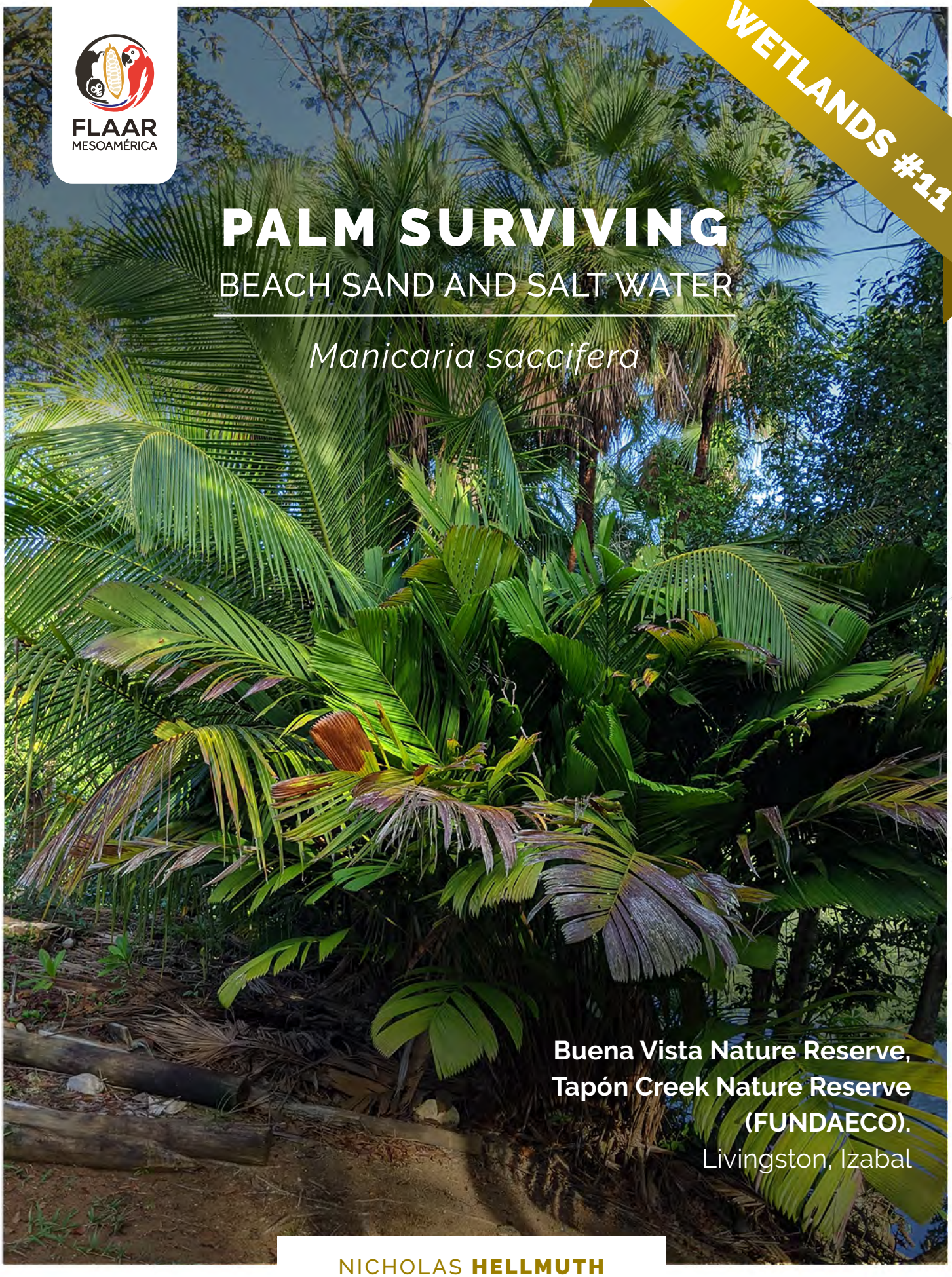
FLAAR
MESOAMÉRICA

WETLANDS #11

PALM SURVIVING

BEACH SAND AND SALT WATER

Manicaria saccifera



Buena Vista Nature Reserve,
Tapón Creek Nature Reserve
(FUNDAECO).
Livingston, Izabal

NICHOLAS **HELLMUTH**

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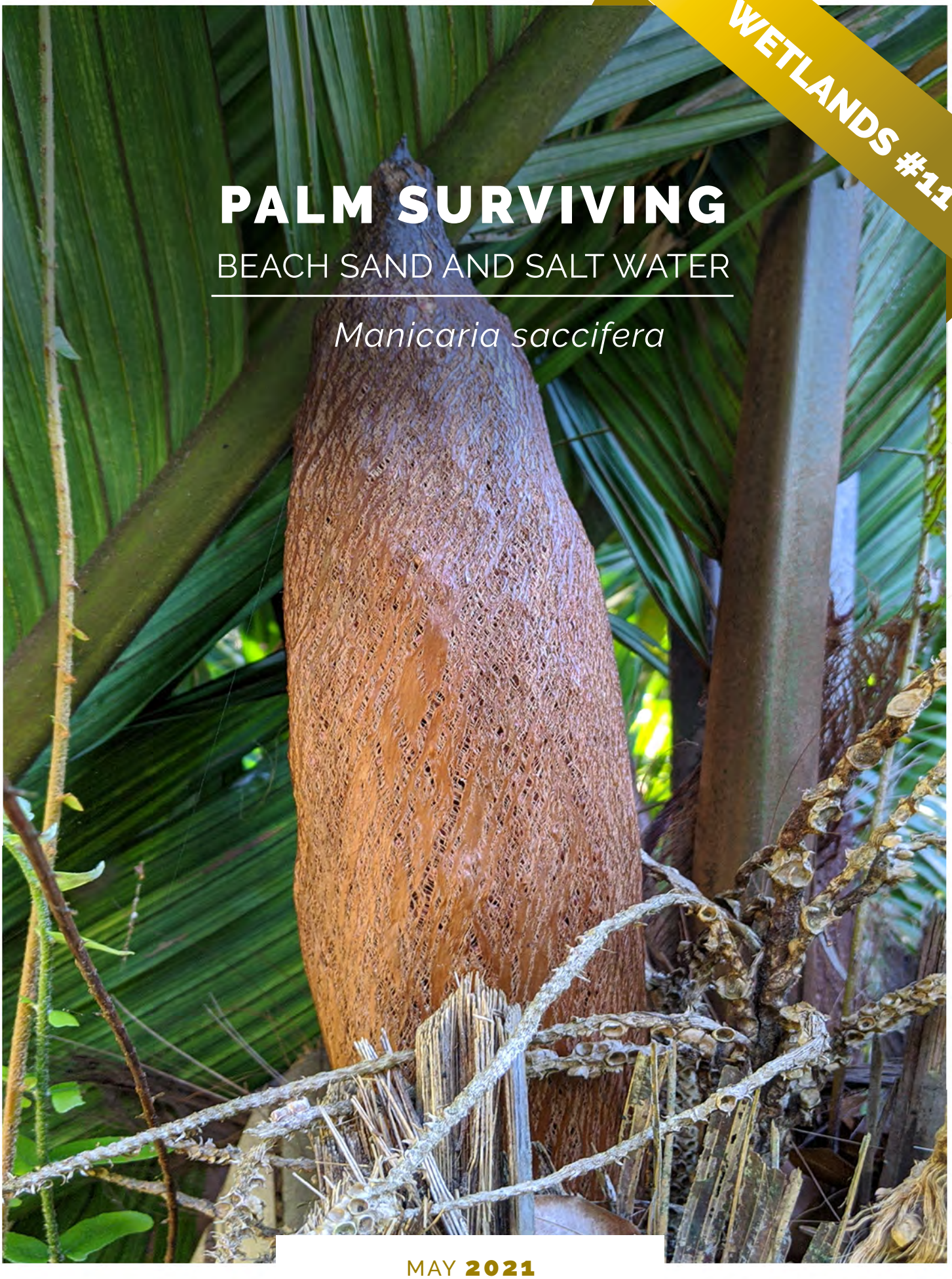

MAY **2021**

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The helpful individuals listed below are all part of the FLAAR Mesoamerica research and field work team. The office research team, webmaster, and web designers are additional individuals in the main office in Guatemala City. Since each report is a different plant or animal, the individuals who assist in preparing the bibliography, species identification and botanical information category are not the same for each report.

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FRONT COVER PHOTOGRAPH
Manicaria saccifera. Palm that grows near the beach.

Photography by: Nicholas Hellmuth,
FLAAR Mesoamerica, Dec. 3, 2020, 7:25 a.m.
Lagunita Creek reserve, Municipio de Livingston.
Camera: Google Pixel 3.

TITLE PAGE PHOTOGRAPH
Manicaria saccifera and its seed pod.

Photography by: Nicholas Hellmuth,
FLAAR Mesoamerica, Dec. 3, 2020, 7:30 a.m.
Lagunita Creek reserve, Municipio de Livingston.
Camera: Google Pixel 3.

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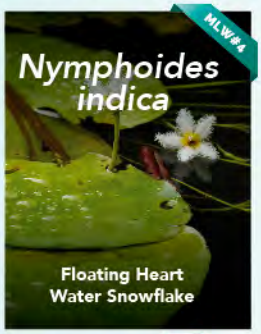

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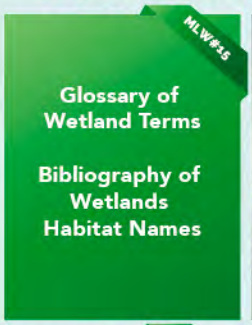
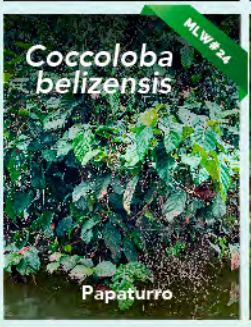
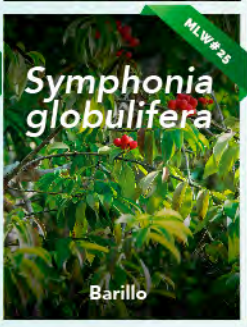






FLAAR

GLOSSARY: PALM vs. TREE TERMS

Leaf vs. **Frond:** all my life I used the word frond for a palm; but now that I do botanical research, I was surprised to find that most botanists use the word leaf. The term Frond is used by botanists almost exclusively when refering to ferns.

Palm vs. **Tree:** most websites call this a palm tree. I realize "a palm is technically not a tree" but I tend to call them "palm trees". Often lists of "Trees of…" a particular area of Mesoamerica do include palms. Some xate palms are definitely not "trees."

Palmate leaves: palmate is a technical botanical designation for what is referred to normally as a fan palm; botan palms and escoba palms are the most common in the Maya Lowlands. If you really want to learn botanical jargon, also look up costapalmate leaves (found on Sabal species).

Trunk vs. **Stem:** I tend to prefer the word trunk, since a corozo palm "stem" is as big as a most tree trunks. Stem fits pacaya and other palms with thinner trunks, or tasiste palm where 8 to 14 stems rise out of a single root mass. But the main reason I prefer to use the word trunk is that even for the dozen tasiste palms rising from a single root mass, each tasiste is a complete palm with all parts. It is a lot more than a stem portion of something else.

For a technical botanical glossary that will exercise your brain, here you go:
http://idtools.org/id/palms/palmid/glossary.php

ANDERSON, P. J.

2011 Identifying Commonly Cultivated Palms. In A Resource for Pests and Diseases of Cultivated Palms. Florida Department of Agriculture and Consumer Service, Division of Plant Industry and Identification Technology Program, CPHST, PPQ, APHIS, USDA; Fort Collins, CO.

Life on land is the Sustainable Development Goal (number 15 of the United Nations propossal) which claims to ensure the conservation of terrestrial and freshwater ecosystems. Municipio de Livingston has multiple natural protected areas that include tropical rain forests and species associated to rivers.

GLOSSARY FOR WETLANDS

Coastal, beach: The coastal zone is a dynamic part of the Earth's surface where both marine and atmospheric processes produce rocky coasts, as well as beaches and dunes, barriers and tidal inlets, and shape deltas.

https://www.nature.com/scitable/knowledge/library/coastal-processes-and-beaches-26276621/

Crique: is one of many ways of spelling the local rural pronunciation of Creek. I have seen it spelled several other ways; but it is pronounced crique. I only heard this word after beginning to do field work in the Caribbean area of Guatemala (Municipio de Livingston, Izabal).

Humedal: is a generic term in Spanish for **wetland**, generally more **marsh**-like than **swamp**-like.

Lakeside: is the land adjacent to a lake.

Manantial: is a generic term in Spanish for spring, is a point at which water flows from an aquifer to the Earth's surface.

Marsh: It usually has water all year but has no total tree cover. Grasses, reeds and low plants are very common, as well as underwater plants and floating plants.

Pantano: could be considered a Spanish translation of marsh, so lots of reeds and grasses (but not many trees). If the area is a forest with water at the foot of every tree, tree, similar to a swamp. The definition of each of these words depends a bit whether you are in the wetlands of Tabasco, or Río San Pedro (western Petén), or near Monterrico (inland from Pacific Ocean coast of Guatemala) or in the Municipio de Livingston.

Riperian: the bank of a river or stream. In a location such as the Municipio de Livingston, it would help to have a single word for the bank of a river, stream, and lagoon. I will use shoreline or comparable.

GLOSSARY FOR WETLANDS

Sandy shore habitat: is a challenge to define since when you hike along the beach of Amatique Bay, Municipio de Livingston (Caribbean area of Guatemala) you get a different habitat every kilometer. Where the waves break and where there is relatively pure sand, is the "beach." But a few meters inland you get swampy areas, or more sand, or sand but also lots of soil. Often the shore is the edge of a hill (so no beach to walk on). We found *Amphitecna latifolia* in several of these variants of coastal shore.

Swamp: usually has water all year but has lots of trees. During the rainy season the water simply gets deeper. Petén has more marshes than swamps; Izabal has both. You get mangrove swamps all around the Caribbean coast and parallel to the Pacific Ocean coast (several impressive mangrove swamp areas inland from the Pacific coast of Guatemala).

Swampo: is the way this is pronounced in the Caribbean area of Guatemala.

Wetland or **wetlands:** to me is a generic word to cover swamps, marshes, and seasonally inundated areas. Each ecologist and geographer and botanist use their own academic terms. But, Holdridge (initiator of life zone systems concept) never hiked through the Savanna of 3 Fern Species nor the Savanna East of Nakum (PNYNN) nor took a boat up all the rivers entering into El Golfete. And if he cruised up Arroyo Petexbatún, he (and Lundell and all other capable scholars who accomplished fieldwork in Petén) did not get out of their seats on the lancha to hike through the tintal swamps to see what was 100 to 200 meters inland.

Seasonally inundated: means that during the rainy season a flatland has standing water (several centimeters to almost a meter; obviously varies by rainfall and drainage). A tintal is a seasonally inundated area of palo de tinta (palo de Campeche, *Haematoxylum campechianum*). Some corozeras, if on a flat area, are seasonally inundated (two corozeras between Yaxha and Nakum and one on the west edge of the ruins of Naranjo (Parque Nacional Yaxha, Nakum and Naranjo). A corozera is an area of predominantly corozo palm, *Attalea cohune*. The Savanna East of Nakum was bone dry when we visited it in 2018-2019 field seasons; but had snail shells everywhere, documenting that in a more rainy year much of this same "savanna" has standing water. Tasistal, some guanal areas, escobal areas are also seasonally inundated (Lundell 1937 for some areas of Petén; but not the entire departamento).

Manicaria saccifera.

Photography by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 3, 2020, 7:26 a.m.
Lagunita Creek reserve, Municipio de Livingston.
Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/200 sec; f/5.6; ISO 640.

INTRODUCTION TO *MANICARIA* ***SACCIFERA*, CONFRA PALM**

During our October 2020 field trip to the Municipio de Livingston we have found *Manicaria saccifera* palm everywhere on and near the Caribbean Coast:

- on the sandy area around the houses on the beach of Buena Vista Tapón Creek (150 meters west of mouth of Tapón Creek)
- in the seasonally inundated areas a hundred meters inland
- around aldea Buena Vista nature reserve (managed by the community of Buena Vista)
- and around Tapón Creek nature research (managed by FUNDAECO).

Coconut palms were all along the beach also. Lots of pimientillo palms in brackish water. These *Acoelorrhaphe wrightii* palms can adapt to salt water or brackish water or inland water with no seawater anywhere near (such as Arroyo Petexbatún, Sayaxché, Petén, Guatemala). In the Municipio de Livingston you notice *Acoelorrhaphe wrightii* palms along the shore of Tapón Creek, along the shore of El Golfete area of Río Dulce, etc. Surely they are also inland but we transit these areas primarily by boat.

The present FLAAR report on *Manicaria saccifera*, confra palm, is to bring this plant to attention of

- botanists, soil scientists, ecologists (to figure out why this palm is not often found along the shores of the Yucatan peninsula)
- ethnobotanists and archaeologists (confra palm is potentially best house roof thatch, potentially longer lasting than even guano and much better than corozo)
- local people today (this palm is a biodegradable eco-friendly source of multiple products for houses and to sell to tourists to help local Q'eqchi' Mayan and Garifuna people earn support for their families)
- also we wish to alert engineers and architects (since the fibers of *Manicaria saccifera* can help modern construction (Porras et al. 2012, 2015, and 2016).

There are several aldeas or communities with the name of Buena Vista in the same areas of Guatemala; the one we are focusing on is Buena Vista Tapón Creek. This is facing Amatique Bay about 200 meters east of where Tapón Creek enters the Amatique Bay. We are trying to get it listed by Google Maps (which lists only another aldea with the same name elsewhere in Izabal).

In the meantime, we have made our own maps of the coast of the Municipio de Livingston which are more accurate than the maps of Google!

Manicaria saccifera.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 17, 2020, 10:13 a.m. Playa Quehueche, Livingston. Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/200 sec; f/5.6; ISO 640.

ACCEPTED NAME **AND SYNONYMS**

The accepted name is *Manicaria saccifera* Gaertn. Plant family Arecaceae.

Synonyms are:

- *Manicaria atricha* Burret
- *Manicaria plukenetii* Griseb. & H.Wendl.
- *Manicaria saccifera* var. *mediterranea* Trail
- *Manicaria saccifera* var. *plukenetii* (Griseb. & H.Wendl.) Drude
- *Pilophora saccifera* (Gaertn.) H.Wendl.
- *Pilophora testicularis* Jacq.

COMMON **NAMES**

Confra is one common local name.

> "Cabecinegro", "Napa", "Jícara", "Jicra", "Yajuji", "Mavaco", "Temiche" (Venezuela), "Palma Real" (Costa rica), "Tukira" (Embera), "k.ed" (Waudnana).

(Cañas 2011: 36).

WHAT OTHER PLANTS HAVE **SIMILAR COMMON NAMES**

Cabecinegro is the name by which different species of birds are known that have a black head and a different color body. Napa is the name by which Chinese cabbage is known in México. Jícara is the common name of the species *Crescentia cujete*.

HABITAT: *MANICARIA SACCIFERA* GAERTN **IN GUATEMALA ONLY IN COASTAL ZONES**

You see massive cohune (Corozo) palms as you drive into Izabal from the less wet areas south. These *Attalea cohune* and/or close relatives are in most hillside cow pastures between Livingston and Plan Grande Tatín. But around the coastal beach area of Buena Vista and brackish inland creek areas of Tapón Creek, and Taponcito Creek nature reserves, there are only a few areas with multiple examples of corozo palm. Same with guano palm: not many here near the coast. Is sea breeze and brackish water something these palms are not keen on?

Yet on other parts of the Caribbean shore there are majestic growths of corozo palm. So we have a lot more to learn about. But in the meantime, where there are not many Petén hillside palms, in the seasonally inundated flatlands of Izabal there are thousands of *Manicaria saccifera* palms, called confra. These palms have impressive potential for housing materials.

Punta de Manibique is mostly mangrove swamps. Lots of salt water on the outside and brackish water on the Amatique Bay inside. So you can expect *Manicaria saccifera* palms.

HABIT

- Palm.

Manicaria saccifera

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Apr. 25, 2020, 4:07 p.m. Tapón Creek, Livingston. Camera: iPhone 12 Pro Max.

BOTANICAL DESCRIPTION OF *MANICARIA* ***SACCIFERA*** **BY STANDLEY AND COLLEAGUES**

Manicaria saccifera Gaertn. Fruct. & Sem. 2: 469. pi. 176. 1791. Yolillo; Confra; Manaca. Figure 45. Abundant in coastal swamps of the north coast, not extending in-land beyond the influence of tidewater. British Honduras to Brazil. Plants sometimes 6 meters high, but usually lower, the trunk usually short or almost none; leaves often 5 meters long; inflorescence about a meter long; fruit 4-5 cm. in diameter, covered with numerous thick, irregularly pyramidal tubercles.This is the most abundant and conspicuous plant in the extensive tidal swamps along the North Coast, as at Puerto Barrios, where it forms wide dense stands. In Guatemala the trunks usually are short or the plants acaulescent, but sometimes the trunks attain here a height of at least 8 meters. They are much infested with mosses, *Nephrolepis* (a fern), and other epiphytes. The huge leaves are much used along the Atlantic coast of Central America for thatch, and are said to last longer than those of any other palms. The soft brown feltlike spathes, composed of tough, closely interlaced fibers, form a sort of conic covering for the spadix. They are sometimes used in Panama for making long-peaked caps that are one of the articles sold to tourists there. The plant is called "gudgara" in Panamá.

(Standley and Steyermark 1958: 271, 273).

Manicaria saccifera. Seed pods with the seeds about to beeng exposed.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 25, 2021, 4:03 p.m. Tapón Creek, Livingston. Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/200 sec; f/10; ISO 1,600.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 25, 2021, 4:03 p.m. Tapón Creek, Livingston, Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 25, 2021, 3:59 p.m. Tapón Creek, Livingston.
Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/200 sec; f/10; ISO 1,600.

MANICARIA SACCIFERA **DESCRIBED FOR BELIZE**

> A palmaceous swamp forest is found in the Toledo region in a fan-shaped area around the estuary of the Temash River. Here *Manicaria saccifera* (Comfray Palm) is the predominating species, its chief associates being *Calophyllum brasiliense* var. Rekoi (Santa Maria) and *Symphonia globulifera* (Waika Chewstick). The brackish savanna is colonized by *Acoelorraphe* and *Chrysobalanus*, with the later addition of *Bucida Buceras* (Bulletwood) and *Achras Zapota* (Sapodilla) in the northern region and *Symphonia* in the central and Toledo regions. *Calophyllum* is a commonly occurring species in this swamp forest in all three regions. Fresh water savannas are colonized in silting lagoon areas by *Acoelorraphe* and *Chrysobalanus*, associated in the north with *Cameraria belizensis* (White Poisonwood) and *Crescentia*, and in the Toledo region with a swamp *Ficus* sp. and *Schizocardia belizensis.*
>
> (Standley and Record 1936: 22).

Cyrus Lundell was one of the more productive ethnobotanists in Petén because he listed all the plants that were found in each area. This is what helps us the most, to know how many plants to expect in a savanna, how many on a hillside, how many in a tintal (bajo), etc. But he did not find *Manicaria saccifera* in Petén.

Standley and Steyermark don't list all the plants of a specific area very often, but Standley and Record produced the paragraph that we cite above. This tells us what plants to expect near *Manicaria saccifera* plants in Belize. We can thus estimate that many and potentially all of these associated plants will be in the confra seasonally wet swamps of the Buena Vista and Tapón Creek ecosystems south of Río Sarstún (Sarstoon River). Because of the benefits of this list we tabulate it here, so that next time we return to Livingston we can check the similarities and differences and add the trees from the Tapón Creek and Lagunita Creek areas.

GENUS SPECIES	PLANT FAMILY	LOCAL NAME	Q'EQCHI' MAYAN NAME	COMMENTS
Acoelorrhaphe wrightii	Arecaceae	Tasiste in Petén, pimientillo in Izabal		Xk´ib´ ihá es comunmente palmera o palma
Achras zapota synonym; today accepted name is *Manilkara zapota*	Sapotaceae	Sapodilla		
Bucida buceras	Combretaceae	bulletwood		Bully wood is a completely different tree genus and species
Calophyllum brasiliense *Calophyllum brasiliense* var. *Rekoi* (synonym)	Calophyllaceae	Santa Maria	Leech´	
Chrysobalanus probably *C. icaco*	Chrysobalanaceae	coco-plum, pigeon plum		
Pachira aquatica	Malvaceae	zapoton		
Symphonia globulifera	Clusiaceae	Barillo, Waika Chewstick	Bariiy	

Bullet tree and bully tree sound so similar when you are hiking through the rain forests and you ask a bilingual Spanish and Mayan local person. So we need to double-check whether it is Pucte that is associated with *Manicaria saccifera* or *Terminalia amazonia.*

> **Manicaria saccifera** Gaertn. Confra, Yolillo (Guatemala). In coastal swamps in the southern part of the colony; ranging to Brazil. Plants coarse, sometimes 6 meters high or larger, but usually with a very short trunk, unarmed; leaves numerous, erect or ascending, often 5 meters long; inflorescence branched, about a meter long, with 2 spathes, the outer short, the inner a tough fibrous sac; flowers inserted in pits in the rachis; fruit of 1-3 globose, 1-seeded, partly united carpels, 4-5 cm. in diameter, covered with numerous thick, irregularly pyramidal tubercles.The leaves are much used in some parts of Central America for thatch-ing, and are said to last for many years. The brown, feltlike spathes, composed of tough, interlacing fibers, form a persistent conic covering for the spadix. They are employed for fashioning long-peaked caps that are one of the articles commonly sold to tourists in Panama.
>
> (Standley and Record 1936: 84-85).

Standley and Record spelled it Comfray on page 22 and Confra on page 84. We asked local people and they said in Izabal it's Confra (Lucas Cuz, by phone, Oct. 21, 2020).

MANICARIA SACCIFERA IN BELIZE

There is a "*Manicaria* swamp" in the Temash River area of Sarstoon Temash park (Meerman, Herrera, and Howe 2003).

No mention as FOOD in Belize because this palm is no longer eaten; but it is documented as edible in enough other locations. But here is today's ethnobotanical status for Belize:

> **Manicaria saccifera** Gaertn. — **Reg Use:** PRD, CNST, OIL. — **Habit:** Palm.
>
> (Balick, Nee and Atha 2000: 195).

WHERE ELSE CAN YOU **FIND *MANICARIA SACCIFERA?***

No listing for *Manicaria saccifera* whatsoever in Villaseñor 2016 (not in almost "a thousand pages of plant lists"). So far this confra palm is listed primarily for the sea coastal areas of Belize, Izabal, Honduras and down south into South America. I am thus surprised not (yet) to find it in sea coastal areas of Quintana Roo, Yucatán, Campeche, Tabasco or Veracruz (México). This raises the question of What is in the sand and soil of Belize and Izabal that is missing in Quintana Roo and elsewhere around the Caribbean?

90% of the maps of botanical gardens and websites are totally incorrect for distribution: these maps are just colored blobs that show an entire country with green when a plant is found even only in one small area of that country.

www.plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:668116-1

The same incorrect map is on PalmWeb, Palms of the Word Online.

This is misleading to students and scholars who do not know the plant in-person or the ecosystems of the country that is blobbed with the supposed total presence of a plant. The location for this plant is coastal (for Guatemala and Belize) and the map should show this in an acceptable manner.

THE SEED PODS OF *MANICARIA SACCIFERA* **LOOK LIKE A MASS OF BULL BALLS**

Manicaria saccifera.

Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica, Apr. 27, 2021, 3:44 p.m.
Playa aldea Buena Vista, Tapón Creek.
Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photo by: Nicholas Hellmuth,
FLAAR Mesoamerica, Apr. 27, 2021, 11:07 a.m.
Playa aldea Buena Vista, Tapón Creek.
Camera: iPhone 12 Pro Max.

No wonder this palm was called *Pilophora testicularis* Jacq. by some humorous botanist a century or so ago. During the mid-month week of October there were no inflorescences, but many of the palms had clusters of tangerine-sized brown balls. These are much bigger than most other palms.

OTHER PALMS FOUND IN *MANICARIA* SWAMPS NOTED BY **STANDLEY AND STEYERMARK OR BY OTHER BOTANISTS**

Calyptrogyne Donnell-Smithii (Dammer) Burret, Bot. Jahrb. 63: 133. 1930. *Geonoma Donnell-Smithii* Dammer, Bot. Jahrb. 36, Beibl. 80: 32. 1905. Capoca; Guiscoyol (doubtless an erroneous name, belonging properly to *Bactris* and *Pyrenoglyphis*); Coroz. Figure 40.

Dense wet mixed lowland forest, sometimes in *Manicaria* swamps, 600 meters or less, mostly at or near sea level; Izabal; perhaps endemic but to be expected in British Honduras and Honduras. Plants small, acaulescent or with a very short caudex; leaves 1 meter long or more, the petiole short, 40 cm. long or usually much shorter, the blades dull deep green, unequally pinnatisect, the segments linear or broader, 35-45 cm. long, the blade with about 24 nerves on each side; inflorescence simple, the peduncle very slender, greatly elongate, stiff but flexible; lower spathe 26 cm. long or more; rachis of the spadix dull salmon-red to dark red, about 25 cm. long and 7 mm. thick, glabrous, the pits 7-ranked; staminate sepals 4.5 mm. long, the pistillate 4 mm. long; fruits ascending along the rachis (not divaricate), globose-oval, black at maturity, about 8 mm. long when dried, larger when fresh.This palm has been reported from Guatemala under the name *Geonoma Olfersiana* Klotzsch, which belongs to a true *Geonoma* native in Brazil.

(Standley and Steyermark 1958: 215).

OTHER PLANTS FOUND IN *MANICARIA* SWAMPS NOTED BY **STANDLEY AND STEYERMARK OR BY OTHER BOTANISTS**

> *Manicaria saccifera* (Comfray Palm) is the predominating species, its chief associates being *Calophyllum brasiliense* var. *Rekoi* (Santa Maria) and *Symphonia globulifera* (Waika Chewstick).

(Standley and Record 1936: 22).

> **Urospatha Tuerckheimii** Engler, Bot. Jahrb. 37: 121. 1905.
> Type from Livingston, Izabal, Tuerckheim II.I 131; represented in the Herbarium of Chicago Natural History Museum by a photograph of the type (Negative no. 12195). Frequent in *Manicaria* swamps of the north coast (Izabal). Endemic. Plants 1-1.5 meters high; petioles greatly elongate, vaginate for 20 cm.; blades sagittate, 60 cm. long or more, acuminate, the basal lobes equaling or shorter than the midlobe, somewhat divergent, separated by a broad sinus, more or less acuminate; peduncles about 50 cm. long; spathe bronze outside, yellow-green within, linear-lanceolate, twisted above, 20-35 cm. long, 3.5-6 cm. wide, narrowly longattenuate, open almost to the base; spadix short-stipitate, 4-7 cm. long, 1.5-2 cm. thick, very obtuse, purplish green; sepals 4; cells of the ovary 2-ovulate.A rather showy but not especially handsome plant, its huge leaves succulent, soft and flabby. The plant in gross aspect is quite similar to *U. sagittifolia*, illustrated by Engler, Pflanzenreich IV. 23C:/. 12. 1911.

(Standley and Steyermark 1958: 357-358).

Today, with half a century of updates of older botanical names, *Urospatha Tuerckheimii* Engler, is written *Urospatha tuerckheimii* Engl. and is considered a synonym of the now accepted name *Urospatha friedrichsthalii* Schott

www.theplantlist.org/tpl1.1/record/kew-211207.

We need to find this Araceae on future field trips. Fortunately there are no crocodiles anywhere in these areas, curious, since you should get the coastal crocodile in addition to the river crocodile. Upstream you get the river crocodile, but rarely in the Municipio de Livingston. This is unfortunate because the Classic Maya used several aspects of crocodiles in their religious symbolism and clothing for kings and celebrants. But at least we can wade into swamps and wetlands without worrying about crocodiles (not an issue because there are plenty of other things to "get you" if you wade into a swamp or wetland to study plants up close). But any time I need to do macro photography of a plant in a swamp or marsh I do it no matter what (though I did end up in the Emergency Room after needing to fly back to the USA after a severe injury in a swamp while exploring for a plant I had never noticed before).

> La flora de las distintas asociaciones vegetales es variada de acuerdo a los diferentes ambientes y la cercania al mar. Se considera los pantanos de confra la mas tipica flora del humedal. Sus especies principales son la confra (*Manicaria saccifera*), el palosangre y el barillo (*Symphonia globulifera*).
>
> (Cifuentes 2008: 34).

Palosangre (sic) means Palo Sangre, *Pterocarpus officinalis.*

Manicaria saccifera.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Apr. 25, 2020, 4:07 p.m. Tapón Creek, Izabal, Guatemala. Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 26, 2021, 4:03 p.m. Tapón Creek, Izabal, Guatemala. Camera: iPhone 12 Pro Max.

MANICARIA SACCIFERA HAS FIBERS SO STRONG THEY ARE IN DEMAND TODAY FOR MIXING WITH OTHER **MATERIALS TO MAKE CONSTRUCTION PANELS**

Local people tell us that palm of *Manicaria saccifera* lasts longer as house roof thatch than most other palms. And the spathes of this plant have a multitude of natural fibers which are so strong that even modern engineers feel they are of considerable potential for sandwich core panels for construction, for airplanes, and a multitude of modern uses.

Botanists knew of this strength already in the 1800's:

> Structural Fiber. —The fibrous spathes of this palm are well adapted for use in the manufacture of caps, mats, etc. They are also converted into bags, by simply cutting round them near the bottom and pulling them off entire, afterward stretching them open as wide as possible without tearing. When cut down one side and opened they supply a coarse but strong fabric, or kind of cloth.
>
> (Dodge 1897: 235).

So our team at FLAAR (USA) working with our Guatemalan branch (FLAAR Mesoamerica) wishes to find all areas with this palm in Guatemala. This palm needs to be protected (so not chopped down to make teak plantations, chopped down to make African palm plantations, since neither of these plants are native). African palm requires pesticides and so many chemicals that plantations have caused serious ecological damage to Río la Pasión near Sayaxché, Petén. It is more helpful to work with an eco-friendly, renewable, bio-degradable natural resource like *Manicaria saccifera.*

Manicaria ***saccifera***

Manicaria ***saccifera***

USES OF *MANICARIA SACCIFERA* **AS A FIBER SOURCE**

Two guagará (*Manicaria saccifera* Gaertn.) palms grow in La Martillada village, and elders recall that the fruit covering (tutulo) of the guagará palm was used as a shoulder bag.

(Müller-Schwarze 2015: 267)

¡!

The fibers of this coastal palm can also be used to make handicrafts for the home and to sell to tourists (to assist local people to have income to support their families).

Manicaria saccifera.

Photography by: Nicholas Hellmuth,
FLAAR Mesoamerica, Dec. 03, 2020, 07:26 a.m.
Lagunita Creek reserve, Municipio de Livingston.
Camera: Google pixel 3.

CREDITS FOR PAGE 29 and 30.
Manicaria saccifera.

Photo by: David Arrivillaga,
FLAAR Mesoamerica, Apr. 27, 2021, 11:07 a.m.
Tapón Creek, Izabal, Guatemala.
Camera: iPhone 12 Pro Max.

LEAVES OF *MANICARIA SACCIFERA* **ARE AS POPULAR AS THATCH**

The local Q'eqchi' Mayan people all told us that palm leaves of *Manicaria saccifera* is significantly longer-lasting than corozo, and even lasts longer than guano palm thatch roofs. We found and photographed several Mayan homes with confra as roof thatch.

Manicaria saccifera.

Photography by: Nicholas Hellmuth,
FLAAR Mesoamerica, Dec. 18, 2020, 1:49 p.m.
Vuelve Mujer, Municipio de Livingston, Izabal.
Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photography by: Nicholas Hellmuth,
FLAAR Mesoamerica, Dec. 18, 2020, 1:49 p.m.
Vuelve Mujer, Municipio de Livingston, Izabal.
Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photography by: Nicholas Hellmuth, FLAAR Mesoamerica, Dec. 3, 2020, 7:26 a.m.
Lagunita Creek reserve, Municipio de Livingston, Guatemala.
Camera: Sony A7R (ILCE-7RM4). Lens: Sony FE 90mm Macro G OSS. Settings: 1/200 sec; f/5.6; ISO 640.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 17, 2020, 10:13 a.m. Playa Quehueche, Livingston. Camera: iPhone 11 Pro Max.

USES BESIDES **THATCH: OIL**

> **Manicaria saccifera** Gaertn. Fruct. & Sem. 2: 469, t. 176. 1791. Yolillo, confra, manaca, temiche palm. Belize to Brazil in brackish coastal swamps. The large leaves are used for thatch and are said to be more durable than most palm thatch. The seeds contain an oil, probably not used in Central America.
>
> (Williams 1981: 256).

USES BESIDES THATCH AND **OIL: MEDICINAL**

If you Google the plant name and the word medicinal you will get peer-reviewed journal articles and reports mentioning the medicinal potential of *Manicaria saccifera*. Wilbert provides a list of medicinal use by the Warao of Venezuela.

(Williams 1976: 303).

EDIBLE POTENTIAL OF ***MANICARIA SACCIFERA***

> En Guatemala existen varias especies de palmas nativas que se utilizan como alimento (se consumen los meristemos de las hojas tiernas (cogollos), la parte interna del tallo tierno (palmito) y la pulpa o líquido de los frutos. Entre ellas las más conocidas son:
>
> - *Astrocaryum mexicanum* Liebm. (Lancetillo),
> - *Attalea cohune* Mart. (Corozo),
> - *Bactris major* Jacq. (Huiscoyol),
> - *Calyptrogyne ghiesbreghtiana* (Linden & H. Wend.) H. Wend (Capuca),
> - *Euterpe precatoria* Mart. (Palmito, Ternera),
> - *Manicaria saccifera* Gaerth (Manaco)
> - y quizá las más conocida por el aprovechamiento de sus frutos *Acrocomia aculeata* (Jacq.) Lodd. Ex Mart. (Coyol),
>
> (Orellana 2014: 13).

More parts of this palm are eaten than of most other palms. The list below is for the Warao of Venezuela. I predict that the earliest inhabitants of the coastal areas of Belize and Izabal, before "Classic Maya civilization", depended on maize; and that the pre-Maya ate local plants that did not require slash-and-burn and also did not require raised fields or other technologies. Here are the aspects of this palm that can be used and other aspects:

Consumed:

- Starch.
- Fruits for food and drink (directly from the fruit).
- Seedlings "are sought after by the Indians, young and old".

Used:

- Leaves for thatching and sails for canoes
- Spathe for hats.
- Fruits as toy tops for children.

WHAT ARE THE PRIMARY POLLINATORS OF *MANICARIA SACCIFERA* FLOWERS?

> *M. saccifera* is a little studied palm in terms of its reproductive biology, exist the possibilities of auto-pollination and the great quantity of larvae inside the flowers. On the other hand, it was reported several visiting insects, with *Mystrops cercus* and *Mystrops erviki* (Nitidulidae: Coleoptera) being frequent visitors. The most important aspect to highlight in this species is that, contrary to most species in the family, anthesis and all remaining reproductive mechanisms occur "hidden" within the interior of the peduncular bract, without opening or exposing the male and female flowers.
>
> (Copete, Mosquera-Flores and Nuñez-Avellaneda 2018: 24).

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 17, 2020, 10:13 a.m. Playa Quehueche, Livingston. Camera: iPhone 11 Pro Max.

CONCLUDING DISCUSSION AND SUMMARY ON *MANICARIA SACCIFERA* TREES

I was not aware of *Manicaria saccifera* palms during the half century that I worked in Campeche, Petén, Alta Verapaz and other parts of Mesoamérica. Only when I came to the coastal wetlands of the Municipio de Livingston did I see impressive stands of this noticeable palm. Here I saw it being used as roof thatch for the homes of the Q'eqchi' Mayan people. They all said it was much longer-lasting than corozo or even guano palm thatch. After considerable library research back in my office I learned of it being edible plus lots of other uses.

This notable palm is documented for the coastal wetlands of Belize and Izabal, so surely it should also be in coastal wetland ecosystems in Quintana Roo and elsewhere in México. Nevertheless, there is not a single mention in Villaseñor's "thousand page" list of "thousands of plants of México" (2016). I always enjoy learning about new and different plants; the confra palm deserves more research and definitely warrants more publication to show the world it's utilitarian aspects. The nice thing about roof thatch is that you don't have to kill a palm; you don't have to chop down the palm. You just take off one or two fonds; then go to the next palm. You don't have to denude a single palm: there are hundreds available. It is a lot better to have a handsome palm thatch roof than a tin roof that requires clear-cutting and bulldozing entire hills to mine the material and then all the pollutants in making the tin sheets for the roof.

These palms are impressive and deserve to be protected and preserved. 90% of what is published on these palms is from countries other than Guatemala; I bet over 50% of what is published on *Manicaria saccifera* is from Colombia, South America. Yet, we of FLAAR (USA) and FLAAR Mesoamérica (Guatemala) have found hundreds (probably thousands) of this palm surrounding the aldea of Buena Vista Tapón Creek, about 100 meters south of where Tapón Creek flows into Amatique Bay (the Caribbean part of Izabal, Guatemala).

So let's remind the world that there are plenty of places in Guatemala to study *Manicaria saccifera*, keeping in mind that this palm grows only facing the coast (it likes salt water from high tides and salty breeze). This palm has more usable parts than most other palms, so the local people of Guatemala could learn how to harvest without chopping down the palms.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 26, 2021, 8:26 p.m. Tapón Creek, Izabal, Guatemala. Camera: iPhone 12 Pro Max.

Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 26, 2021, 9:27 p.m. Tapón Creek, Izabal, Guatemala. Camera: iPhone 12 Pro Max.

BIBLIOGRAFY: PDFS, ARTICLES, BOOKS ON ***MANICARIA SACCIFERA*, CONFRA PALM**

This bibliography was prepared by Vivian Hurtado, university student working as bibliography preparer manager for FLAAR Mesoamerica. Additions are by Nicholas Hellmuth.

Super helpful report on *Manicaria saccifera:*

WILBERT, Johannes

1976 *Manicaria Saccifera* and its cultural significance among the Warao Indians of Venezuela. Botanical Museum leaflets, Harvard University -- Vol. 24, no. 10 Cambridge, Mass.: The Museum. pages 275-335

CHÍZMAR, C.

2009 Plantas comestibles de Centroamérica. Santo Domingo de Heredia, Costa Rica. Instituto Nacional de Biodiversidad. Editorial- INBio. 360 pages.

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

DELGADO-Von Halle, Carolina

2011 Perfiles estructurales a partir de laminados de Pla y Cabecinegro (*Manicaria saccifera*). Universidad de Los Andes, Facultad de Ingeniería, Departamento de Ingeniería Mecánica. Bogotá, D.C. 56 pages.

Download: https://repositorio.uniandes.edu.co/bitstream/handle/1992/14793/u471545.pdf?sequence=1

DODGE, Charles Richards

1897 A descriptive catalogue of useful fiber plants of the world, including the structural and economic classifications of fibers.

Easy to download as a pdf:
https://ia800207.us.archive.org/22/items/descriptivecatal00dodg/descriptivecatal00dodg.pdf

HENDERSON, Anderson, GALEANO, G. and **R. BERNAL**

1995 Field guide to the palms of the Americas. Princeton University Press.

The single most helpful book on palms of the Americas. Simultaneously the single most incomplete study of palms of the Maya Lowlands (Guatemala and surrounding areas). As is typical of more than 75% of ALL BOOKS ON PLANTS OF THE AMERICAS, everything is focused on Costa Rica or Panamá and South America. Most botanical books include plants from the field research areas of Barro Colorado Island of Panamá. Some books include bits of México but almost never is adequate coverage because the world is focused on comfy traditional research areas such as the nice Smithsonian area of Panamá.

Manicaria saccifera is briefly described in "Chapter 33" on page 118 and if you are an adept reader you can find the distribution map towards the end of the book.

LEDZEMA-Renteria, Eva Dolores

2011 Etnobotánica de las palmas en las tierras bajas del Pacífico Colombiano con énfasis en la Palma Cabecinegro (*Manicaria saccifera* Gaertn.)

Download:
https://repositorio.unal.edu.co/bitstream/handle/unal/7613/190308.2011.pdf?sequence=1&isAllowed=y

MÜLLER-Schwarze, Nina K.

2015 The Arson of a Museum: Ethnography of historical experience and plant fiber use in northern Coclé Province, Panama. Ethnobotany Research & Applications 14:259-288 (2015).

OLMSTED, I. and **E. ÁLVAREZ-Buylla**

1995 Sustainable harvesting of tropical trees: Demography and matrix models of two palm species in Mexico. Ecological Applications 5:484-500.

ORELLANA Polanco, Albaro Dionel

2014 Catálogo de frutales nativos de Guatemala. ICTA.

MEERMAN, J. C., HERRERA, P. and **A. HOWE**

2003 Rapid Ecological Assessment Sarstoon Temash National Park Toledo District, Belize Volume II: Appendices (Species lists and raw data). Sarstoon Temash Institute for Indigenous Management (SATIIM). 73 pages.

PORRAS, A. and **A. MARANON**

2012 Eco friendly core sandwich panel reinforced with Manicaria fiber and pla matrix. European Conference on Composite Materials, Venice, Italy 24-28.

Free download: www.escm.eu.org/eccm15/data/assets/2037.pdf

PORRAS, A., MARANON, A., and **I. A. ASHCROFT**

2015 Characterization of a novel natural cellulose fabric from *Manicaria saccifera* palm as possible reinforcement of composite materials. Composites Part B: Engineering, 74, 66–73.

Available online: www.deepdyve.com/lp/elsevier/characterization-of-a-novel-natural-cellulose-fabric-from-manicaria-0QWIOz5NvL

PORRAS, A., MARANON, A., and **I. A. ASHCROFT**

2016 Thermo-mechanical characterization of *Manicaria saccifera* natural fabric reinforced poly-lactic acid composite lamina. Composites Part A: Applied Science and Manufacturing, 81, 105–110.

Available online: www.researchgate.net/publication/284122884_Thermo-mechanical_characterization_of_Manicaria_Saccifera_natural_fabric_reinforced_poly-lactic_acid_composite_lamina

SERRANO-Sandi, Juan, BONILLA-Murillo, Fabian and **Mahmood SASA**

2013 Distribución, superficie y área protegida de humedales dominados por pantanos de palmas (Arecaceae) en Costa Rica y Nicaragua. Revista de Biología Tropical, vol. 61, núm. 1, septiembre, 2013, pp. 25-33 Universidad de Costa Rica San Pedro de Montes de Oca, Costa Rica.

Download: www.redalyc.org/pdf/449/44958811003.pdf

SMITH, Niegel

2014 *Manicaria saccifera*. Palms and People in the Amazon pp 325-332

Available online: https://link.springer.com/chater/10.1007/978-3-319-05509-1_45

SOUSA Monteiro, Amanda, DANTAS, Denise and **Takashi YOJO**

2021 Preparation of Amazonian Palm Tree Fiber (*Manicaria saccifera* Gaertn.) for Composite Materials U.Porto Journal of Engineering, 7:2(2021) 31-36.

Downloadable.

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. and **Julian A. STEYERMARK**

1958 Flora of Guatemala. Fieldiana, Botany, Volume 24, Part 1.

UICN-ORMA, CONAP, ESCUELA DE BIOLOGÍA, USAC, Gobierno de Noruega, CBM.

2001 Inventario Nacional de los Humedales de Guatemala / Editores Margareth Dix, Juan F. Fernández. – San José, CR.: UICN-Mesoamérica: CONAP: USAC, 176 p.

VIDEOS ON ***MANICARIA SACCIFERA***

www.youtube.com/watch?v=gMfZmz2tTeI
Shows the palm, in Brazil.

Otherwise, definitely no adequate botanical, ethnobotanical, nor even any other helpful video on *Manicaria saccifera* palms.

SUGGESTED WEB PAGES WITH PHOTOS AND **INFORMATION ON *MANICARIA SACCIFERA***

www.backyardnature.net/yucatan/manicaria.htm
Shows seeds from this palm washing up on the shore in Yucatan Peninsula. But evidently the seeds have rotted by the time they get this far away from where they fell into the sea in Belize or Izabal.

www.gbif.org/es/species/2735044
General information, photos and map distribution

www.latinpymes.com/?p=10761
Fibras Naturales Serán la Cara de la Industria de la Construcción y el Corazón del Diseño Automotor. Lists *Manicaria saccifera* as a source of amazing fibers that can transform various industries.

www.naturalista.mx/taxa/365657-Manicaria-saccifera
General information

www.palmweb.org/cdm_dataportal/taxon/ce04443e-bf1a-4e9f-aa57-35927147d0ef
Information and map distribution

https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2017093865
Patent on how to make biodegradable composite material of natural *Manicaria saccifera* fiber. I bet this is a dubious patent for two reasons; one, the process was known before 2016; 2nd, comparable processes were published several times before 2016; 3rd; it's a natural material.

FLAAR MESOAMÉRICA

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 is part of our bibliography team. In addition, she also prepares blogs and articles for our websites with helpful information about the flora and fauna we document in our field trips and other topics we interested in.

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 new Canon mirorless R5 and our four 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

Maria 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 Avilés 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 Sequen is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Rosa Sequen 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.

Maria 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. She 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.

Sergio Jeréz 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).

Prepared by: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020

Reference information:

- Limites departamentales de Guatemala. (IGN)
- Instituto Geográfico Nacional (IGN) (Sheets 2463 IV and 2463 III)
- Google Map data 2020. Shapes: Sistema Guatemalteco de Áreas Protegidas 2017.
- Cuerpos de agua. Ministerio de Agricultura Ganadería y Alimentación (MAGA)
- Dirección de Análisis Geoespacial del (CONAP), March/2017.

Prepared by: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020

FLAAR MESOAMÉRICA

WETLANDS

Edible Wetlands Plants of Municipio de Livingston, Izabal

Wetland Series 1: from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal

Cyperus esculentus
Chufa, Yellow Nutsedge, Earth Almond
MLW#1

Eleocharis geniculata
Eleocharis caribaea
Caribbean Spike-Rush
MLW#2

Montrichardia arborescens
Camotillo
Water Chestnut
MLW#3

Nymphoides indica
Floating Heart
Water Snowflake
MLW#4

Pachira aquatica
Zapoton
MLW#5

Pontederia cordata
Pickerel Weed
MLW#6

Sagittaria latifolia
Water Potatoes
MLW#7

Typha dominguensis
Cattail
MLW#8

Wetland Series 2: plants that grow along the beach shore of Amatique Bay

Amphitecna latifolia
Black calabash
MLW#9

Coccoloba uvifera
Uva del mar
MLW#10

Manicaria saccifera
Confra, Manaca
MLW#11

Chrysobalanus icaco
Coco Plum
MLW#12

Avicennia germinans
Black Mangrove
MLW#13

Rhizophora mangle
Red Mangrove
MLW#14

Wetland Series 3: plants that grow alongside water: rivers, lagoons, swamps, or ocean

Glossary
of Wetland Terms
Bibliography of Wetlands Habitat Names
MLW#15

Acoelorrhaphe wrightii
Pimientillo, Tasiste, Palmetto Palm
MLW#16

Acrostichum aureum
Mangrove Fern
MLW#17

Annona glabra
Alligator Apple
MLW#18

Bactris major
Huiscoyol Palm
MLW#19

Diospyros nigra
Zapote negro
MLW#20

Grias cauliflora
Palo de Jawuilla
MLW#21

Inga vera
Inga multijuga
Inga thibaudiana
River Koko
MLW#22

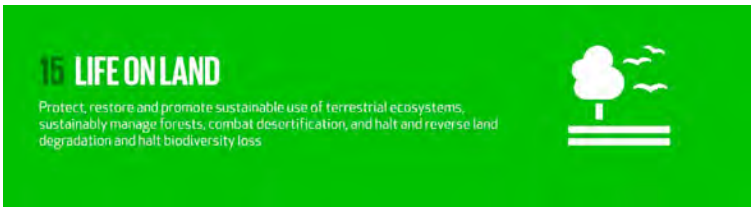
Pithecellobium lanceolatum
Bastard Bully Tree Chucum Red Fowl
MLW#23

Coccoloba belizensis
Papaturro
MLW#24

Symphonia globulifera
Barillo
MLW#25

Crataeva tapia
Matasanillo, Granadillo, Tortugo
MLW#26

FLAAR



The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team of International Cooperation division, Mr. Edwin Mármol, have set the goal of achieving the municipality development in the years 2020-2024 based on the goals and indicators proposed by the 2030 Agenda for Sustainable Development. From this agenda, FLAAR Mesoamerica will collaborate to achieve Sustainable Development Goal (SDG) number 15 "Life on Land".

Throughout this cooperation project, different materials have been prepared, like this Photo Essay, that helps to collect information on species, different ecosystems: terrestrial, wetlands and fresh water biodiversity. This information would also be useful as part of a strategy to protect threatened species and prevent their extinction. The municipality's goals include to promote the sustainable use, conservation and research of the species of flora and fauna of the terrestrial, wetlands and aquatic shore and coastal ecosystems of the Guatemalan Caribbean. Learn more about this project and the SDG indicators at: **https://flaar-mesoamerica.org/rain-forests-rivers-lakes-bays-ocean-caves-canyons-livingston-the-caribbean-biodiversity-wonderland-of-guatemala/**

SERIES OF MUNICIPIO OF LIVINGSTON

Any school, college, university, botanical garden, zoological garden, botanical or zoological association (or club) may post this report on their web sites, (at no cost) as long as they link back to one of our web sites:

www.maya-ethnobotany.org
www.maya-ethnozoology.org
www.maya-archaeology.org
www.digital-photography.org
www.FLAAR-Mesoamerica.org

This report may be cited with this information:

HELLMUTH, N. (2021)
Palm surviving Beach Sand and Salt Water, *Manicaria saccifera*, Wetlands of Municipio de Livingston, Izabal, Guatemala. Wetlands Report #11, Edible Plants of Municipio de Livingston that grow along the beach shore of Amatique Bay MLW2, Number 1. FLAAR Mesoamerica.

BACK COVER PHOTO
Manicaria saccifera.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Apr. 26, 2021, 9:04 a.m.
Tapón Creek, Izabal, Guatemala.
Camera: iPhone 12 Pro Max.

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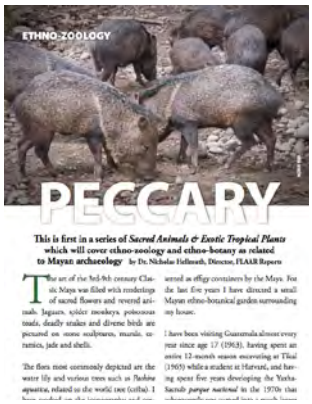

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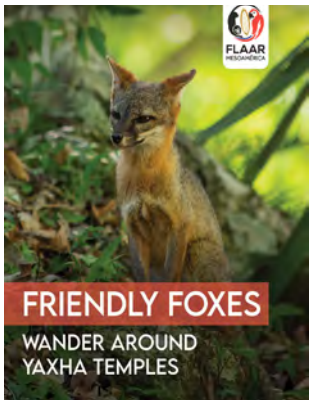

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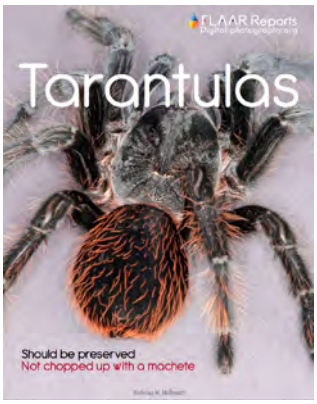

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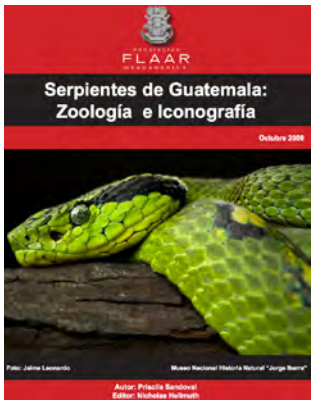

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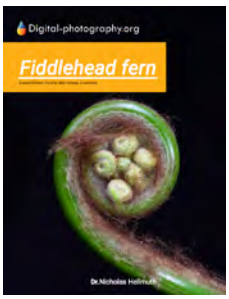

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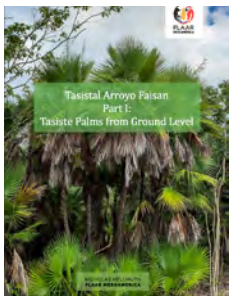

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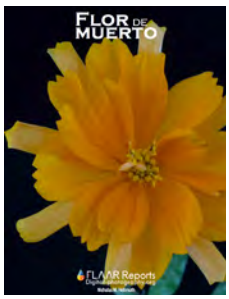

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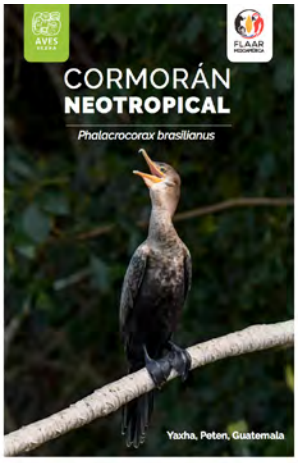

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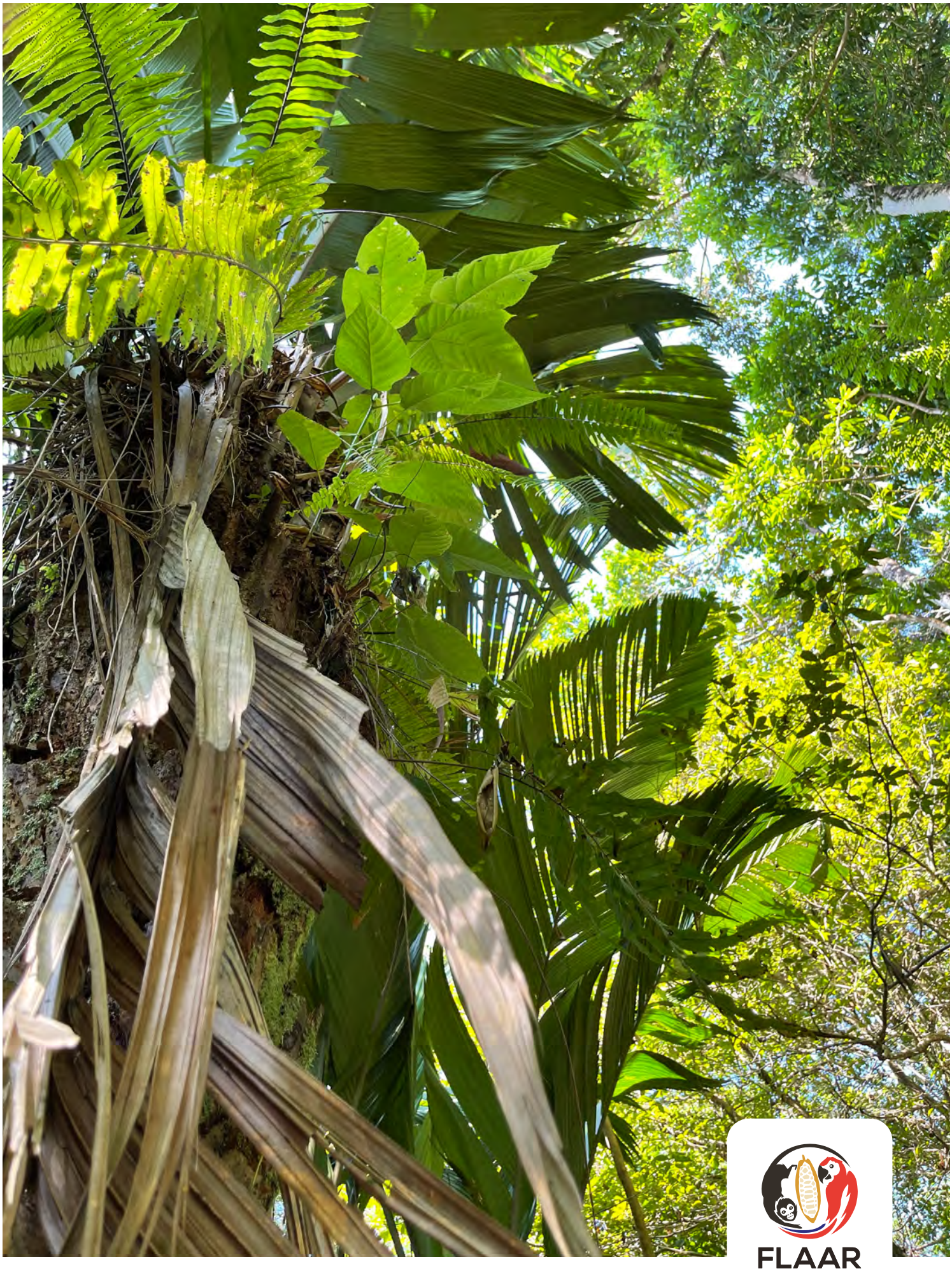

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