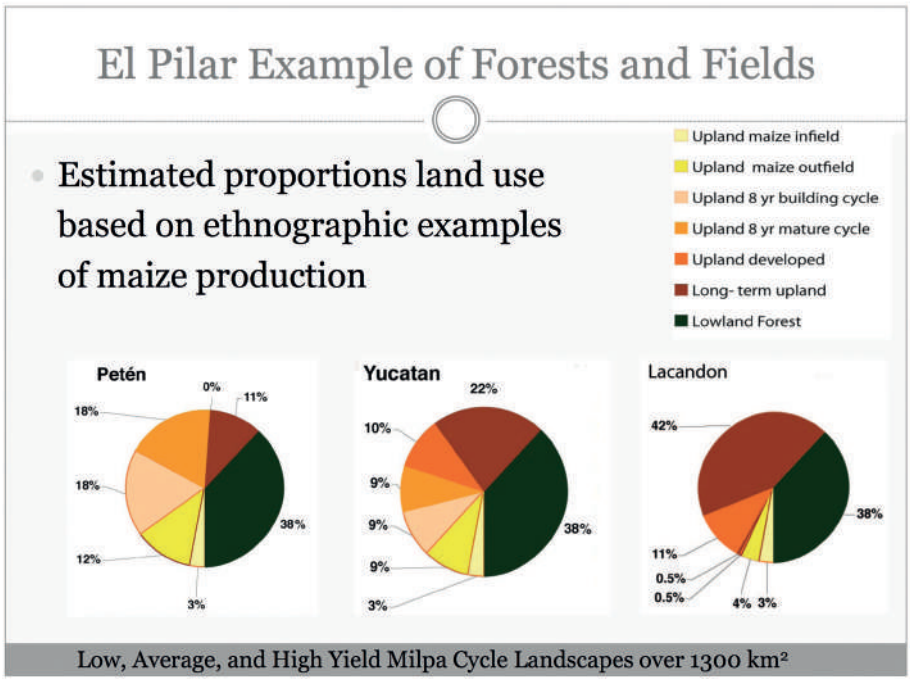

Figure 5. Landscape proportions of the fields and forests of the Milpa cycle based on El Pilar.
© MesoAmerican Research Center.

The Maya forest-gardener demonstrates a mastery of nature, cultivating biological capital as a product of their culture. The Mayan languages show the forest's integral role within their culture, with terminology about the forest revealing an interest in collective and community value, not simply individual. Three-dimensional subtleties of the forest are common observations. The recognition of flying insects, such as the damselfly, tell of nearby running water; the identification of valued trees, such as avocado, provide directions; the presence of specific plant species are indicative of other important species; habitat indicators are validated with animal tracks; forest floor features reveal the existence of specific animals; and the identification of infected trees always involves care and attention to remedy the affliction.

These forest qualities are expressed in common terms: *K'axil kab,* 'forest with beehives', or *Ka'kab K'aax,* 'forest with good soil qualities'. They tacitly acknowledge that the forest is home, *Otoch K'aax*. Thus, the phrase *Kanan K'aax,* 'well cared for forest' as defined in Yucatec Maya Cordemex dictionary (Burrera Vázquez et al., 1995), is much more than a forest. Maya speakers argue that embedded in the concept of *Kanan K'aax* is learning from the forest and gaining an appreciation of the forest. In other words, it is not simply caring for the environment, as we expect forest rangers to do in protected areas, but a dialectic interaction between the Maya and the natural landscape, creating an understanding of ecological relationships, the causes and effects, and even our human actions' multifaceted impacts. Furthermore, the Mayan language does not separate culture from nature; there is no division amongst animals, only the distinction between four footed and two footed ones.

Eight Millennia in the Tropical Woodlands

To understand the development of the Americas, we need to appreciate that the foundations of subsistence lies within management strategies that have impacted the landscape as a whole. Habitats were shaped in the context of natural processes, actually tending to and cultivating what Westerners call the wild. This can be as light or as heavy a management hand as required by the population, and in the Americas it was with stone tools and fire. Management was at the landscape level, and interventions were in recognition of the natural processes. This is expressed in a quote by Chief Luther Standing Bear (1868–1939) of the Oglala band of Sioux (Standing Bear, 1998), 'Only to the white man was [the land] a 'wilderness' and only to him was the land 'infested' with 'wild' animals and 'savage' people. To us it was tame.' This illustrates that nature was not dangerous but hospitable, not forbidding but welcoming. This is not how Europeans look at the jungle. Classically, it is perceived as land overgrown with dense forest and impenetrable tangled vegetation, a 'green hell' (Curry, 2016). The Western interpretation of the tropical woodlands is laden with suspicion and thus, interpretations of the palaeoecological record are coloured by this view.

Significant sources of interpretation of the changes in the Maya forest come from plants: the fossil pollen record of lake cores and the macro and microscopic remains from the archaeological record (Figure 2). These remarkable sources of data are

challenging to interpret, each with their advantages and limitations. Pollen identified in lake cores highlight pollen that is abundant and can travel great distances (wind pollen). Wind is a small proportion of plant pollination strategies and makes up less than 20% of the world's total and accounts for only 2% of the plants in the tropics. Any reconstruction of environmental changes must take this into account. With plant remains in the archaeological record, pollination strategies are not the problem, but we are burdened with human selection, not to mention that which can survive plant use. Together, however, these two lines of evidence have the potential to be very powerful and should be leveraged (see Lentz et al., 2015).

What can we learn from the pollen data? We can identify major shifts in the record that span more than 12,000 years, the time of human presence in the Maya forest. The major climatic signal of transition from the cold-dry to the warm-wet comes when the temperate pine-oak-grass complex gives way to tropical megathermal taxa (Figure 2). This is tracked in the Maya forest with the rise of the pollen attributed to a Moraceae type, suggested to be ramon or *Brosimum alicastrum*, a well-known dominant tree of the forest today (Campbell et al., 2006; Ford, 2008; Ross, 2011).

Today, *Brosimum alicastrum* shows a clear presence in the tall forest canopy, but is also recognized as a pioneer of open areas. The wind pollination syndrome is a characteristic of pioneering plants and *Brosimum alicastrum* is one such a plant that expands in open areas and thrives as a canopy species (Table 2). One can easily envision *Brosimum's* rapid move into the open and expanding tropical niche, paramount in the identified pollen of the Holocene Thermal Maximum. Essentially holding the position as the most abundant pollen present in the lake cores for the better part of four millennia of the warm-wet Holocene Thermal Maximum, *Brosimum* type pollen has a notable drop after 4,000 years before present (BP) with the onset of precipitation chaos followed by a dramatic drop after 3,000 years BP with the prolongation of the chaos (Figure 2).

The initial period of the drop in *Brosimum* type pollen coincides with a chaotic, unpredictable period of precipitation. This period of climate chaos corresponds with the establishment of settlements all over Meso-America and the Maya forest, in particular. By 3,000 years BP, the beginnings of civic monuments are attested in the archaeological record followed by the growth and expansion of settlements and centres over the next 2,000 years (Ford and Nigh, 2015, pp. 36-37).

The pollen changes are logically associated with the timing of the growth and development of Classic Maya civilization. Since the assumption has been that *Brosimum* type pollen heralds the 'presence' of the tropical forest, its absence must mean its 'disappearance'. Following this reasoning, the conclusion was that the ancient Maya deforested the environment to replace it with savanna, suggesting open grasslands. Assumed but not tested.

On close inspection, what is evident is that with the drop in the *Brosimum* types in the fossil pollen record there is a dramatic increase in pollen diversity (Ford and Nigh, 2015, pp. 84–88). The dominance of the *Brosimum* type Moreaceae pollen is replaced with a wide variety of forbs, the shrubs and annuals dicotyledons that depend on wind pollination. That is, Moraceae drops with the rise of a dozen herbaceous flowering annual and perennial shrubs.[1] Such annuals and perennials are precisely the plants found in the phases of the open milpa field gap and the first period of succession building of perennials, a sequence of the milpa cycle that would run from 12 to 20 years. One need not imagine great open spaces to account for high wind pollen. As little as 12 to 15% of the landscape was required to provide the necessary maize in open fields and from 9 to 18% (Ford and Nigh, 2015) in the succession building of perennials, both phases of the milpa forest-garden cycle that would support wind pollinated plants that would contribute to the abundance of forbs in the fossil pollen record (Figure 5).

Important corroborating plant data come directly from the archaeological record. Dating to the peak of the Late Classic Maya civilization, these plant data from archaeological contexts reveal that forest trees found in the contemporary forest were equally available to the ancient Maya more than a thousand years before (Thompson, 2013). Not only are the useful species present in archaeological contexts, but also their proportions are comparable to the tree species found in current inventories of the Maya forest. From the rural hamlet of Chan, in the upper Belize River area, to the major centre of Tikal, in central Petén, it has been demonstrated that the products used by the ancient Maya were diverse and representative of a biodiverse forest laden with utility (Lentz et al., 2015; Robin, 2012). Indeed, it is argued that the archaeological plant collections could be easily used as a proxy of the forest species in the region today.

The ratio of forbs to *Brosimum* type pollen in the lake core sediments shifts again around 1,000 BP just as the archaeological data on the civilization diminishes (Figure 2). This shift coincides with the date of the 'abandonment' of the civic architecture, more neglect across several centuries. For the next 500 years, forbs were still present, but the *Brosimum* type pollen began to rise. This has been interpreted as the resurgence of the forest with the desertion of the area. But did the farmers leave? The adaptability, flexibility and resilience of the maize-based milpa forest-garden cycle are well recognized. This change in prehistory could be the first instance of 'escape agriculture,' as discussed by James Scott, with the introduction of New World crops into South-East Asia after the great Columbian Exchange (Scott, 2009).

Maya farmers were present at the conquest. In 1524, Cortés and his army of nearly 100 Spanish cavalry and 3,000 Mexica struggled to traverse the Maya forest region that was made for foot traffic and not mounted Spanish armies. Cortés never wrote about hunger (1526), regularly slept under roofs and managed well on existing resources. It is likely that the neglected temples, palaces and plazas provided a new

1. The families and species include: *Acalyphia,* Acantheae, *Chenoodium-Amaranthus, Ambrosia,* Asteraceae, *Cecropia, Celtis, Cephalanthus,* Melastomataceaea, *Mimosa, Trema,* Urticaceae. Many of these are annuals that cause allergies, and all are pioneering plants.

niche for pioneering species and gave rise to the expansion once again of *Brosimum* type pollen that is seen in abundance on ancient monuments today.

Rediscovery of the Maya Civilization

It was only in the nineteenth century that the ancient remains of past glory came to light, by means of Stephens and Catherwood's masterful account and folio, along with the subsequent adventurers and photographers that trekked across the area. By the time these travellers were rediscovering the ancient Maya temples, the radical social changes of the conquest, colonialism and degradation had divorced the indigenous peoples from their own past. Ecological imperialism had relegated their adaptations as inappropriate and primitive.

Historical ecology has shown that this is not the case. Indigenous systems of land use, developed in the context of the immediate environment, are attuned to the vagaries of the locality. The Maya milpa forest-garden cycle emerged from climate chaos to sustain the necessities of life as the foundation of a major civilization (Ford and Nigh, 2015). The milpa cycle conserves valuable water by maintaining land cover, nourishes the people with rich and biodiverse annual and perennial crops and is connected to the biodiverse forest they lived in. How are we honouring this legacy achievement today?

We are now encountering climate chaos around the world. In the Maya forest, this has resulted in the sequencing of radical dry and wet years, pernicious hurricanes and wild fires over the past decades. Temperatures measured at night have risen 2 °C over the past 50 years. And worse, salt water is infiltrating up sweet water regimes along the coastal zones of the greater Yucatán Peninsula. Critically, land use conversion, with the introduction of European grazing animals and ploughs that were not used in prehistory have conspired to denude, degrade and deforest the landscape, exacerbating climate change. The conditions we are facing today are not unlike those that populations of the ancient Maya forest experienced 4,000 years ago and provided the conditions for the co-creation of the Maya forest-garden. It is time to recognize the success of innovations that resulted in the milpa forest-garden cycle, exhibited in traditional and local Maya land use and the values of smallholder farming practices embedded in and integral to the Maya forest.

This ecological imperialist penchant for clearing and making 'tourist friendly lawns' has extended to the revealing and, rather than consolidating, '*remuddleing*' of rediscovered ancient monuments by stripping trees and land cover, exacerbating the notorious deforestation and exposing the monuments to all the elements of neglect (Larios Vilalta, 2005). Furthermore, more often than not, these exposures do not follow the UNESCO Conventions referred to in ICOMOS Charters and go beyond imagination to reconstruct monuments with a modern interpretation. Now new shapes, forms and facades are in view that may have had little to do with the original. This robs the world of the authentic materials and leaves nothing to the mind's eye.

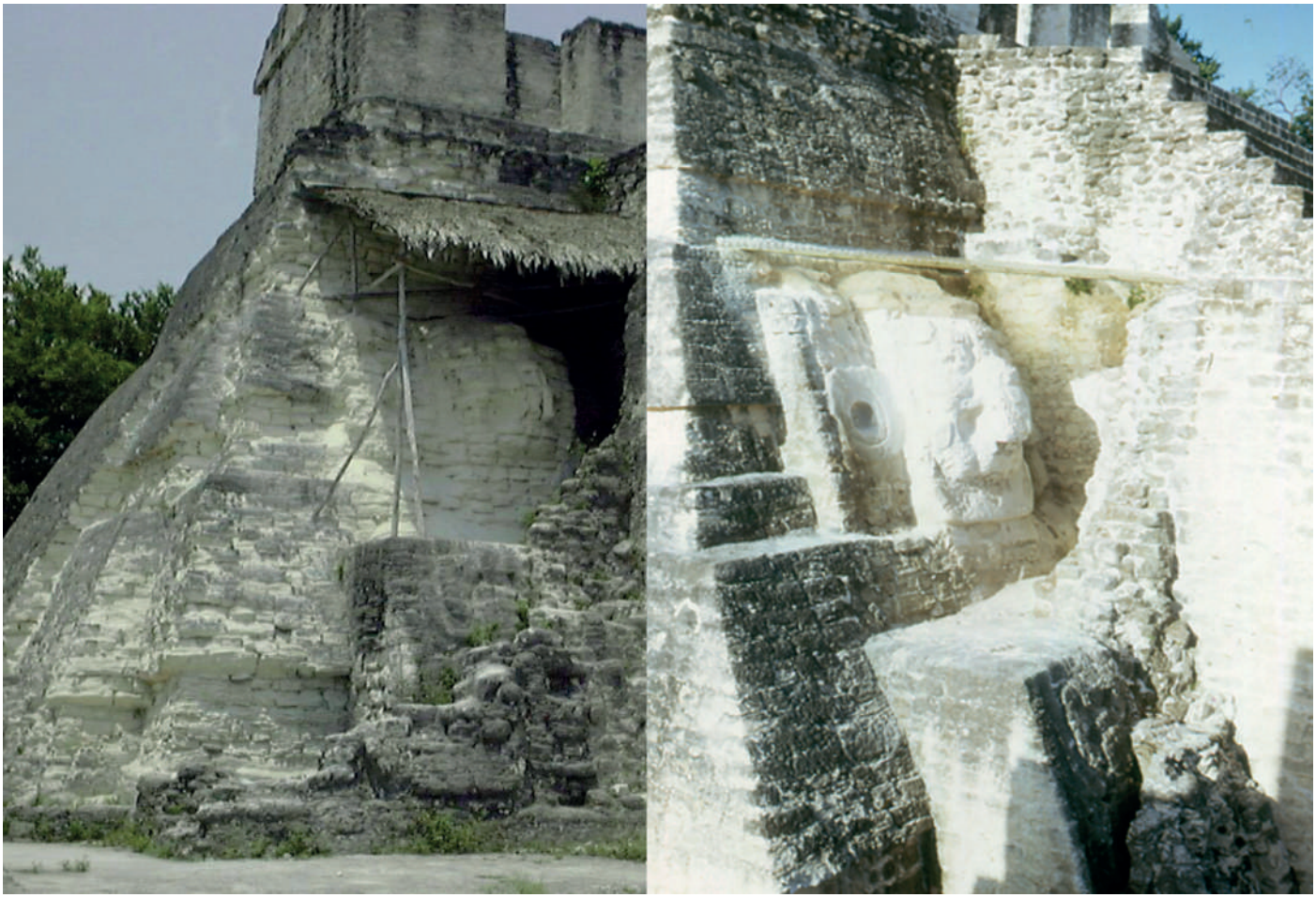

Figure 6. The tragedy of 40 years of exposure of the southern acropolis mask of Tikal (right 1972, left 2012). © MesoAmerican Research Center.

Laying the monuments bare disturbs the natural processes and displaces the valuable Maya forest, the canopy and understory that not only provide resources and habitat, but have protected the monuments over the past centuries. In the humid tropics, surfaces are the invitation for the natural development of soil formation processes that break down the limestone to provide the basis of the rich earth that supports the verdant forest canopy (Figure 6). Exposed ancient architecture provides a fertile basis for escalating these natural processes. The hot tropical Sun by day and the moisture by night, coupled with the seasonal rains and lengthy dry periods to take a toll on the exposed monumental architecture. In the open Sun, the structures dry out, drawing salts to the surface, not unlike the salinization of irrigated fields. At night, the moisture collects on the surface, diluting the salts that concentrate in the day to continue the process. The daytime salty surfaces attract specific biofilms that are attracted to the salts and, as a by-product, drop acid to pulverize the limestone and make the rich soil that allows the Maya forest to grow. This results in the destruction of stone and stucco surfaces.

We have affirmed that the inherent value of the Maya forest and its biodiversity should be conserved. Now we need to acknowledge that the forest itself provides a strategy for the conservation of Maya culture, ancient and contemporary. As an integral part of the Maya story, the forest can shade and protect monuments as well as provide food, construction materials and medicine for people and offer a habitat for animals. All of this together provides a complete picture of the Maya and their forest.

Archaeology Under the Canopy

The best way to conserve the tropical landscape is to begin to recognize that on one hand, the culture and nature of forests are entwined and on the other hand that the local smallholder farmers have the knowledge, skill and experience to guide us. These stubborn traditionalists have millennial knowledge and practice that feed their families, conserve their forests and manage biodiversity. These heroes need to be celebrated and brought into the conservation equation.

If we are concerned about the conservation of the tropics, then why are we removing valuable forest cover when this is what is endangered? Pastures need not be simply grasses; they can be complex to supply food and shade for the browsers. Homes and public spaces can have useful trees for food, temperature reduction and water conservation. Smallholders can be rewarded with subsidies comparable to the large farms to encourage their diverse investments in the conservation and development of the forest.

Indeed, in management there must be a balance between cultural and natural heritage. For the cultural heritage of the ancient architecture, we must favour the irreplaceable monument over the regeneration of a tree. But if the tree on a monument can be pruned, its crown lightened and the branches shortened, this needs to be part of the discussion. These same trees contribute to the conservation system. The results are evident in the contrast between cultural monuments that are presented fully exposed, wich are in most cases reconstructed, and those

Figure 7. El Pilar Poniente Temple framed by the trees and shaded under the canopy. © MesoAmerican Research Center.

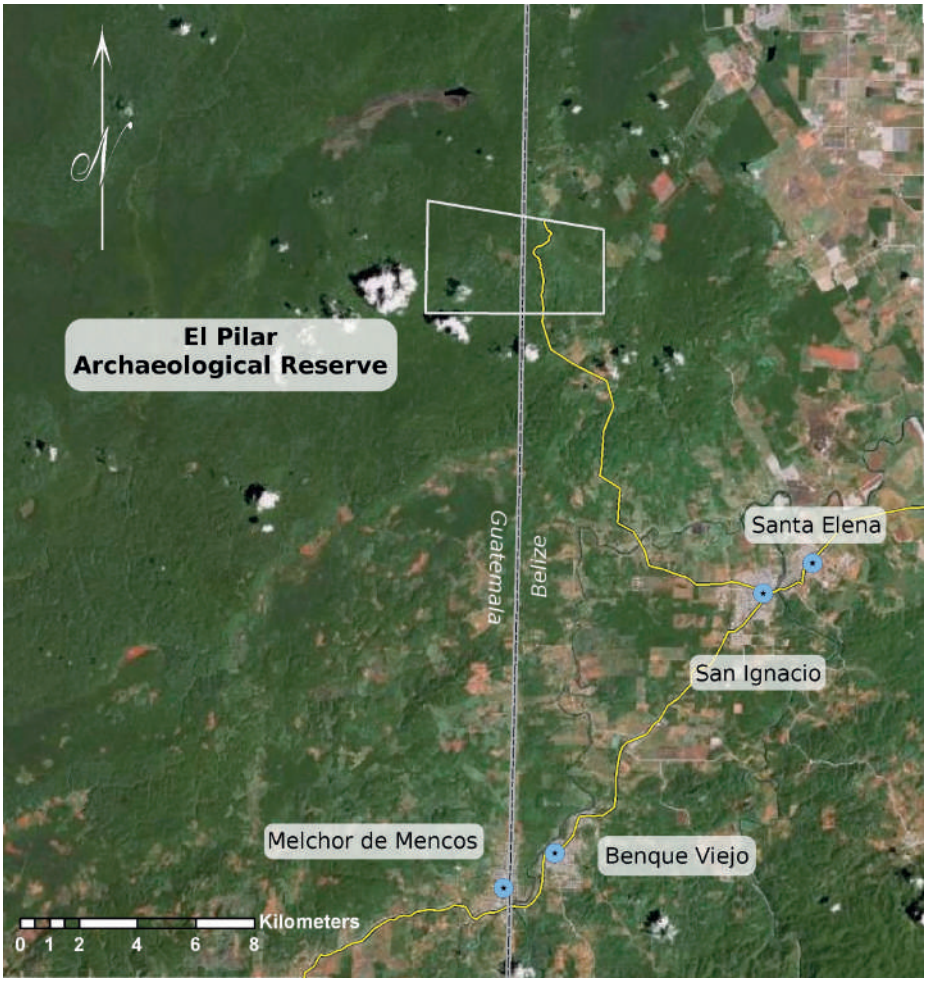

Figure 8. The Contiguous Binational Space of the Protected Area around El Pilar © MesoAmerican Research Center

presented framed in the context of the natural world, by the trees and the canopy of the Maya forest. The monuments shaded and framed by the Maya forest are inviting for the visitor and in a better state of conservation (Figure 7), covered with ferns and shrubs that are easy to manage and sheltered by the trees that shade and protect them.

A unique example is El Pilar, a cultural and natural resource that spreads across two countries (Figure 8). At the El Pilar Archaeological Reserve for Maya Flora and Fauna, we have an adaptive and inclusive management plan that is homologous in both Belize and Guatemala[2]. The majestic trees themselves are solar collectors, lowering the temperatures at ground level and marinating the temperatures even from night to day. The branches and leaves disperse the rain into sprinkles and showers that are spread out, rather than directed and drained in a stream, growing and ever-changing so that no one area receives the same amount of rainfall. In addition, visitors to ancient monuments shaded by canopy trees find it cooler and more attractive. These canopy trees are of utmost value to the continuity of the forest. El Pilar is a living museum, an educational destination, inviting reflection on the experience of archaeology under the canopy (Ford and Wernecke, 2002). El Pilar is stimulating a new vision for the merging of culture with nature that is gaining attention and appeal with transformative encounters in the Maya forest.

2.http://www.marc.ucsb.edu/research/conservation-philosophy/adaptive-management

The example of El Pilar takes a step further in adaptive management to engage the community (Ford and Ellis, 2013). Forest-gardeners around El Pilar are involved in the future of this protected area. Youth from the villages have participated in education, celebration and work events (Ford, 2006). Grasping the importance of their heritage, schools have promoted home gardens, encouraged interest in local plants and have initiated school gardens. A model example has been developed near El Pilar at the Santa Familia Primary School, spearheaded by an integrated group of Maya forest-gardeners. With their collaboration, the school is including outdoor learning into the national curriculum. Their motto is 'No Child Left Indoors!'

As diverse evidence converges to show that the Maya forest was a co-creation of the ancient inhabitants of the landscape, a new vision of the ancient monuments and the forest must materialize. The abundance of useful plants has awakened the interest of botanists, the biodiversity has been identified by conservationists and the ancient monuments and houses that thrived in the environmental setting of the forest are all related.

The Maya civilization prospered in this environment. A re-examination of the data used to argue the destruction of the forest (Turner and Sabloff, 2012) is now shown to have an alternative interpretation. Certainly the Maya had an impact on the nature of the Maya forest, but the result transformed into a landscape with abundant uses, constructed by the millennial long-term selection of families for the plants and habitats that sustained them. Understanding the qualities of the Maya milpa forest-garden cycle clearly demonstrates how the forest became a garden. And this forest-garden must be recognized as part of the archaeology of the ancient Maya.

In exploring frameworks for the conservation and development of the tropics worldwide, we must begin by understanding that humans were, in large part, co-creators of the tropical landscape, and the Maya forest is a prime example of this. Consequently, as we look to conserve these cultural and natural resources, we need to consider the local, traditional and indigenous knowledge of how to live in the context of the forest. These forest-gardeners are heroes, yet their skill and sophistication have too long been set aside and devalued. The culture of living in the forest can be told in a number of ways, but respecting local strategies for survival is critical. Ancient monuments in the Maya forest, like El Pilar of Belize and Guatemala, can celebrate the world's natural and cultural heritage, and provide a reason for telling this important story. And by respecting the local knowledge and skill of smallholders, we can begin to see how they can help us to conserve what has become one of our last terrestrial frontiers, the tropics.

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