



FLAAR
MESOAMÉRICA

Introduction to Flora and Fauna of **Biotopo Cerro Cahuí**

and Potential for Further Research

Reserva de la Biosfera Maya (RBM)
Petén, Guatemala

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For cooperation, hospitality, and assistance at Parque Nacional Yaxha, Nakum and Naranjo Project (August 2018 through July 2019)

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PHOTO FROM FRONT COVER

Mirador

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jun. 24, 2021. Petén, Guatemala.

Camera: iPhone 12 pro.

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Introduction to Cerro Cahuí

Cerro Cahuí is a protected nature reserve capably managed by CECON (USAC). This nature reserve is reachable by paved highway so does not require 4WD to get here. Cerro Cahuí is on a road just a few hundred meters from the highway that goes north to Parque Nacional Tikal (Cerro Cahuí is west, on the north side of Lake Petén Itza, just outside the west edge of the town of El Remate).



Biotopo Cerro Cahuí.
Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica,
Jun. 25, 2021. Panoramas, El mirador,
Las Chachalacas, Petén.
Camera: iPhone 12 Pro.

“Cerro” means hill in Spanish, so this nature reserve is a series of hills that overlook Lake Petén Itza. From the lookouts (Miradores) at the top of each hill area you get awesome panoramic views. Your iPhone or other mobile phone that can take automatic pano-photos can record gorgeous views to share on social media with your family and friends back home.

Cerro Cahuí is part of an alliance between nearby Tikal, PNYNN (Parque Nacional Yaxha, Nakum and Naranjo), Bio Itzá, and Biotopo El Zotz (Bloque de Conservación). We were asked by the CONAP co-administrator of PNYNN (Ing. Mario Vázquez) to visit the other members of this alliance on our June field trip, so we introduced ourselves to the administrators of each of these four areas during June. We then dedicated one day to Bio Itza, one day to Biotopo El Zotz, one day to Cerro Cahuí and several days to the much larger focus area of PNYNN. We have already photographed flora and fauna in Tikal in a past decade, when with a permit and working together with biologist Mirtha Cano (who was there in that past decade). Since we now have significantly higher resolution camera equipment, we can achieve better photos in 2021 onward; so as soon as paperwork is filed with Tikal, we look forward to showing the world the plants and animals that await you at Parque Nacional Tikal.

My Personal Experience with the Petén Itzá area of Guatemala

In our report on Bio Itza, I document my experience doing ethnohistorical research on the Petén Itza Maya culture in the 1970s. Plus, I list the years that I have visited the Lake Petén Itzá area in the last half century.



Full Name of the nature reserve and their main web site

Biotope Protegido Cerro Cahú is the name used in the CONAP Master Plan. This area is administered by -CECON-, Centro de Estudios Conservacionistas. The reserve is 650 hectares, which equals 6.5 square kilometers. In English and North American measurements this is close to 2.51 square miles, which is about 1,606 acres.

How to reach this nature reserve?

Cerro Cahú is a few kilometers from the highway CA-13 to Tikal. If you are driving through El Remate, keep going to the north edge of the town and take the road to the left. The Hotel Casa de Don David is at this turn off (to your left). Drive just a few kilometers more and the entrance to Cerro Cahú is at your right.

On the next page we show the map prepared by the FLAAR Mesoamerica team working together with Vivian Díaz (Project Manager for our cooperation and coordination with CONAP).

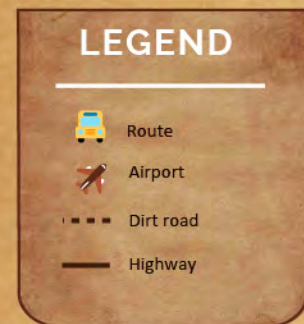
We are preparing maps for every single nature reserve (Biotopo) and every national park within the Reserva de la Biósfera Maya.

Our maps will often have driving tips, though obviously lots of people use Google Maps.



Biotopo Cerro Cahuí.
Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.

HOW TO REACH CERRO CAHUÍ?



Google Maps 2021
 CONRED - Amenaza por deslizamientos e inundaciones, 1701
 Rainforest Alliance 21 Oct 2015
 CONAP - Sistema de Información Geográfica, Centro de Monitoreo y Evaluación

Go to Mundo Maya Airport (Santa Elena). There you will find tourist vehicle services to go to Cerro Cahuí. If you travel by car from Guatemala City, use the route: Río Dulce - Poptún - Flores. At the Ixlú junction, further on, you will find the junction to Tikal. You must take that route, which also leads to El Remate on the shore of Lake Petén Itzá. At the Hotel Posada de Don David, turn left, to advance about 1km and reach Biotopo Cerro Cahuí.

Geology, elevation, etc. for Cerro Cahuí Nature Reserve

This is a limestone hill, part of a range that overlooks the north side of Lake Petén Itzá, so most of the reserve is hillside habitat and then the hilltop. This means there are no “aguadas” within this area. The Plan Maestro says the height varies between 100 and 360 meters. 400 meters is also mentioned, so it's unclear which is the uppermost height (but there are several peaks, so each one may be at a different altitude).

The Plan Maestro lists wetlands, reeds or sedges, so I assume they are listing what is along the shore of Lake Petén Itzá in front of the entrance on the north side of the highway. The lake shore is along the south side of the highway, but once you start your climb, I doubt there are any wetlands uphill or at the top.

At PNYNN, using aerial photographs of IGN, I found a “laguna perdida” (of three adjacent, joined circular tops of what may have been adjoined cenotes a million years ago). About 50 meters to the south was a circular marsh-bog with a rectangular seasonally inundated savanna on the east side. All this area was, literally, up on top of a low hill (with Lake Yaxha and all the other lakes to the west at a significantly lower level). So, in karst geology “wetlands” can exist “on top of a hill”, since water can move upwards in karstic areas (I am not a geologist, but I had to climb a hill to get to the Savanna of 3 Fern Species and the adjacent Laguna Perdida). The Savanna of 3 Fern Species and all three conjoined lakes had water at the height of a really dry series of years (2018-2019). So even lagoons can in fact exist at the top of a plateau because underground water pressure can push the water up (this is my estimate because otherwise, how could the three conjoined circular lagoons have water even at the height of the dry season in two years of drought?). But I would not expect bogs or aguadas at the top of most hills in Petén

What Ecosystem(s) can you expect to find in the Cerro Cahuí Nature Reserve?

Karst is most of Petén and Izabal's geology, as of other areas of Guatemala (and adjacent countries). Leaf litter often is the main component of ground cover, and many trees literally grow on top of the irregular shape of the surface of the limestone.

What other Trees or Plants have been listed for Cerro Cahuí by earlier botanists?

In our Appendix A we tabulate by genus all the trees listed in the Plan Maestro of Cerro Cahuí. Year by year we will find a few more trees, lots more ferns, plus mushrooms (which are obviously not in a list of trees and palms). It is super helpful to have a list of trees and other plants already present.

So far there are 84 plants in the Plan Maestro list, but one is listed twice (*Cecropia peltata*), so the total would be 83 (trees, palms, reeds, orchids, etc.). There is a lot more fieldwork to accomplish here in the coming years.



Road to Cerro Cahuí.
Photo by: Nicholas Hellmuth, FLAAR
Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.

What plants of Cerro Cahuí have also been found in the PNYNN (Parque Nacional Yaxha, Nakum and Naranjo)?

Since the hills of Tikal and Yaxha are not far away, and are also karstic, it would be logical to estimate that most of the plant species of Cerro Cahuí are also at Yaxha. At Tikal the reeds and sedges would need to be better documented, since there are not as many wetlands in Tikal as there are in adjacent PNYNN; but for trees and palms, most of what is documented for Cerro Cahuí is at these other locations.

The typical botanical estimate of what an area the substantial size of Tikal or PNYNN should have is between 180 to 220 species of trees and palms and between 1,800 and 2,200 plants. So, there's lots more to find.

Is there potential medicinal usage of plants of Cerro Cahuí by local people?

Medicinal plants are found in all areas of Guatemala. The monograph by Atran et al. covers medicinal plants of the Petén Itzá Maya areas.

Tabernaemontana donnell smithii,
huevo de burro or caballo
Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica,
Jun. 15, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.



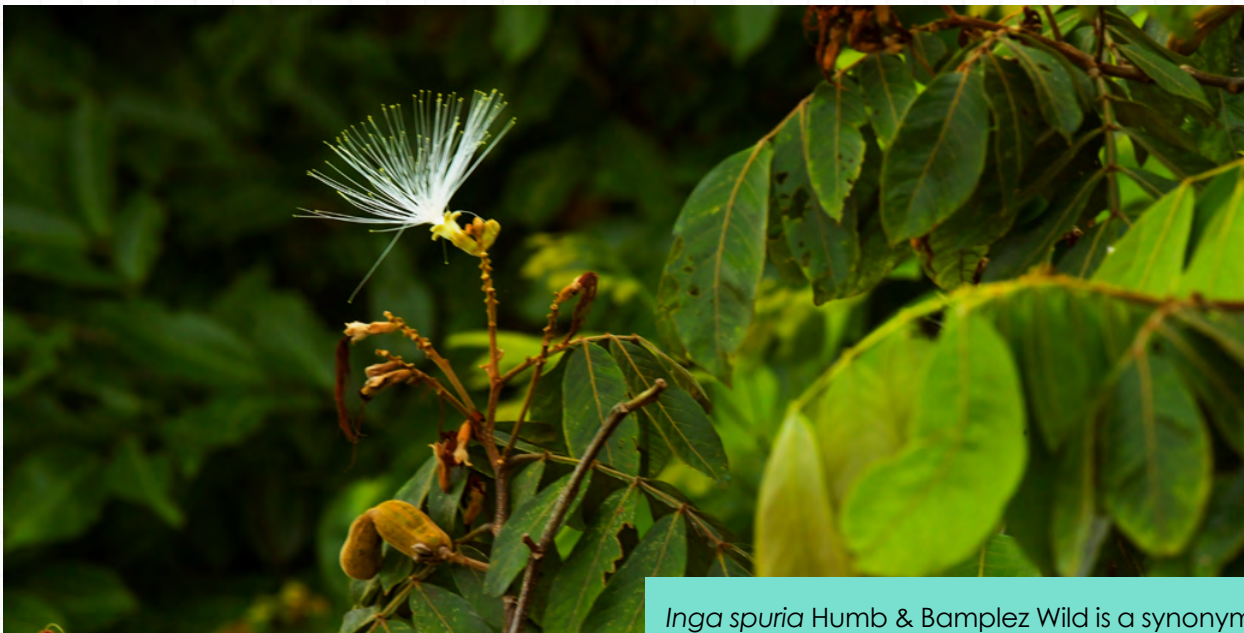
Which plants of Cerro Cahuí are edible?

Medicinal plants have more ethnobotanists working on these topics than for edible plants. Therefore, our focus during the recent and current decades is to learn which wild native plants of each area are edible by people. "Edible" means a lot more than what plants are eaten by the Itza Maya today; edible means which plants of Petén are eaten by any local cultural entity anywhere from southern USA, Mexico, and the rest of Mesoamerica south of Guatemala or even down to South America.

We will be working on listing which plants in the Plan Maestro are edible and which plants that we have found are edible. Here is my initial list:

Genus, species	Plant Family	Common name	Comments
<i>Alibertia edulis</i> (L. Rich) A Rich	Rubiaceae	guayaba de monte	edible
<i>Allophylus cominia</i> (L.) Sw.	Sapindaceae		edible
<i>Brosimum alicastrum</i> Sw.	Moraceae	Ramón blanco, breadnut	edible
<i>Casearia corymbosa</i> Kunth	Salicaceae	Café de montaña	edible
<i>Cecropia peltata</i> L.	Urticaceae	guarumo	edible
<i>Chrysophyllum</i> <i>cainito</i> L.	Sapotaceae	caimito	edible
<i>Chrysophyllum</i> <i>mexicanum</i> Brandege	Sapotaceae		edible
<i>Garcinia macrophylla</i> Mart.	Clusiaceae	manguito	edible
<i>Inga vera</i> Willd.	Mimosaceae		edible
<i>Lonchocarpus</i> <i>guatemalensis</i> Benth.	Fabaceae		edible

Genus, species	Plant Family	Common name	Comments
<i>Malmea depressa</i> (Baill.) Chatrou	Annonaceae	wild coffee, wild soursop.	edible
<i>Manilkara zapota</i> (L.) P.Royen	Sapotaceae	chico zapote, chicle	edible
<i>Maclura tinctoria</i> (L.) D.Don ex Steud.	Moraceae		edible
<i>Orbignya cohune</i> should be <i>Attalea cohune</i> Mart	Arecaceae		edible
<i>Parmentiera aculeata</i> (Kunth) Seem	Bignoniaceae	Cuajilote	edible
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Poaceae		edible
<i>Piper auritum</i> Kunth	Piperaceae	Santa maria	edible
<i>Pithecellobium insigne</i> Micheli	Fabaceae		edible
<i>Pouteria campechiana</i> (Kunth) Baehni	Sapotaceae	mamey cerilla, sapotillo rojo	edible
<i>Pouteria reticulata</i> (Engl.) Eyma	Sapotaceae	wild cherry, zapotillo negro	edible
<i>Sagittaria lancifolia</i> subsp. <i>Media</i> (Micheli) Bogin	Alismataceae	Lance-leaved Arrowwood	edible
<i>Spondias mombin</i> L.	Anacardiaceae	Jocote jobo	edible
<i>Talisia floresii</i> Standl.	Sapindaceae	coloc	edible
<i>Talisia olivaeformis</i>	Sapindaceae	guaya, kinep, uayum	edible
<i>Trema micrantha</i> (L.) Blume	Cannabaceae	capulin	edible
<i>Trophis racemosa</i> (L.) Urb	Moraceae	ramon	edible
<i>Vanilla planifolia</i> Jacks. ex Andrews	Orchidaceae		edible



Inga vera

Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica,
Oct. 09, 2020. Arroyo Petexbatún.
Camera: iPhone 12 Pro.

Inga spuria Humb & Bamplez Wild is a synonym for *Inga vera* subsp. *spuria* (Willd.) J.Leon (the accepted name today), and I estimate that it is potentially *Inga vera* Willd. This means we have a lot of field work ahead of us to update the Plan Maestro list.



Lonchocarpus castilloi Standl. is a relative of *Lonchocarpus guatemalensis* Benth.; field work is needed to make sure whether both species are present and if so, if they are both edible (as a balché ingredient) or only one species.

Lonchocarpus guatemalensis

Photo by: David Arrivillaga, FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: Sony Alpha A9 II. Lens: Sony FE 200-
600mm G OSS. Settings: 1/800 sec; f/10;
ISO 1,600.

Concluding Discussion and Summary on Cerro Cahuí Nature Reserve

There are three miradors at the top of the hill. We had time to climb up to one: the view of the lake was awesome. Whereas at Yaxha you can experience the sunset, here at Cerro Cahuí the lake view is impressive, but you would need to get to the other miradors to see the sun (setting on another side, therefore not setting “into the lake” as it seems to do at Parque Nacional Yaxha, Nakum and Naranjo).

The Plan Maestro Cerro Cahuí list of insects, reptiles, birds, etc. and especially plants are very helpful. We stop to photograph primarily plants that are flowering the day that we are in front of them. No photos are in most Planes Maestros, so we will donate all our photos to CONAP and CECON, plus our updated tabulations of plant species (which can help for future Plan Maestro reports). We have spell-checked the plant list plus noted a few synonyms which should be changed to today's accepted names. We will donate this list to CECON. We already did the same for a list of plants of

Cerro San Gil; we completely updated and donated the new list to them.

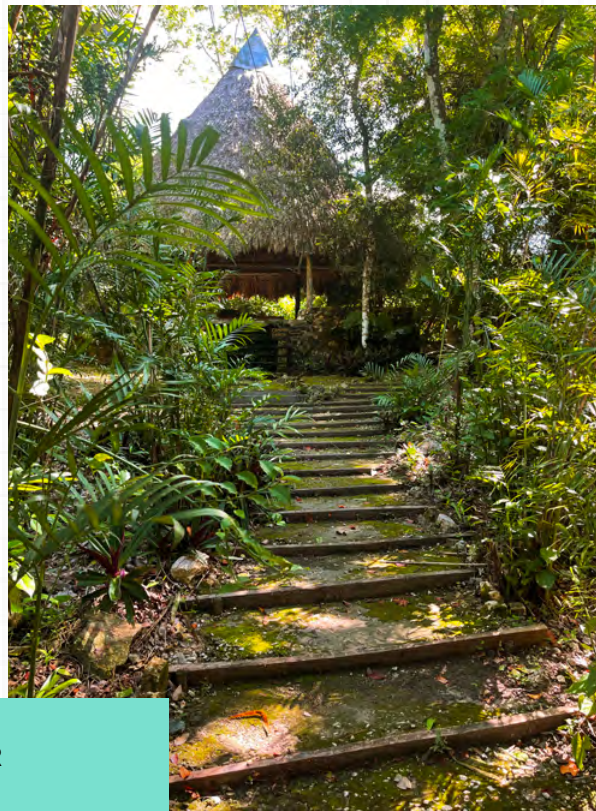
About every two months different trees, vines, shrubs or herbs are blooming, so we have found that it is more efficient and productive to return every two months.

In the alternating months we go to other parks and nature reserves in the RBM (Reserva de la Biósfera Maya) that have different flora and fauna because they have different biodiverse ecosystems. So, every month during the coming 5 years we will be in one part or another of the Reserva. Our May and June 2021 field trips were to meet the administrators of key areas such as Tikal, to do 1-day exploration of areas of the block (Bio Itzá, Cerro Cahuí, Biotopo El Zotz), and multi-day exploration at the significantly larger Parque Nacional Yaxha, Nakum and Naranjo. This means our first six months will be devoted to visiting-to-plan-in-depth-future-field-trips.

Then in the year 2022 onward, we will do longer stays at each area where base camp facilities are available. It is most efficient to accomplish productive field work if the entire team is living and sleeping within the park or nature reserve, so time is not wasted driving back-and-forth to some nearby town. When we were at the base camp of Cerro San Gil, of the high mountain above the Río Carboneras, we experienced giant flying insects that belong to a species that is larger than any other insect in Guatemala. Since the base camp building had no windows and all the “walls” were open, in the evening giant insects came running in on the floor or flying in on their huge wing systems. You are not going to have this experience if you are far away in a hotel every night



Biotopo Cerro Cahuí.
Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica,
Jun. 25, 2021. Panoramas, El mirador,
Las Chachalacas, Petén.
Camera: iPhone 12 Pro.



Biotopo Cerro Cahuí.
Photo by: Nicholas Hellmuth, FLAAR
Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.



Nido de colibrí. Hummingbird nests almost always have lichen on their edges to help camouflage the nest.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.



Jocote jobo.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.



Naranjillo or ceibillo.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.

Camera: iPhone 12 Pro.

APPENDIX A

Trees and palms listed in Cerro Cahuí master plan

Anexo No. 4 of the Plan Maestro lists a helpful quantity of trees and palms by plant family (CONAP, ONCA, and CECON 2002: 75). In the present Appendix A, I put these into alphabetical order by genus, and I add a column for uses or comments. This column will be improved in our next edition with appropriate lists of plant uses such as by Balick, Nee and Atha (2000). But at least we want to start in this direction, especially to list which plants are edible. We also add common names (month by month, year by year we will update this list with common names).

Since the Plan Maestro was written in 2002, several of the scientific names used are today considered synonyms. But for our first edition, we use the names from the Master Plan.

We also correct the few typographical errors of the Master Plan; *Chamaedron* and below are palms, not aroids, so they belong to the family Arecaceae not Araceae. *Chamaedron* should be spelled *Chamaedorea*. One of our team members will correct the spelling of any other genres and species that should be improved, and then find which year 2002 plant names are today (in 2021) considered synonyms. It is normal for plant lists to have spelling errors because the people typing up the text are hard-working designers, not botanists. For example, I believe the genus name of this tree, *Cedería odorata*, should have the genus spelled *Cedrela* and with no accent.



Luis López, who was in charge of the group of park rangers in the protected area.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Acacia dolichostachya</i>	Mimosaceae	Jesmo, wild tamarind	
<i>Alibertia edulis</i> (L. Rich) A Rich	Rubiaceae	guayaba de monte	edible
<i>Allophylus cominia</i>	Sapindaceae		edible
<i>Alseis yucatanensis</i>	Rubiaceae	cacao-che, Tson	With sign on trail
<i>Anturium sp.</i>	Araceae	Cuajilote	Aroid
<i>Anturium bakeri</i> Hook	Araceae		Aroid, common at Yaxha (and in most hotel gardens)
<i>Astronium graveolens</i>	Anacardiaceae		
<i>Blomia prisca</i>	Sapindaceae	Tzolche, Tzol	
<i>Brosimum alicastrum</i>	Moraceae	Ramón blanco, breadnut	edible
<i>Bursera simaruba</i>	Burseraceae		These are very common in most parks and reserves
<i>Cabomba palaciformis</i> Fasset	Cabombaceae		Should be spelled <i>Cabomba palaeformis</i>
<i>Calyptrocarya glonerulata</i> (Brongn)	Cyperaceae		Should be spelled <i>Calyptrocarya glomerulata</i>
<i>Casearia corymbosa</i>	Flacourtiaceae (Balick, Nee, Atha)	Café de montaña	edible
<i>Cecropia peltata</i>	Cecropiaceae	guarumo	edible
<i>Cecropia peltata</i>	Moraceae	guarumo	Repeated under 2 plant family names by mistake
<i>Cedrela odorata</i>	Meliaceae	cedro	Has painted name on sign
<i>Cephaelis glomerulata</i>	Rubiaceae		Accepted name today is <i>Psychotria glomerulata</i> (Donn. Sm.) Steyerm.

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Chamaedron elegans</i>	Arecaceae		<i>Chamaedorea elegans</i>
<i>Chamaedron oblongata</i>	Arecaceae		<i>Chamaedorea oblongata</i>
<i>Chrysophyla argentea</i>	Arecaceae		<i>Chrysophyia</i> is the correct spelling
<i>Chrysophyllum cainito</i>	Sapotaceae	caimito	edible
<i>Chrysophyllum mexicanum</i> Brandegge ex Standl	Sapotaceae		edible
<i>Cladium</i> sp.	Cyperaceae		
<i>Cladium jamaicense</i> Crantz	Cyperaceae		
<i>Cordia cerascanthus</i>	Boraginaceae		
<i>Cordia sebastana</i>	Boraginaceae	ciricote, ziricote	edible
<i>Discorea</i> (maybe)	A common vine with thorns or spines that grows from a turtle-sized root mass above ground level.	Potential relative of Zarsaparilla	Biotopo-Cerro-Cahuí-NEEDS-ID-Dioscorea-Petén-RBM-iPhone-12pro-1203-pm-Jun-25-2021-NH
<i>Egeria densa</i>	Hydrocharitaceae		
<i>Eleocharis illinoensis</i>	Cyperaceae		
<i>Eleocharis interstincta</i> (Vahl)	Cyperaceae		
<i>Epidendrum</i> sp.	Orchidaceae		
<i>Exostema</i> probably <i>Exostema mexicana</i> <i>Exostema mexicanum</i>		quina	Sign along the trail but not in Plan Maestro under <i>Exostema</i>
<i>Ficus</i> sp.	Moraceae		
<i>Ficus involuta</i> (Liebm.) Miq	Moraceae		Accepted name today is <i>Ficus obtusifolia</i> H.B.K.

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Fuirena simplez</i> Vahl	Cyperaceae		Should be spelled <i>Fuirena simplex</i>
<i>Garcinia macrophylla</i>	Moraceae	manguito	
<i>Garcinia macrophylla</i> Miq. is an unresolved name according to ThePlantList. Nonetheless, lots of botanical reports use that name. The fruit is edible. For Belize the species listed is <i>Garcinia intermedia</i> (Pittier) Hammel. This fruit is edible.			
<i>Guettarda combsii</i> Urban	Rubiaceae		
<i>Hamelia rivosae</i> Wernham	Rubiaceae		Should be spelled <i>Hamelia rivosae</i>
<i>Hyparremia rufa</i> (Ness) Stapf	Poaceae		Should be spelled <i>Hyparrhenia rufa</i>
<i>Hypolitrum schderianum</i> Ness	Cyperaceae		
<i>Inga spuria</i> Humb & Bamplez Wild	Mimosaceae		Accepted name today is <i>Inga vera</i> subsp. <i>spuria</i> (Willd.) J.Leon
<i>Lippia stoechadifolia</i> (L.) HBK	Verbenaceae		
<i>Lonchocarpus castilloi</i>	Fabaceae	Manchiche, Machiche, balche	
<i>Lonchocarpus guatemalensis</i>	Fabaceae		edible
<i>Malmea depressa</i>	Annonaceae		Edible, surprisingly few Annonaceae in this initial list
<i>Manilkara zapota</i>	Sapotaceae	chico zapote, chicle	edible
<i>Metopium brownei</i> (Jacq.) Urb	Anacardiaceae	che-chen	
<i>Morus tinctoria</i>	Moraceae	quina	Accepted name today is <i>Maclura tinctoria</i> (L.) D.Don ex Steud.
<i>Najas guadalupensis</i> (Spreng) Morong	Natudaceae		
<i>Najas wrightiana</i> A. Braun	Natudaceae		
<i>Vittaria graminifolia</i>	Vittariaceae		

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Nectandra globosa</i>	Lauraceae		Balick, Nee and Atha suggest is South American
<i>Nymphaea ampla</i> (Salisb.) DC	Nymphaeaceae		Should be spelled Nymphaea
<i>Oeccodads maculata</i> (Lind) L:O: Wms	Orchidaceae		
<i>Orbignya cohune</i>	Arecaceae	Corozo palm	Accepted name today is <i>Attalea cohune</i> Mart.
<i>Parmentiera aculeata</i>	Bignoniaceae	Cuajilote	Edible; we found tree with fruit + fruit all over the ground
<i>Peperomia cobana</i> C. DC	Piperaceae		
<i>Peperomia rotundifolia</i> (L.) HBK	Piperaceae		
<i>Phroguites australis</i> (Cav) Trin Ex Steud	Poaceae		Spelling really garbled here, should be <i>Phragmites</i>
<i>Piper auritum</i> HBK	Piperaceae	Santa maria	
<i>Piscidia piscipula</i>	Fabaceae	Jabin	Painted sign at base of tree, along the trail
<i>Pithecolbium cf insigne</i> Micheli	Mimosaceae		Should be spelled <i>Pithecellobium</i> edible
<i>Potamogeton illinoensis</i>	Potamogetonaceae		
<i>Potamogeton nodosus</i>	Potamogetonaceae		
<i>Pouteria campechana</i>	Sapotaceae	mamey cerilla, sapotillo rojo	Should be spelled <i>campechiana</i>
<i>Pouteria reticulata</i>	Sapotaceae	wild cherry, zapotillo negro	
<i>Protium copal</i>	Burseraceae		
<i>Rehdera penninervia</i>	Rubiaceae	roble del mico, sak-ka-che	
<i>Sabal mexicana</i>	Arecaceae		

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Sagitaria lancifolis</i> sups. Media (Micheli) Bongii Another spelling mistake, should be <i>Sagittaria lancifolia</i> subsp. media	Alismataceae		We have found this plant in Municipio de Livingston and in seasonally inundated areas or bogs of PNYNN. In monographs on Guatemala botanists sadly do not list it as edible (since it is eaten only in other countries).
<i>Sickingia salvadorensis</i>	Rubiaceae		Accepted name is <i>Simira salvadorensis</i> (Standl.) Steyererm.
<i>Sobralia dicora</i>	Orchidaceae		
<i>Spondias mombin</i>	Anacardiaceae	Jocote jobo	Painted sign at base of tree, along the trail
<i>Swarzia cubensis</i>	Caesalpinaceae	Mexican Royal Ebony	<i>Swartzia</i> is the way to spell it
<i>Tabernaemontana donnell-smithii</i>		Huevos de caballo	Common in many parts of Guatemala; not in list under this accepted name
<i>Talisia floresii</i>	Sapindaceae	coloc	edible
<i>Talisia olivaeformis</i>	Sapindaceae	guaya, kinep, uayum.	edible
<i>Tillandsia</i> sp.	Bromeliaceae		
<i>Trema micrantha</i>	Ulmaceae	capulin	edible
<i>Trichylia havanensis</i>	Meliaceae	limoncillo	<i>Trichilia havanensis</i> Jacq.
<i>Trophis raceomsa</i> (L)	Moraceae	ramon	Racemose edible
<i>Utricularia foliosa</i> L.	Lentibulariaceae		
<i>Utricularia giba</i> L.	Lentibulariaceae		
<i>Utricularia hydrocarpa</i> Walter	Lentibulariaceae		
<i>Vallisneria americana</i> var. <i>Americana</i> Michaux	Hydrocharitaceae		

Genus species as listed by the Plan Maestro	Plant family as listed by the Plan Maestro	Common name(s)	Comments by Nicholas
<i>Rehdera penninervia</i>	Rubiaceae	roble del mico, sak-ka-che	
<i>Sabal mexicana</i>	Arecaceae		
<i>Vainilla planifolia</i> Andrews	Orchidaceae		edible
<i>Wedelia</i> sp.	Asteraceae		

It is nice that wild vanilla orchid vines have been found. We have found wild vanilla orchid vines in many seasonally dry areas of PNYNN, and in both “pantanos” and hilltop areas of the Municipio de Livingston, Izabal. I estimate that more than one species is involved (unless one species is unexpectedly able to live both in seasonally dry and all-year-round wetlands).

We estimate that it should be possible to find in Cerro Cahuí:

- More species from the family Malvaceae (subfamily Bombacoideae)
- Ferns, both wetlands, ground, and arboreal
- a few more palms
- lots more bromeliads
- lots more aroids.

Last month PNYNN park ranger Teco showed us a *Castilla elastica* tree a few hundred meters from the entrance to Cerro Cahuí.



***Parmentiera aculeata*, cuajilote.**
Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.

APPENDIX B

June 25, 2021, Cerro Cahuí Photographical report of Petén field trip

Cerro Cahuí, tree names painted on signs next to trees:

Biotopo-Cerro-Cahuí-tree-identification-signs-common-names-iPhone-12pro-Jun-25-2021-NH

Cedro, *Cedrela odorata*, Meliaceae

Jabin, *Piscidia piscipula*

Jocote jobo *Spondias mombin*

Manchiche, Machiche, balche, *Lonchocarpus castilloi* Fabaceae

www.tropicaltimber.info/es/specie/machiche-lonchocarpus-castilloi/

Manguito, *Garcinia macrophylla*

quina, *Exostema*, Rubiaceae, probably *Exostema Mexicana*

Ramon Blanco, *Brosimum-alicastrum*

Tzolche, Tzol, *Blomia prisca*

Tson, *Alseis yucatanensis*

Yaxnic, *Vitex gaumeri*

PHOTOGRAPHER: NICHOLAS HELLMUTH

PHOTOGRAPHY ASSISTANT: Seneida Ba

- iPhone 12pro
- Google Pixel 4a
- Nikon D810

Time when the picture was taken	Place where the picture was taken	Notes by Byron	Folder Names
08:32 am 08:35 am	Sendero del Cerro Cahuí	Fotografía de la entrada, Croquis Cerro Cahuí	Biotopo-Cerro-Cahuí-Entrada-signate-iPhone-12pro-835am-Jun-25-2021-NH
08:58 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-tree-iPhone-12pro-858am-Jun-25-2021-NH-6840.JPG
09:00 am	Sendero del Cerro Cahuí	Palo de Jiote y Cactus	Biotopo-Cerro-Cahuí-Bursera-simaruba-Palo-de-jiote-Petén-RBM-iPhone-12pro-9am-Jun-25-2021-NH
09:00 am	Sendero del Cerro Cahuí	Cactus	Biotopo-Cerro-Cahuí-NEEDS-ID-Cactus-Petén-RBM-iPhone-12pro-9am-Jun-25-2021-NH
09:01 am 09:05 am	Sendero del Cerro Cahuí	Cuajilote	Biotopo-Cerro-Cahuí-Parmentiera-acleata-Cuajilote-Petén-RBM-iPhone-12pro-901am-Jun-25-2021-NH Parmentiera-acleata-cuajilote-green-fruit-Biotopo-Cerro-Cahuí-RBM-SonyA1-902-Jun-25-2021-DA
09:14 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Tabernaemontana-donnell-smithii-Huevo-de-caballo-Petén-RBM-iPhone-12pro-914am-Jun-25-2021-NH
09:18 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-Zompopo-Petén-RBM-iPhone-12pro-918am-Jun-25-2021-NH
09:28 am	Sendero del Cerro Cahuí	Hongos	ID-little-cup-mushroom-Biotopo-Cerro-Cahuí-RBM-SonyA1-957am-Jan-25-2021-DA ID-yellow-mushrooms-Biotopo-Cerro-Cahuí-RBM-SonyA1-1002am-Jun-25-2021-DA
09:29 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Alseis-yucatanensis-Tson-arbol-Petén-RBM-iPhone-12pro-929am-Jun-25-2021-NH
09:33 am	Sendero del Cerro Cahuí	Hormiga	
09:45 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Nido-de-colibri-no-bird-Petén-RBM-iPhone-12pro-945am-Jun-25-2021-NH
09:48 am	Sendero del Cerro Cahuí	Tipo de Maripositas Cafés	Biotopo-Cerro-Cahuí-NEEDS-ID-Copal-pom-fruta-Petén-RBM-iPhone-12pro-954-Jun-25-2021-NH NEEDS-ID-Copal-pom-fruits-on-ground-Biotopo-Cerro-Cahuí-Google-Pixel-4a-955am-Jun-25-2021-NH
09:57 am	Sendero del Cerro Cahuí	Hongo-botonetas	
10:09 am 10:10 am	Sendero del Cerro Cahuí	Árbol-manguito-con fruto agridulce	
10:14 am	Sendero del Cerro Cahuí	Hongo amarillo	ID-yellow-mushroom-Biotopo-Cerro-Cahuí-RBM-SonyA1-1014am-Jan-25-2021-DA
10:17 am	Sendero del Cerro Cahuí	Semilla Roja de come-manos-posiblemente Arácea	

Time when the picture was taken	Place where the picture was taken	Notes by Byron	Folder Names
10:25 am	Sendero del Cerro Cahuí	Mariposa color anaranjado-Nocturna	
10:34 am	Sendero del Cerro Cahuí		NEEDS-ID-Cienpies-Biotopo-Cerro-Cahuí-Google-Pixel-4a-1034am-Jun-25-2021-NH
10:35 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Chile-de-chachalaca-fissured-trunk-Petén-RBM-iPhone-12pro-1035am-Jun-25-2021-NH
10:33 am	Sendero del Cerro Cahuí	Rana	ID-brown-spotted-toad-Biotopo-Cerro-Cahuí-RBM-SonyA1-Jun-25-2021-DA
10:34 am	Sendero del Cerro Cahuí		NEEDS-ID-Cienpies-Biotopo-Cerro-Cahuí-Google-Pixel-4a-1034am-Jun-25-2021-NH
10:37 am	Sendero del Cerro Cahuí	Chile Chachalaca	
10:39 am 10:40 am	Sendero del Cerro Cahuí	Avispas negras	NEEDS-ID-wasps-on-ground-2021-06-25_1039am.mp4
10:45 am	Sendero del Cerro Cahuí	Bejuco en Árbol	
10:47 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Jocote-Jobo-rough-tree-bark-iPhone-12pro-1047am-Jun-25-2021-NH
10:49 am	Sendero del Cerro Cahuí	Rana color cafés	
10:50 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-yellow-tubular-flowers-fallen-to-ground-iPhone-12pro-1050am-Jun-25-2021-NH
10:52 am	Sendero del Cerro Cahuí	Huevo de caballo	
11:00 am	Sendero del Cerro Cahuí	Nuevamente semilla Roja-come-manos	
11:09 am	Sendero del Cerro Cahuí		RBM-Cerro-Cahuí-Casearia-corymbosa-café-de-montaña-NikonD810-1109am-jun-25-2021-NH
11:14 am	Sendero del Cerro Cahuí	Café de montañas	
11:15 am	Sendero del Cerro Cahuí	Pájaro carpintero	
11:19 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-Acacia-Petén-RBM-iPhone-12pro-1119amJun-25-2021-NH
11:25 am	Sendero del Cerro Cahuí	Flor amarilla	Biotopo-Cerro-Cahuí-Cafe-de-montaña-Petén-RBM-iPhone-12pro-1125am-Jun-25-2021-NH
11:23 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-Sabal-Guano-palm-leaf-litter-Petén-RBM-iPhone-12pro-1123am-Jun-25-2021-NH

Time when the picture was taken	Place where the picture was taken	Notes by Byron	Folder Names
11:26 am	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-leaf-iPhone-12pro-1126am-Jun-25-2021-NH
11:30 am	Sendero del Cerro Cahuí	Orquídea Rosada	
11:35 am	Sendero del Cerro Cahuí	Fruto Rojo de café de montaña	
11:55 am onwards	Sendero del Cerro Cahuí	Many trees, different times, same folder	Biotopo-Cerro-Cahuí-NEEDS-ID-various-tree-trunks-iPhone-12pro-Jun-25-2021-NH
12:03 pm	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-Dioscorea-Petén-RBM-iPhone-12pro-1203-pm-Jun-25-2021-NH
12:14 pm	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-photogenic-tree-trunk-bark-Hoja-de-Vidrio-Petén-RBM-iPhone-12pro-1214pm-12pro-Jun-25-2021-NH
12:16 pm	El Mirador		Biotopo-Cerro-Cahuí-Panoramas-El-Mirador-Las-Chachalacas-Petén-RBM-iPhone-12pro-1216pm-Jun-25-2021-NH
13:10 pm	El Mirador		NEEDS-ID-white-fluffy-larva-El-Mirador-Las-Chachalacas-Biotopo-Cerro-Cahuí-Google-Pixel-4a-110pm-Jun-25-2021-NH
13:32 pm	Sendero del Cerro Cahuí	Café de montaña	RBM-Cerro-Cahuí-fruit-inside-flower-NikonD810-106pm-and-208pm-jun-25-2021-NHH
13:36 pm	Sendero del Cerro Cahuí	Flor de café de Montaña	
13:50 pm 13:54 pm	Sendero del Cerro Cahuí	Avispas cafés-denominados como señorita	RBM-Cerro-Cahuí-NEEDS-ID-wasp-nest-NikonD810-154pm-Jun-25-2021-NH
14:08 pm 14:10 pm	Sendero del Cerro Cahuí	Flor de Yaya	RBM-Cerro-Cahuí-NEEDS-ID-fruit-inside-flower-NikonD810-106pm-and-208pm-jun-25-2021-NH
14:16 pm	Sendero del Cerro Cahuí	Palo de Lagarto-Naranjillo-sevillo	Biotopo-Cerro-Cahuí-Naranjillo-or-ceibillo-single-spine-horizontal-base-iPhone-12pro-216pm-Jun-25-2021-NH
14:20 pm	Sendero del Cerro Cahuí	Palo de cedro	
14:21 pm	Sendero del Cerro Cahuí	Maybe the distorted trunk is the Cedro listed by Byron?	Biotopo-Cerro-Cahuí-NEEDS-ID-tree-trunk-diseased-beautifully-iPhone-12pro-221pm-Jun-25-2021-NH
14:28 pm	Sendero del Cerro Cahuí	Fruto de Hoja de Piedra	
14:30 pm	Sendero del Cerro Cahuí		ID-red-woodpecker-bird-Biotopo-Cerro-Cahuí-RBM-SonyA1-230pm-Jan-25-2021-DA
14:37 pm	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahuí-NEEDS-ID-fissured-trunk-iPhone-12pro-233pm-237pm-Jun-25-2021-NH

Time when the picture was taken	Place where the picture was taken	Notes by Byron	Folder Names
14:40 pm	Sendero del Cerro Cahuí	Hoja de Piedra con flor y/o fruto pequeño.	ID-Hoja-de-piedra-flower-Biotopo-Cerro-Cahui-RBM-SonyA1-228pm-Jun-25-2021-DA
14:43 pm	Sendero del Cerro Cahuí		Biotopo-Cerro-Cahui-Ficus-species-mata-palo-is-my-estimate-iPhone-12pro-243pm-Jun-25-2021-NH
15:01 pm	Sendero del Cerro Cahuí	Grupo de fruto de cuajilote	
15:05 pm	Sendero del Cerro Cahuí	Palo de Jiote pequeño	All the Palo de Jiote photos are together in other folders.
	Sendero del Cerro Cahuí	Since Sony a1 was brand new	ID-brown-jelly-like-mushroom-Biotopo-Cerro-Cahui-RBM-SonyA1-Jan-25-2021-DA
	Sendero del Cerro Cahuí	by mistake it did not have hour set	ID-mushroom-Biotopo-Cerro-Cahui-RBM-SonyA1-Jun-25-2021-DA
	Sendero del Cerro Cahuí		ID-pink-orchid-flowers-Biotopo-Cerro-Cahui-RBM-SonyA1-Jun-25-2021-DA
Photographs taken after leaving Cerro Cahuí, on our way back to where we stayed in El Remate (north shore of Lake Petén Itza)			
15:12 pm 15:16 pm	Shore of Lake Petén Itza	Ferns	RBM-NEEDS-ID-giant-fern-north-side-of-highway-El-Remate-towards-Cerro-Cahui-iPhone-12pro-312pm-Jun-25-2021-NH
15:14 pm			Castilla-elastica-tree-south-edge-of-highway-El-Remate-towards-Cerro-Cahui-iPhone-12pro-314pm-Jun-25-2021-NH-6981.JPG
15:17 pm			Biotopo-Cerro-Cahui-entrance-to-camping-area-north-side-of-highway-317pm-June-25-2021-6985.JPG
15:19 pm			Biotopo-Cerro-Cahui-Cedrela-odorata-Cedro-Petén-RBM-iPhone-12pro-319pm-Jun-25-2021-NH



Alseis yucatanensis.
Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Jun. 25, 2021. Petén, Guatemala.
Camera: iPhone 12 Pro.

References Cited and Suggested Reading on Cerro Cahuí

Most helpful monographs on this nature reserve:

So far, the most informative report on this nature reserve is:

Consejo Nacional de Áreas Protegidas (CONAP), Organización Nacional Para la Conservación y el Ambiente. SC. (ONCA), Centro de Estudios Conservacionistas (CECON), (2002) Plan Maestro Biotopo Cerro Cahuí. Guatemala (73 pages).

Report on Cerro Cahuí

CONAP, ONCA, and CECON

- 2002 Plan Maestro Biotopo Cerro Cahuí. Guatemala. Consejo Nacional de Áreas Protegidas (CONAP), Organización Nacional Para la Conservación y el Ambiente. SC. (ONCA), Centro de Estudios Conservacionistas (CECON), 73 pages).

Generic List of Suggested Reading on Trees of Guatemala and surrounding Areas

AGUIRRE de Riojas, Regina and Elfriede de PÖLL

- 2007 Trees in the Life of the Maya World. BRIT PRESS, Botanical Research Institute of Texas. 206 pages.

Regina de Riojas has dedicated much of her life to trees of the Maya and trees of Guatemala. Elfriede de Pöll has likewise dedicated her life to biology of Guatemala, at Universidad del Valle de Guatemala.

ARELLANO Rodríguez, J. Alberto, FLORES Guido, José Salvador, TUN Garrido, Juan and M. M. CRUZ Bojórquez

- 2003 Nomenclatura, forma de vida, uso, manejo y distribución de las especies vegetales de la Península de Yucatán. Ethnoflora Yucatanense Fascículo 20. Universidad Autónoma de Yucatán, UADY. 815 pages.

ATRAN, Scott, LOIS, Mimena and Edilberto UCAN Ek'

2004 Plants of the Petén Itza' Maya. Museum of Anthropology, Memoirs, Number 38, University of Michigan. 248 pages.

Very helpful and nice collaboration with local Itza' Maya people. It would help in the future to have a single index that has all Latin, Spanish, and English plant names so that you can find plants more easily. Suzanne Cook's Lacandón ethnobotany index is significantly easier to use

BALICK, Michael J., NEE, Michael H. and Daniel E. ATHA

2000 Checklist of the Vascular Plants of Belize: With Common Names and Uses. Memoirs of the New York Botanical Garden Vol. 85. 246 pages.

BALICK, Michael J. and Rosita ARVIGO

2015 Messages from the Gods: A Guide to the Useful Plants of Belize. The New York Botanical Garden, Oxford University Press.

BESTELMEYER, Brandon T. and Leanne E. ALONSO (editors)

2000 A Biological Assessment of Laguna del Tigre National Park, Petén, Guatemala. RAP Bulletin of Biological Assessment 16, Conservation International, Washington, DC. 221 pages.

CHIZMAR, Carla

2000 Plantas Comestibles de Centroamérica. Instituto Nacional de Biodiversidad (INBio). Santo Domingo de Heredia. Costa Rica. 360 pages.

Download: www.museocostarica.go.cr/descargas/PlantasComestiblesCA-VE.pdf

COOK, Suzanne

2016 The forest of the Lacandon Maya: an ethnobotanical guide. Springer. 334 pages.

Sold online: www.springer.com/la/book/9781461491101

DIX, Margaret A. and M. W. DIX

1992 Recursos biológicos de Yaxha-Nakúm-Yaloch. 54 pages.

This is one of the sources for the tree list portion of CONAP Plan Maestro reports on Yaxha in the past decade. Unfortunately, the Dix and Dix list is rather limited. The 1999 Schulze and Whitacre list for Tikal is more complete (but all these lists need more field work to improve).

GOODWIN, Z. A., LÓPEZ, G. N., STUART, N., BRIDGEWATER, G. M., HANSTON, E. M., CAMERON, I. D., MICHELAKIS, D., RATTER, J. A., FURLEY, P. A., KAY, E., WHITEFOORD, C., SOLOMON, J. LLOYD, A. J. and D. J. HARRIS

2013 A checklist of the vascular plants of the lowland savannas of Belize, Central America. Phytotaxa 101 (1): 1–119.

Download: www.eeo.ed.ac.uk/sea-belize/outputs/Papers/goodwin.pdf

GRANDTNER, Miroslav

2005 Elsevier's Dictionary of Trees: Volume 1: North America. ELSEVIER.

IBARRA-Manríquez, Guillermo, VILLASEÑOR, José Luis and Rafael DURÁN García

1995 Riqueza de especies y endemismo del componente arbóreo de la Península de Yucatán, México. Bol. Soc. Bot. México 57: 49-77

Download: www.researchgate.net/publication/306128522_Riqueza_de_especies_y_endemismo_del_componente_arboreo_de_la_Peninsula_de_Yucatan_Mexico

INE

2013 Nomination of Ancient Maya City and Protected Tropical Forests of Calakmul, Campeche. 55 pages.

There is no author on the fragment that is the most available as a download, so we put INE.

INECOL

2007 Familia Leguminosae. Flora del Bajío y de Regiones Adyacentes, Fascículo 150, noviembre de 2007.

<http://inecolbajio.inecol.mx/floradelbajio/documentos/fasciculos/ordinarios/Mimosoideae%20150.pdf>

LESUR, Luis

2011 Árboles de México. Editorial Trillas. 368 pages.

LUNDELL, Cyrus L.

1937 The Vegetation of Petén. Carnegie Institution of Washington, Publ. 478. Washington. 244 pages.

LUNDELL, Cyrus L.

1938 Plants Probably Utilized by the Old Empire Maya of Petén and Adjacent Lowlands. *Papers of the Michigan Academy of Sciences, Arts and Letters* 24, Part I:37-59.

MARTÍNEZ, Esteban and Carlos GALINDO-Leal

2002 La Vegetación de Calakmul, Campeche, México: Clasificación, descripción y distribución. *Bol. Soc. Bot. México* 71: 7-32.

Download: www.botanicalsciences.com.mx/index.php/botanicalSciences/article/download/1660/1309/

OCHOA-Gaona, Susana, RUÍZ González, Hugo, ÁLVAREZ Montejo, Demetrio, CHAN Coba, Gabriel and Bernardus H. J. DE JONG

2010 Árboles de Calakmul. ECCOSUR, Chiapas. 245 pages.

It is amazing that there is no such book for Parque Nacional Tikal, nor El Mirador. Even though it includes only half the estimated number of "trees," it has more tree species than Schulze and Whitacre for Tikal (they estimated about 200 but list only about 156 (their lists of species and lists by plant family are not identical).

The entire book is a totally free download; however, you can't copy and paste so it is difficult to add it to your discussion.

In the future it would be helpful to have a photographer with high-resolution equipment available and a book producer that can put these photos at a resolution that allows you to see the details. The photos of the overall tree have almost no visible detail. Nonetheless, the authors all have botanical experience, and this book is a good start. A second edition would be helpful. It would also help to have more than one page per photo.

http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/74R92GMRSJSEPFDEE5NJY4SJ2I8AK.pdf

PARKER, Tracey

2008 *Trees of Guatemala*. The Tree Press. 1033 pages.

Although more than half the book is copy-and-paste from *Flora of Guatemala*, it helps to have 99% of the trees of Guatemala in one single volume. And, since the Parker book is from year 2008, it has additional information for some trees.

PEÑA-Chocarro, María and **Sandra KNAPP**

2011 *Árboles del mundo maya*. Natural History Museum Publications. 263 pages.

Helpful book; contributing authors are experienced botanists. They cover 220 species of trees, more than virtually all other "Books on Trees of the Maya." Even includes *tasiste* (which is missing from all other books on "Trees of the Maya" except for the recent book on *Árboles de Calakmul*).

But if all this effort is going into a book, it would help if there were more photos, larger photos, and not so much blank space at the bottom of each page. Plus, it would help if the text could include personal first-hand experience with these trees out in the Mundo Maya. But even as is, it is a helpful book.

If you are doing field work you need this, plus *Árboles de Calakmul* and *Árboles tropicales de México*. Parker's book you need back in your office, since out in the field it's not much help due to lack of photographs. Back in your office the books by Regina Aguirre de Riojas are also helpful.

PENNINGTON, Terence D. and **José SARUKHAN**

2005 *Árboles tropicales de México*. Manual para la identificación de las principales especies. 3rd edition. UNAM, Fondo de Cultura Económica. 523 pages.

This book is serious botanical monograph. 1968 was the first edition (I still have this), 1998 was second edition. The 3rd edition is a "must have" book. Each tree has an excellent line drawing of leaves and often flowers and fruits (though to understand flowers you need them in photographs, in full color). Each tree has a map showing where in Mexico it was found (such maps are lacking in most books on *Trees of Guatemala* or plants of Belize). But trying to fit a description of a tree on one single page means that a lot of potential information on flowering time is not present. And this is definitely not a book on ethnobotany: for that you need Suzanne Cook.

SCHULZE, Mark D. and David F. WHITACRE

- 1999 A Classification and Ordination of the Tree Community of Tikal National Park, Peten, Guatemala. *Bulletin of the Florida Museum of Natural History*. Vol. 41, No. 3, pp. 169-297.

Even though from 20 years ago, it's the best list of trees of Tikal that I have found. There is a web site with plants of Tikal but they are not separated into trees, vines, shrubs, etc., so it is harder to use. The new monograph on *Arboles de Calakmul* is better than anything available so far on Tikal (and the nice albeit short book by Felipe Lanza of decades back on trees of Tikal is neither available as a scanned PDF nor as a book on Amazon or ebay).

STANDLEY, Paul C. and Samuel J. RECORD

- 1936 The Forests and Flora of British Honduras. *Field Museum of Natural History*. Publication 350, Botanical Series Volume XII. 432 pages plus photographs.

STANDLEY, Paul C.

- 1923 Trees and Shrubs of Mexico. *Contributions from the United States National Herbarium*, Volume 23, Part 3. Smithsonian Institution.

In this one monograph the species are not listed in alphabetical order, so it's a mental adventure finding the species you are looking for.

All monographs by Standley and co-authors can be easily found and downloaded. I would recommend finding the .pdf versions as they are easier to store, easier to copy, and easier to share with students and colleagues.

STANDLEY, Paul C. and Julian A. STEYERMARK

- 1949 Flora of Guatemala. *Fieldiana: Botany*, Volume 24, Part VI, Chicago Natural History Museum.

STANDLEY, Paul C. and Julian A. STEYERMARK

- 1958 Flora of Guatemala. *Fieldiana: Botany*, Volume 24, Part I Chicago Natural History Museum. 478 pages

TETETLA Rangel, Ericka

- 2010 Diversidad vegetal de especies raras y su relación con la estructura del paisaje a múltiples escalas espaciales en las selvas de la Península de Yucatán. Dissertation, Centro de Investigación Científica de Yucatán.

This is one of the better dissertations that I have seen and is as good as most peer-reviewed articles in scientific journals. It even has location maps for most of the trees.

VILLASEÑOR, José Luis

- 2016 Checklist of the native vascular plants of Mexico Catálogo de las plantas vasculares nativas de México. *Revista Mexicana de Biodiversidad* 87 (2016) 559–902.

<http://revista.ib.unam.mx/index.php/bio/article/view/1638/1296>

VILLAR Anléu, Luis

- 2005 Guatemala, Arboles Mágicos Y Notables. Empresa Eléctrica de Guatemala, Editorial Artemis-Edinter. 148 pages.

I always enjoy seeing an author who is really enthusiastic about what he is writing about. I have had this book in my office reference library for 15 years (since it first came out).

ZAMORA-Crescencio, Pedro, GUTIÉRREZ-Báez, Celso, FOLAN, William J., DOMÍNGUEZ-Carrasco, Ma. Del Rosario, VILLEGAS, Pascale, CABRERA-Mis, Geucilio, CASTRO-Angulo Claudeth and Juan Carlos CARBALLO

- 2012 La vegetación leñosa del sitio Arqueológico de Oxpemul, Municipio de Calakmul, Campeche, México. *Polibotánica*, Num 33, pp. 131-150

Download: www.scielo.org.mx/pdf/polib/n33/n33a9.pdf

Helpful web sites for any and all plants

There are several web sites that are helpful even though not of a university or botanical garden or government institute.

However, most popular web sites are copy-and-paste (a polite way of saying that their authors do not work out in the field, or even in a botanical garden). Many of these web sites are click bait (they make money when you buy stuff in the advertisements that are all along the sides and in wide banners also. This is why we prefer to focus on web sites that have reliable information.

<https://serv.biokic.asu.edu/neotrop/plantae/>

Neotropical Flora data base. To start your search, click on this page:

<https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php>

<http://legacy.tropicos.org/NameSearch.aspx?projectid=3>

This is the main SEARCH page.

<https://plantidtools.fieldmuseum.org/pt/rrc/5582>

SEARCH page, but only for collection of the Field Museum herbarium, Chicago.

<https://fieldguides.fieldmuseum.org/guides?category=37>

These field guides are very helpful. Put in the Country (Guatemala) and you get eight photo albums.

<http://enciclovida.mx>

CONABIO. The video they show on their home page shows a wide range of flowers pollinators, a snake and animals. The videos of the insects are great.

[www.kew.org/science/tropamerica/](http://www.kew.org/science/tropamerica/imagedatabase/index.html)
[imagedatabase/index.html](http://www.kew.org/science/tropamerica/imagedatabase/index.html)

Kew gardens in the UK is one of several botanical gardens that I have visited ().

www.ThePlantList.org

This is the most reliable botanical web site to find synonyms. In the recent year, only one plant had more synonyms on another botanical web site.

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

The reports are a joint production between the field trip team and the in-house office team. So here we wish to cite the full team:

Flor de María Setina is the office manager, overseeing all the diverse projects around the world (including FLAAR-REPORTS research on advanced wide-format digital inkjet printers, a worldwide project for over 20 years). We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Díaz environmental engineer, is project manager for flora, fauna projects (field work and resulting reports at a level helpful for botanists, zoologists and ecologists, and for university students). Also coordinates activities at MayanToons, division where educational material for kids is prepared.

Victor Mendoza identifies plants, mushrooms, lichen, insects, and arachnids. When his university schedule allows, he also likes to participate in field trips on flora and fauna research.

Vivian Hurtado prepares the bibliography for each subject and downloads pertinent research material for our e-library on flora and fauna. All of us use both these downloads plus our in-house library on flora and fauna of Mesoamerica (Mexico through Guatemala into Costa Rica).

Sergio Jerez prepares the bibliography of each topic and download the pertinent research material for our electronic library on flora and fauna. We all use these two downloads plus our internal library on Mesoamerican flora and fauna (Mexico through Guatemala to Costa Rica).

Andrea de la Paz is a designer who helps prepare the master-plan for aspects of our publications. She is our editorial art director

Senaida Ba is photography assistant for many years. She knows the Canon, Nikon and is learning the two new Sony mirrorless cameras. She prepares, packs, sets-up, and helps the photographers before, during, and after each day's field trip.

Jaqueline González is a designer who puts together the text and photographs to create the actual report (we have several designers at work since we have multiple reports to produce).

Roxana Leal is Social Media Manager for flora and fauna research and publications, and MayanToons educational book projects

María Alejandra Gutiérrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens for photographing tiny insects, tiny flowers, and tiny mushrooms. Work during and after a field trip also includes sorting, naming, and processing. And then preparing reports in PDF format.

David Arrivillaga is an experienced photographer and is able to handle both Nikon and the newest Sony digital cameras. Work during and after a field trip also includes sorting, naming, and processing.

Juan Carlos Hernández takes the material that we write and places it into the pertinent modern Internet software to produce our web pages (total network is read by over half a million people around the world).

Paulo Núñez is a webmaster, overlooking the multitude of web sites. Internet SEO changes every year, so we work together to evolve the format of our web sites.

Valeria Áviles is an illustrator for MayanToons, the division in charge of educational materials for schools, especially the Q'eqchi' Mayan schools in Alta Verapaz, Q'eqchi' and Petén Itzá Maya in Petén, and the Q'eqchi' Mayan and Garifuna schools in the municipality of Livingston, Izabal.

Josefina Sequén is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Rosa Sequén is also an illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Laura Morales is preparing animated videos in MayanToons style since animated videos are the best way to help school children how to protect the fragile ecosystems and endangered species

Heidy Alejandra Galindo Setina joined our design team in August 2020. She likes photography, drawing, painting, and design.

María José Rabanales she is part of the team for editing photographic reports and educational material of Flora and Fauna since September 2020. She works together with others of the team to prepare the finished pdf editions of the material of the Yaxha, Nakum and Naranjo Project.

Alejandra Valenzuela biology student is now part of Flora y Fauna's photographic report and educational material editing team since September 2020.

Alexander Gudiel designer who join the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Cristina Ríos designer student who join the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Carlos Marroquín is a USAC graphic design student who volunteered to do his professional practice with the Editorial Design Team. We are very grateful with people like him who join our team and bring his knowledge and work.

Permissions

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www.maya-ethnobotany.org or www.maya-ethnozooology.org or www.maya-archaeology.org or www.digital-photography.org or www.FLAAR-Mesoamerica.org.

FLAAR (in USA) and FLAAR Mesoamerica (in Guatemala) are both non-profit research and educational institutes, so there is no fee. And you do not need to write and ask permission; but we do appreciate when you include a link back to one of our sites.

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Any web site in or related to the Municipio of Livingston, is also welcome to post this PDF on their web site (no fee). This permission includes travel agencies, hotels, guide services, etc. And you do not need to write and ask permission; but we do appreciate when you include a link back to one of our web sites.

CECON, CONAP, FUNDAECO, INGUAT, ARCAS, IDAEH, Municipio de Livingston, etc. are welcome to publish our reports, at no cost.

All national parks, nature reserves, and comparable are welcome to have and use our reports at no cost.

To publish photographs

Hellmuth's photographs have been published by National Geographic, by Hasselblad Magazine, and used as front covers on books on Mayan topics around the world. His photos of cacao (cocoa) are in books on chocolate of the Maya and Aztec both by Dr Michael Coe (all three of editions) and another book on chocolate by Japanese specialist in Mayan languages and culture, Dr Yasugi. We naturally appreciate a contribution to help cover the costs our office expenses for all the cataloging, processing, and organization of the photos and the field trip data.

For your social media

You can post any of the FLAAR Mesoamerica PDFs about the Municipio of Livingston on your Social Media sites; you can send any of these PDFs to your friends and colleagues and family: no cost, no permission needed.

We hope to attract the attention of professors, botanical garden clubs, orchid and bromeliad societies, students, tourists, experts, explorers, photographers and nature lovers who want to get closer, to marvel at the species of flowering plants, mushrooms and lichen that FLAAR Mesoamerica finds during each field trip each month.

PHOTO FROM BACK COVER

Photo by: Nicholas Hellmuth. FLAAR Mesoamerica, Jun. 25, 2021. Petén, Guatemala. Camera: iPhone 12 pro.

Base Camp Assistance in Parque Nacional Tikal

While doing field work in the Tikal national park about a decade ago we appreciate the house provided to us by the park administration. We also thank the Solis family, owners of the Jaguar Inn, for providing a place to stay when park facilities had other occupants. We also thank the Solis family for food in their Jaguar Inn restaurant.

Base Camp Assistance in PNYNN

We thank Biologist Lorena Lobos and both co-administrators of PNYNN (Arq. Jose Leonel Ziesse (IDAEH) and Ing. Jorge Mario Vazquez (CONAP) for providing a place to stay for the photographers, biologists, and assistants of the FLAAR Mesoamerica team of flora and fauna.

Ecolodge El Sombrero

I thank Gabriella Moretti, owner of Ecolodge El Sombrero, for providing hotel room and meals while we have been doing field work at Parque Nacional Yaxha, Nakum y Naranjo. We also appreciate the hospitality of her sons Sebastian de la Hoz and Juan Carlo de la Hoz. Every workday is exhausting because we are carrying and then using very heavy cameras, super-telephoto lenses, sturdy tripods, large gimbals or ball tripod heads. Thus it is crucial for my health to be able to rest and totally recuperate every night in order to be ready for the following day of botanical and zoological adventures in Parque Nacional Yaxha, Nakum y Naranjo.

Equally crucial is having a place to charge the batteries of the computers, or all the cameras, and of the cell phones. Solar power is great, but it lasts only an hour, or less, if you plug in multiple computers and cameras and flash batteries to charge. So a place with enough electricity to charge the entire mass of essential field work equipment is essential and thus very much appreciated.

Contact Info: +502 5460 2934, VentasElSombrero@gmail.com or WhatsApp.

www.elsombreroecolodge.com/en-us

This report can be cited in your preferred style.

Here is the basic information:

HELLMUTH, Nicholas

2021 Introduction to Flora and Fauna of Biotopo Cerro Cahú and Potential Here for Further Research, Reserva de la Biósfera Maya Petén, Guatemala. FLAAR and FLAAR Mesoamerica.



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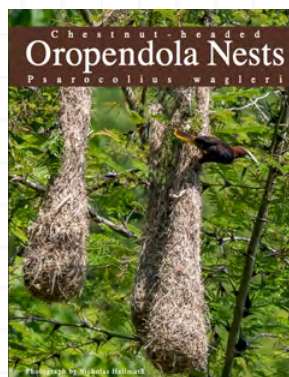
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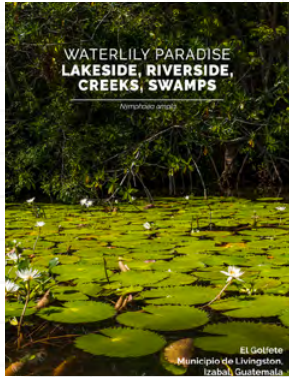
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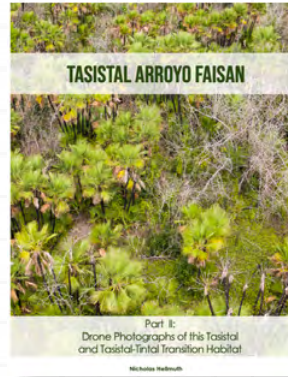
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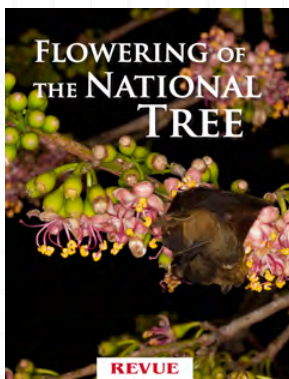
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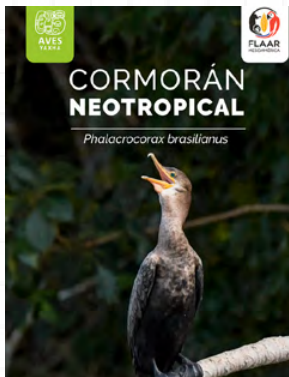
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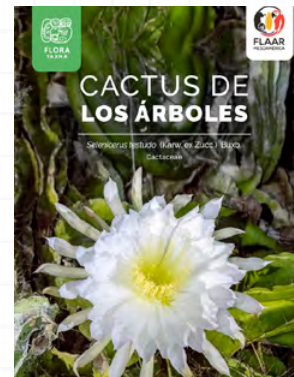
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