FLAAR
MESOAMÉRICA

WETLANDS #19

HUISCOYOL PALMS

Bactris major and Bactris mexicana

Municipio de Livingston,
Izabal, Guatemala

VICTOR MENDOZA, DIANA SANDOVAL & NICHOLAS HELLMUTH

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Municipio de Livingston, Izabal, Guatemala

DECEMBER **2022**

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FRONT COVER PHOTOGRAPH
***Bactris mexicana*.**

Photo by: David Arrivillaga, FLAAR Mesoamerica, Sep. 6, 2021, 1:08 p.m. Río Chocon Machacas , Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/320; sec; f/8; ISO 3,200.

TITLE PAGE PHOTOGRAPH
***Bactris mexicana*.**

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, May. 7, 2021, 4:49 p.m. Carboneras, Livingston, Izabal. Camera: iPhone 12 Pro Max.

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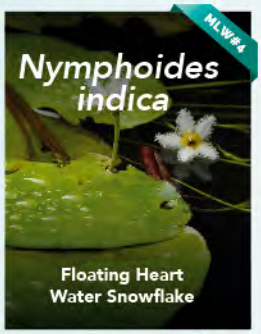

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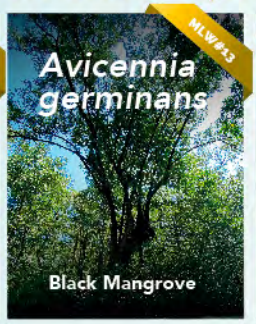

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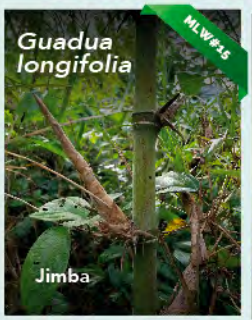

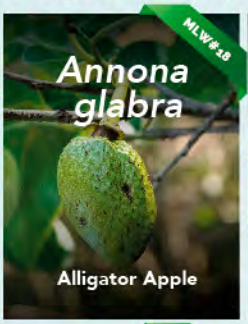

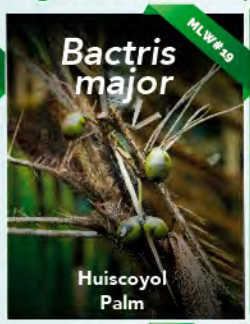

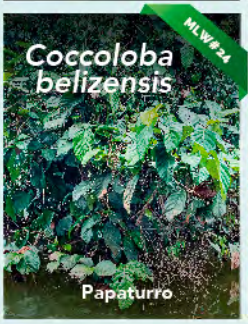

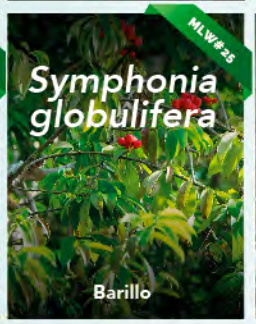

FLAAR

PALMS GLOSARY

Berry: fleshy or pulpy fruit with several seeds inside that are directly wrapped by the pulp; Often have a rounded shape.

Bracts: Modified leaves that are close to the flowers to protect them and can be of different colors.

Compound leaf: Leaf that has several leaflets.

Defenseless Plant: Plant that does not have physical defense mechanisms such as thorns.

Drupe: A drupe is a simple fruit of fleshy, leathery, or fibrous mesocarp surrounding a woody endocarp, commonly known as a pit or bone. Example: peaches.

Endocarp: Inner layer of the three that make up the fruit, which can be of a woody consistency, like a peach stone.

Inflorescence: The inflorescences are branches of the stem, with limited growth, bearing flowers. They consist of an axis where the modified flowers and leaves are inserted.

Leaflet: each of the separate pieces into which a leaf is sometimes divided.

Mesocarp: The fleshy part of the fruit.

Monoecious plant: They have separate male and female flowers on the same plant.

Palmate leaves: in which the leaflets are arranged in the form of a palm.

Pinnate leaves: in which leaflets are arranged in the shape of a pine tree.

Primary growth: Growth that occurs upwards at the apex of plants.

Rachis: in compound leaves it is the axis in which the leaflets are inserted.

Spathes: A spathe is a broad and sometimes colored bract that surrounds the inflorescences of some monocots such as palms.

Stipe: The trunk of a tree without lateral branching, as in palms and tree ferns.

Unisexual flower: These are those flowers that only have one type of sexual organs, male (stamens) or female (pistil) but never both. They are also known as incomplete or imperfect flowers.

Life on land is the Sustainable Development Goal which claims to ensure the conservation of terrestrial and freshwater ecosystems. Municipio de Livingston has multiple natural protected areas that includes tropical rain forests and species associated to rivers.

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 30, 2021, 10:23 a.m. Vuelve Mujer, Livingston, Izabal. Camera: iPhone 12 Pro Max.

INTRODUCTION

Bactris mexicana and *Bactris major* are two palm species that belong to the ARECACEAE family. In Guatemala there is diversity of palms in tropical areas such as in the Municipality of Livingston, Izabal.

During the FLAAR Biodiversity Documentation project in Livingston it was possible to document these two palm species, in similar or the same environments. These two palms are of great importance for the community members of the municipality of Livingston since they provide them with goods and services such as: medicines, food and construction materials.

During the field trips carried out in 2020 to 2021, it was possible to photograph these two species of palms in different places, specifically in the Chocón Machacas river area in the month of March. At first, we thought the palms we were in front of were *Bactris mexicana* but after research we learned they were *Bactris major.* This aroused the interest of the FLAAR researchers in differentiating both palms. When carrying out these investigations, our researcher Victor Mendoza used a dichotomous key from the book "Trees of Guatemala" by Tracey Parker.

Then there was a visit to the USCG Herbarium of the Guatemalan Botanical Garden and the UVAL Herbarium of the Universidad del Valle. With the help of Maria Renée Alvarez, we learned that they were two different species, resulting in the documentation of both species of *Bactris*. In this photographic report you will find descriptions and distribution of *Bactris* spp. in the Mesoamerican zone. It will also be possible to find the dichotomous key of both palm trees and their botanical descriptions by different authors to enrich the search.

PERSONAL EXPERIENCE OF HELLMUTH WITH ***BACTRIS MAJOR* AND *BACTRIS MEXICANA***

I saw palms of Mesoamerica for the first time when I asked a local Maya person outside Teapa, Tabasco, Mexico if he could lead me into the rain forest so I could experience this ecosystem. *I was 16-years old*, in 1961, heading to Palenque (no highway there in that decade so you had to go by train). In the 1960's the area outside the railway station of Teapa was solid rain forest on the hilly side, so the hospitable local Maya man took me up and down trails to see an impressive cave. I saw palms as I hiked back and forth, and more when I finally got to Palenque.

Then I experienced more palms while hiking many kilometers from a dirt airfield outside a Lacandon aldea in Chiapas. The INAH archaeologists that I met in Tenisique, Tabasco in that year (circa 1963) accepted my offer to help them carry their supplies and equipment from the airfield to the Maya ruins of Bonampak. I stayed for at Bonampak for a week to help them set up camp.

During 12 months of 1965 I saw primarily guano, bayal, escoba, and various xate palms as I lived and worked at Tikal, Peten, Guatemala as an architect to measure pyramids and temples and palaces in the area of the North Acropolis, East Plaza and west end of the Central Acropolis.

But my total immersion in palm species of the Maya Lowlands came when we explored the various biotopes and nature reserves of the eastern part of the Municipio de Livingston, Izabal, Guatemala. Since there is brackish water upstream any river that flows into Amatique Bay (Caribbean area), several species of palms have evolved to survive or to relish the salt water or salty breeze that blows through this area during storms. Plus, in Izabal it rains more than in Peten, so lots of additional species of palms.

The common broom palm, escoba, is in both Peten and Izabal, as are many xate species, but several areas of eastern Izabal are a paradise of palms.Comparable for Parque Nacional Yaxha, Nakum and Naranjo (PNYNN): palms of every size and shape. Learning to identify each genus and species was easy for escoba and lancetillo (due to the notable size, shape, and angle of their long spines). But learning about the other palms has been a challenge (since we also have to learn to identify leche miel tree (honey milk tree, whose conical spines are often identical to the prickles on Ceiba pentandra trees. So if you are an archaeologist or iconographer studying Classic Maya incensarios with conical spines all over them, it helps to have stood in front of all the different genera of trees with conical spines on their trunk.

The spines on escoba and lancetillo are the ones I can note the most quickly. *Bactris* palm spines need more education (in the field, in the library and in the herbarium). So today let's learn that it helps to learn the difference between the two species of *Bactris* palms especially of the Municipio de Livingston.

Bactris major.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 21, 2021, 3:44 p.m. Río Chocón Machacas, Livingston, Izabal. Camera: iPhone 13 Pro Max.

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 29, 2021, 10:59 a.m. Playa Quehueche, Livingston, Izabal. Camera: iPhone 12 Pro Max.

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:35 p.m. Río Chocon Machacas , Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/400; sec; f/10; ISO 1,600.

SYNONYMS FOR *BACTRIS MAJOR* AND *BACTRIS MEXICAN*

Bactris major

- *Augustinea balanoidea* Oerst.
- *Augustinea major* (Jacq.) H. Karst.
- *Augustinea ovata* Oerst.
- *Bactris albonotata* L.H. Bailey
- *Bactris augustinea* L.H. Bailey
- *Bactris balanoidea* (Oerst.) H. Wendl.
- *Bactris beata* L.H. Bailey
- *Bactris broadwayi* L.H. Bailey
- *Bactris cateri* L.H. Bailey
- *Bactris chaetorhachis* Mart.
- *Bactris chapadensis* Barb. Rodr.
- *Bactris cruegeriana* Griseb.
- *Bactris curuena* (Trail) Trail ex Drude
- *Bactris demerarana* L.H. Bailey
- *Bactris ellipsoidalis* L.H. Bailey
- *Bactris exaltata* Barb. Rodr.
- *Bactris gaviona* (Trail) Trail ex Drude
- *Bactris infesta* Mart.
- *Bactris leucacantha* Linden ex H. Wendl.
- *Bactris mattogrossensis* Barb. Rodr.
- *Bactris minax* Miq.
- *Bactris nemorosa* Barb. Rodr.
- *Bactris obovoidea* L.H. Bailey
- *Bactris ottostaffeana* Barb. Rodr.
- **Bactris ovata* Stokes
- *Bactris ovata* (Oerst.) H. Wendl.
- *Bactris planifolia L.H. Bailey*
- *Bactris pyrenoglyphoides* A.D. Hawkes
- *Bactris ovata* (Oerst.) H. Wendl.
- *Bactris planifolia* L.H. Bailey
- *Bactris pyrenoglyphoides* A.D. Hawkes
- *Bactris socialis* Mart.
- *Bactris socialis* subsp. curuena Trail
- *Bactris socialis* subsp. gaviona Trail
- ***Bactris subglobosa* H. Wendl. ex Kerch.
- *Bactris superior* L.H. Bailey
- *Bactris swabeyi* L.H. Bailey
- *Pyrenoglyphis balanoidea* (Oerst.) H. Karst.
- *Pyrenoglyphis chaetorhachis* (Mart.) Burret
- *Pyrenoglyphis chapadensis* (Barb. Rodr.)
- *Pyrenoglyphis cruegeriana* (Griseb.) Burret
- *Pyrenoglyphis curuena* (Trail) Burret
- *Pyrenoglyphis exaltata* (Barb. Rodr.) Burret
- *Pyrenoglyphis gaviona* (Trail) Burret
- *Pyrenoglyphis hoppii* Burret
- *Pyrenoglyphis infesta* (Mart.) Burret
- *Pyrenoglyphis leucacantha* (Linden ex H. Wendl.) Burret
- *Pyrenoglyphis major* (Jacq.) H. Karst.
- *Pyrenoglyphis mattogrossensis* (Barb. Rodr.) Burret
- *Pyrenoglyphis nemorosa* (Barb. Rodr.) Burret
- *Pyrenoglyphis ottostapfeana* (Barb. Rodr.) Burret
- *Pyrenoglyphis ovata* (Oerst.) H. Karst.
- *Pyrenoglyphis socialis* (Mart.) Burret
- *Pyrenoglyphis superior* (L.H. Bailey) Burret

Bactris mexicana

- *Bactris acuminata* Liebm. ex Mart.
- *Bactris baculifera* Karw. ex Mart.
- *Bactris trichophylla* Burret

Click here to read more

FULL BOTANICAL **NAME**

- *Bactris major Jacq.*
- *Bactris mexicana Mart.*

Click here to read more

LOCAL NAMES FOR *BACTRIS* **AND *BACTRIS MEXICANA***

In Livingston are: Huiscoyol, coyolillo and guiscoyo

HABIT

- Palm

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 4, 2021, 10:17 a.m. Aldea Buena Vista, Finca Santa Ana, Livingston, Izabal. Camera: iPhone 12 pro Max.

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 4, 2021, 10:06 a.m. Costa Buena Vista. Camera: Sony A9 (ILCE-9M2). Settings: 1/250; sec; f/10; ISO 3,200.

IN WHAT ECOSYSTEM(S) CAN YOU FIND NATIVE ***BACTRIS MAJOR* AND *BACTRIS MEXICANA?***

Bactris major flowers from December to January, it is found in savanna ecosystems, acahuales riparian vegetation, secondary vegetation, from 0 m to 50 m, mainly

Bactris mexicana flowers from August to October and bears fruit from September to December and is also found in savannah ecosystems, riverbanks and wetlands. (Ochoa, Moreno, Jiménez, Ramos, Muñiz & Hass. 2017)

CLOSE RELATIVE(S) OF *BACTRIS MAJOR* AND ***BACTRIS MEXICANA* PRESENT IN GUATEMALA**

Bactris gasipaes Kunth

Click here to read more

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:32 p.m. Río Chocon Machacas , Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/400; sec; f/10; ISO 1,600.

Bactris mexicana.

Photo by: Roxana Leal, FLAAR Mesoamerica, Jul. 4, 2021, 10:18 a.m. Finca Santa Ana, Livingston, Izabal..
Camera: Google Pixel 3XL

Bactris mexicana.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Sep. 7, 2021, 10:31 a.m. Río Dulce, Livingston, Izabal..
Camera: Sony A9 (ILCE-9M2). Settings: 1/400; sec; f/6.3; ISO 3,200.

BRIEF DESCRIPTION OF *BACTRIS MAJOR* AND ***BACTRIS MEXICANA* BY STANDLEY AND RECORD**

***Bactris* Jacq.**

Small, erect, usually slender palms, viciously armed throughout with long slender needlelike spines; leaves clustered at the top of the stem or scattered along its upper part, pinnate, with numerous narrow, often spiny segments; spadix usually small and branched, subtended by two hard spiny spathes; fruits small, globose, each with a single seed.

Bactris major Jacq. Pork-and-doughboy, Pokenoboy. Huiscoyol.

Biscoyol (Honduras). Abundant in swampy forest; ranging to South America. Stems rather slender, usually 1-3 meters high, forming dense clumps or large colonies, densely armed with very long, slender, dark spines; leaves short, parted into numerous linear segments, these armed along their edges with short spines, the rachis and petiole covered with very long, slender, blackish, woolly spines; spathes 2, hard, spiny; spadix branched; fruits small, globose, blackish, smooth, 1-seeded. This palm is one of the worst pests in the lowlands of Central America, often forming thickets that are impenetrable except by free use of a machete. The spines inflict painful wounds, and it is difficult to avoid them, because of the abundance of the plant.

(Standley and Steyermark 1958 :208)

BOTANICAL DESCRIPTION OF *BACTRIS MAJOR* AND ***BACTRIS MEXICANA* BY STANDLEY AND STEYERMARK**

***Bactris* Jacquin.**

Reference: Burret, Repert. Sp. Nov. 34: 167, 237, 241. 1934 (including Guilielma Martius and Pyrenoglyphis Karsten).

Low or tall palms, abundantly armed with short or long spines, the stems solitary or forming dense clumps or colonies, the stems or trunk annulate; leaves terminal or scattered along the upper part of the stem, equally or unequally pinnatisect, the sheath elongate, spiny; spathes 2, longer than the spadix, cymbiform or fusiform; spadix simple or simply branched, inserted among the leaves; flowers monoecious in the same spadix, sessile, the lower ones ternate with the middle flower pistillate, or the sexes irregularly scattered; staminate calyx annular, urceolate, or 3-parted; stamens 6, 9, or 12, included, the filaments subulate, the anthers linear, affixed by the bifid base, erect; pistillate calyx various, the corolla longer than the calyx or of the same length, tridenticulate at the apex, the staminodia free and dentiform, or united in a ring; ovary 3-celled, the 3 stigmas short, sessile, finally recurved; fruit ovoid, subglobose, or oblong, 1-celled and 1-seeded, the stigmas terminal, the pericarp hard and almost ligneous or fleshy and juicy, the endocarp osseous, 3-pored near the apex or above the middle; seed pendulous below the apex of the cell, the raphe reticulate, the endosperm uniform, corneous, the embryo opposite one of the pores. Nearly 200 species are known, distributed almost throughout tropical America but mostly in South America. It is probable that others may be found in Guatemala, but they have not been collected. Many of the species are more offensively armed, perhaps, than any other Central American plants, and that is saying a great deal. The fruits, indeed, often are eaten by people, but they furnish a sorry sort of food. Those of some species do have a small amount of acidulous pulp that is not unpalatable, but others, which are eaten in extreme cases, have little that can be consumed except the very hard kernels, and these are eaten usually in the green and immature state, if at all. An exception is the pejibaye, B. Gasipaes, which is cultivated for its edible fruit.

(Standley and Steyermark 1958 :208)

BACTRIS MAJOR AND ***BACTRIS MEXICANA*** IN BELIZE

> ***Bactris major*** Jacq. var. major — **Syn:** Bactris balanoidea (Oerst.) H. Wendl. — **Loc Use:** FOOD, MED, BEV, FIBR, FORG. — **Reg Use:** PRD. — **Nv:** biscoyol, cocando boy, hones, jauacte, pok-eno-boy, poknoboy, pork and doughboy. — **Habit:** Palm, spiny.
>
> ***Bactris mexicana*** Mart. — **Syn:** Bactris trichophylla Burret — **Loc Use:** FORG, FOOD, CNST. — **Nv:** hawak-te, ki'sh-kib, palma de espina, warrie, warrie cohune. — **Habit:** Palm, spiny.

(Balick, Nee and Atha 2000: 194)

WHERE IN MEXICO CAN *BACTRIS MAJOR* AND ***BACTRIS MEXICANA*** BE FOUND

> *Bactris major* Jacq. CAM, CHIS, GRO, OAX, QROO, TAB, VER
>
> *Bactris mexicana* Liebm. ex Mart. CAM, CHIS, GRO, OAX, PUE, QROO, TAB, VER

(Villaseñor 2016: 616)

COVERAGE OF *BACTRIS MAJOR* AND *BACTRIS* ***MEXICANA*** IN OTHER PERTINENT

Distribution in "GUÍA DE PLANTAS ACUÁTICAS Y RIBEREÑAS DE LA CUENCA DEL USUMACINTA" by Susana Ochia, Fernando Moreno, Nelly Jiménez, Leandro Ramos, Leydy Muñiz & Alejandra Haas. 2017

Botanical Description and Dichotomous Key in "Trees of Guatemala" by Tracey Parker. 2008

Bactris mexicana.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Sep. 7, 2021, 10:31 a.m. Río Dulce, Livingston, Izabal..
Camera: Sony A9 (ILCE-9M2). Settings: 1/320; sec; f/6.3; ISO 3,200.

BOTANICAL DESCRIPTION (INFLORESCENCE, **FLOWERS AND SEEDS) TREES OF GUATEMALA**

Bactris mexicana Mart. Güiscoyol; Huscoyol.

- Habitat: Moist or wet thickets, often in wooded swamps; 900 meters or lower.
- Distribution: Alta Verapaz, Izabal, Petén. Mexico; Belize; Honduras; Nicaragua; Panama

Palms to 8 meters tall, cespitose, often forming dense clumps or thickets, stems 3-6 cm in diameter; petioles 60 cm long or more, flaky-tomentose or glabrate, armed below with slender but stiff, blackish spines 4-7 cm long; leafblades 1.5-2 meters long, rachis densely spiny below; leaf segments about 25 on each side, grouped, linear, mostly 30-60 cm long, 2-4 cm broad, acuminate, 2-3-nerved, deep green above, somewhat paler beneath, pubescent; upper spathe 24 cm long, narrow-acuminate, dark grayish brown leprose, not at all tomentose, armed with slender spines 5-10 mm long; peduncles about 11 cm long, pale-tomentose, densely spiny, branched portion 16 cm long, branches about 40,8-12 cm long, dark grayish brown flaky; pistillate calyx 3.5 mm wide, with 3 very short, acute teeth, corolla obscurely 3-dentate; ripe fruit depressed-globose, mammillate, 1.5 em high and wide, glabrous; fruiting perianth 1 cm wide

(Parker 2008)

¡!

Uses: The fruit is juicy and commonly eaten.

Bactris major Jacq. Güiscoyol; Viscoyol; Huiscoyol; Pahuac (Petén).

- English: "Hones" (Belize), "Lata Palm," «Prickly Palm"
- Habitat: Dry to wet thickets or forests, often on swampy ground; mostly at 250 meters or lower.
- Distribution: Escuintla, Izabal, Petén, Retalhuleu, Santa Rosa,probably in all Pacificcoastdepartments. Mexico; Belize; El Salvador; Honduras; Nicaragua; Costa Rica; Panama; South America.

Palms slender, stems cane-like, caespitose, usually forming dense, small or large clumps or thickets, to 5 meters tall, stems 2.5-5 cm in diameter, densely armed with long and short, blacklsh spmes, or older stems almost naked; leaves evenly pinnatiser mostly 1-1.5 meters long, dark green above, dull pale green beneath, wide-spreadin more or less decurved, slender petioles 45-60 cm long, rusty-pubescent, armed wi spines 2.5-7.5 cm long; leaf segments 30-40 pairs, subopposite or lower ones alterna 2-5 cm apart, 25-45 cm long, puberulent beneath, margins setulose; spathe 20-35 clong, densely spiny; spadix with 10-12 simple branches; fruit cream-colored, probal becoming purple, 3.5-4 cm long, 1-2.5 cm thick, obtuse or rounded and apiculate at ape calyx persistent, 8-11 mm high; endosperm surrounded by coarse hair-like fibers, blac about 3 cm long.

(Tracey Parker 2008)

¡!

Uses: It is reported that the small spadices of this palm are sometimes used to decorate nativity scenes at Christmas.

DICHOTOMOUS KEY **TREES OF GUATEMALA**

Bactris Jacq. ex Scop.

Palms small to large, mostly multi-stemmed, rarely solitary; monoecious, spiny; trunks with thorns arranged in rings. Leaves pinnate or deeply 2- cleft (bifid). Inflorescence a spike or branched, interfoliar, with one peduncular coriaceous bract, persistent, with thorns. Fruit ovoid andfleshy, purple-black or reddish yellow, with one seed. (Tracey Parker. 2008)

The genus Bactris has a large number of species (239), extending from Mexico to Bolivia and Paraguay.

- Fruit purple at maturity, 3.5-4 cm long; pistillate flowers with staminodes united in a ring, forming a conspicuous crenate cupule within the corolla in fruit……***Bactris major***

- Fruit red or yellow at maturity; pistillate flowers with inconspicuous free tooth-shaped staminodes. Fruit large, fleshy, edible; endocarp with numerous flat fibers radiating from pores…...***Bactris gasipaes***

- Fruit small, about 1.5 cm high and wide; endocarp lacking radiating fibers……. ***Bactris mexicana***

(Parker 2008)

WHERE HAS *BACTRIS MAJOR* AND *BACTRIS MEXICANA* **BEEN FOUND IN THE MUNICIPIO OF LIVINGSTON?**

> Is *Bactris major* and *Bactris mexicana* listed for Biotopo Protegido Chocón Machacas, CECON/USAC

Yes, *Bactris trichophylla* (*Bactris mexicana*) is in the list of PEREZ-Consuegra 2001: 23 and 56.

> Is *Bactris major* and *Bactris mexicana* listed for Tapon Creek Nature Reserve (including Taponcito Creek), FUNDAECO

Not Mentioned.

> Is *Bactris major* and *Bactris mexicana* listed for Buena Vista Nature Reserve?

Not mentioned.

> Is *Bactris major* and *Bactris mexicana* listed for Cerro San Gil (south side of Rio Dulce)?

Only the genus Bactris is mentioned, the species is not mentioned in the list of species of the Cerro San Gil Reserve Master Plan, 2008-2012 (Ruíz 2006: 66).

> Is *Bactris major* and *Bactris mexicana* listed for Ecoalbergue Lagunita Creek (Área de Usos Múltiples Río Sarstún)

Yes, Bactris trichophylla (Bactris mexicana) is in the list (FUNDAECO 2007: 44).

> Is *Bactris major* and *Bactris mexicana* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)

Yes, both species are mentioned (Meerman, Herrera, and Howe 2003: 2).

> Is *Bactris major* and *Bactris mexicana* listed for Refugio de Vida Silvestre Punta de Manabique

Yes, Bactris balanoidea (Oerst) Wendl (Bactris major) and Bactris ferox Bartlet (FUNDARY 2001: 110).

> Is *Bactris major* and *Bactris mexicana* listed for Bocas de Polochic

Not Mentioned

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:50 p.m. Río Chocon Machacas, Livingston, Izabal.
Camera: iPhone 13 Pro Max

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 4:13 p.m. Río Chocon Machacas, Livingston, Izabal.
Camera: Sony A9 (ILCE-9M2). Settings: 1/400; sec; f/9; ISO 1,250.

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:47 p.m. Río Chocon Machacas, Livingston, Izabal.
Camera: iPhone 13 Pro Max

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:50 p.m. Río Chocon Machacas, Livingston, Izabal.
Camera: iPhone 13 Pro Max

WHERE HAS *BACTRIS MAJOR* AND ***BACTRIS MEXICANA* BEEN FOUND IN PETEN?**

In Tikal there is the species *Bactris major* (Schulze & Whitacre 1999: 232) Thompson 2013, in Tikal, only mentions the genus Bactris.

Bactris balanoidea (Oerst) Wendl (*Bactris major*) has been found in Reserva Bioitzá where the name Jawcte' is given, which is in the Maya Itzá language. (Lara-Ponce E. et al. 2013).

Bactris mexicana has been reported in Tikal and La Libertad.

Click here to read more

WHERE ELSE HAS *BACTRIS MAJOR* AND ***BACTRIS MEXICANA* BEEN FOUND IN GUATEMALA**

Bactris major has been found in the department of Escuintla

Click here to read more

Bactris mexicana has been found in the department of Alta Verapaz

Click here to read more

IS *BACTRIS MAJOR* AND *BACTRIS MEXICANA* FROM THE **HIGHLANDS OR FROM THE LOWLANDS (OR BOTH)?**

Both species are primarily in the lowlands, *Bactris major* is found between 0–240 meters above sea level and *Bactris mexicana* inhabits elevations of 0–600 meters above sea level.

DOES *BACTRIS MAJOR* AND *BACTRIS MEXICANA* **ALSO GROW IN HOME GARDENS?**

The *Bactris genus* is among the palms used for construction, so it is possible to associate it with gardens. In Mexico, *Bactris mexicana* is considered for ornamental use, so it can be found in gardens and parks.

Click here to read more

USES OF *BACTRIS MAJOR* **AND *BACTRIS MEXICANA***

Bactris major: FOOD, MED, BEV, FIBR, FORG.
The trunk is used for fencing. the fruit is edible for some animals and for man sold in some markets; the stems are used for making baskets (PÉREZ-García and REBOLLAR-Domínguez 2008: 57).

Bactris mexicana: FORG, FOOD, CNST (Balick, Nee and Atha 2000: 194)

MODERATE POTENTIAL MEDICINAL USAGE OF *BACTRIS MAJOR* AND *BACTRIS MEXICANA* BY LOCAL PEOPLE

In Tabasco, the fruits of *Bactris major* are used medicinally, for the treatment of conditions of the respiratory tract: the peeled fruit is cooked with honey to form a syrup (BURELO-Ramos, et al. 2009: 85).

Bactris mexicana does not report any medicinal use.

WHAT ARE THE PRIMARY POLLINATORS OF *BACTRIS MAJOR* AND *BACTRIS MEXICANA* FLOWERS?

In Costa Rica the most important pollinator of *Bactris major* is the curculionid *Phyllotrox megalops* (Mora-Urpí 1982: 176).

Coleoptera in general are among the main pollinators of the palms of the genus *Bactris*.

Click here to read more

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 2, 2021, 1:23 p.m. Lagunita Creek, Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/125; sec; f/9; ISO4,000.

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 29, 2021, 11:59 a.m. Playa Quehueche, Livingston, Izabal. Camera: iPhone 12 Pro Max.

Bactris mexicana.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 29, 2021, 11:59 a.m. Playa Quehueche, Livingston, Izabal. Camera: iPhone 12 Pro Max.

CONCLUDING DISCUSSION AND SUMMARY ON ***BACTRIS MAJOR AND BACTRIS MEXICANA***

It is important to be able to identify the plants with botanical samples either in the field or collected for herbarium. In the field try to photograph the infloresences. *Bactris mexicana* versus *Bactris major* in the field have a big difference in terms of their fruits. If the plant is not in a state of flowering or fruiting, it is important to make a collection to identify it in botanical laboratories.

In order to differentiate *Bactris major* from *Bactris mexicana* it is important to use a dichotomous key such as the one described in this photographic report. In Guatemala we can use different bibliographies to be able to identify them. Both *Bactris major* and *Bactris mexicana* are of the utmost importance for their documentation and conservation, because in many locations in Mesoamerica, this plant is important for medicinal, edible, and construction uses. The genus *Bactris* is of great importance for the communities of the municipality of Livingston, in general palms are used as construction material, *Bactris major* has medicinal properties and both this and *Bactris mexicana* are edible and can be used for fodder. Generally, palm species also represent an invaluable resource for a great diversity of animals because through their inflorescences and fruits they provide them with food, shelter, and mating sites. In its ecological importance, it is highlighted that it can serve as microecosystems for smaller species, intervening in the nutrient cycle, maintaining ecosystems in balance.

If you are a botanist or ethnobotanist we highly recommend the Municipio de Livingston as a friendly hospitable place to accomplish field trips. Find a boat man who knows the local area and speaks Q'eqchi' Mayan language since along the shores of many streams there are Q'eqchi' aldeas and communities. Be sure to ask permission to enter any land. Plus be sure to register your project with the Municipal authorities, with CONAP, FUNDAECO and the managers of the biotope or nature reserve where you will be studying. Since our field work was requested by the Alcalde and since we know the CONAP, FUNDAECO and other helpful conservation organizations that work in Izabal, this was helpful for our field work. Members of our team speak Q'eqchi' and Garifuna-speaking individuals assisted on field trips.

Bactris mexicana.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021, 4:22 p.m. Mirador del Cañon,Río Dulce, Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/250; sec; f/10; ISO 2,000.

Bactris mexicana.

Photo by: Victor Mendoza, FLAAR Mesoamerica, Jul. 29, 2021, 11:52 a.m. Playa Quehueche, Livingston, Izabal. Camera: Sony DSC-RX10M4. Settings: 1/160; sec; f/4.0; ISO 800.

Bactris mexicana.

Photo by: David Arrivillaga, FLAAR Mesoamerica,Apr. 27, 2021, 2:37 p.m. Tapon Creek, Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/250; sec; f/11; ISO 1,600.

Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Jan. 24, 2021, 3:32 p.m. Río Chocon Machacas , Livingston, Izabal. Camera: Sony A9 (ILCE-9M2). Settings: 1/1250; sec; f/6.3; ISO 1,250.

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Most helpful mention of this plant (because this book lists the most uses):

Balick, Nee and Atha 2000: 194

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PARKER, Tracey
2008 Trees of Guatemala. The Tree Press. 1033 pages.

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2001 Caracterización Ecologica de los Biotopos Chocon Machacas, Izabal y Cerro Cahui, Petén, Universidad de San Carlos de Guatemala (USAC)

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WEB SITES SPECIFICALLY ON ***BACTRIS MAJOR* AND *BACTRIS MEXICANA***

https://www.cicy.mx/sitios/flora%20digital/ficha_virtual.php?especie=117
General information about *Bactris mexicana*

https://biodiversidad.gt/portal/taxa/index.php?tid=42121
Bactris genus present in Guatemala

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. So 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/imagedatabase/index.html
Kew gardens in the UK is one of several botanical gardens that I have visited (also New York Botanical Gardens and Missouri Botanical Gardens (MOBOT), in St Louis. Also the botanical garden in Singapore and El Jardín Botánico, the open forest botanical garden in Guatemala City).

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.

APPENDIX A

Where has Bactris major and Bactris mexicana been stored in Botanical Herbaria that are listed on the Neotropical Flora data base

New York Botanical Garden Steere Herbarium – Plants

Catalog #: 02385516
Occurrence ID: d680aeec-8a5f-4377-b225-598444eade9e
Taxon: *Bactris major* Jacq.
Family: Arecaceae
Collector: C.L. Lundell
Number: 2655
Date: 1933-04-11 - 1933-01-10
Literal Date: 11 Apr 1933
Location: Guatemala,
Preparations: sheet

Click here to read more

Catalog #: 01070938
Occurrence ID: e9730ceb-25ce-4eda-b071-b7643e766146
Taxon: *Bactris major* var. *Major* Jacq.
Family: Arecaceae
Collector: J. J. Castillo Mont
Number: 2744
Date: 1995-12-20 - 1995-02-04
Literal Date: 20 Dec 1995
Location: Guatemala, Santa Rosa, Taxisco, shore of a small river
Elevation: 220-220 meters Literal Elevation: 722 ft
Preparations: sheet

Click here to read more

United States National Herbarium- Smithsonian

Catalog #: US 719547
Occurrence ID: http://n2t.net/ark:/65665/314dbf522-86ea-44a9-b91b-9843ba2d6974
Taxon: *Bactris major* Jacq.
Family: Arecaceae
Determiner: Nevers, G. C. de, (CAS), California Academy of Sciences
Collector: O.F. Cook & C. Doyle
Number 6
Date: 1904-04-01
Literal Date: 01 Apr 1904
Location: Guatemala, Izabal, Rio Polochic
Single Count: 1

Click here to read more

Field Museum of Natural History - seed plants

Occurrence ID: fb4cc03c-d85a-480e-a653-60086ecdc3c3
Taxon: *Bactris mexicana* Mart.
Family: Arecaceae
Determiner: G. C. de Nevers (1990)
Collector: J.A. Steyermark
Number: 44418
Date: 1942-03-01
Literal Date: 1942-3-1
Location: Guatemala, Alta Verapaz, Cubilgüitz, 1.5-2 mi. S of Den
15.6494 -90.4278
Elevation: 300-350 meters (984-1148ft)
Rights of Use: CC0 1.0 (Public Domain)
Rights Holder: http://fieldmuseum.org/about/copyright-information
Record ID: 79f3677c-ed63-460f-8152-cb2abc82bd43

Click here to read more

Missouri Botanical Garden

Catalog #: 2451683
Occurrence ID: urn:catalogue:MO:Tropicos:2451683
Taxon: *Bactris mexicana* Mart.
Family: Arecaceae
Determiner: A. Henderson (1989)
Collector: Elias Contreras
Number: Contreras 66
Date: 1959-08-01
Literal Date: 1959-8-1
Location: Guatemala, Petén, Tikal, in forest that covers the ruins
17.225 -89.61305
Usage Rights: CC BY (Attribution)
Registry ID: d5f8f642-a07b-45a9-8508-95cecb20592a

Click here to read more

New York Botanical Garden Steere Herbarium – Plants

Catalog #: 02385778
Occurrence ID: 27031c1a-889c-42b5-bee6-1958790bfbb5
Taxon: *Bactris mexicana* var. trichophylla (Burret) AJHend.
Family: Arecaceae
Collector: E. Contreras
Number: 66
Date: 1959-08-01 - 1959-01-21
Literal Date: 01 Aug 1959
Location: Guatemala, Petén, Tikal, in the forest that covers the ruins.
Preparations: sheet

Click here to read more

Registros de Plantas en Colecciones Mexicanas

Catalog #: 1051323
Occurrence ID: urn:catalog:IBUNAM:MEXU: 1051323:586fb12249991d22a0404693
Taxon: Bactris trichophylla Burret
Family: Arecaceae
Determiner: M. Veliz
Collector: M. Veliz
Date: 2000-03-25
Literal Date: 2000-03-25T00:00:00
Location: Guatemala, Petén, LA LIBERTAD, La Joyanca Archaeological Site
Location ID: 638506]
Single Count: 1
Preparations: Herbalized
Notes: BIGUA Herbarium. Guatemalan flora. School of Biology, USAC.
Usage Rights: CC BY-NC (Attribution-Non-Commercial)
Rights Holder: CONABIO
Record ID: 73bb3e27-b43d-4040-b42c-44f827b9153c

Click here to read more

United States National Herbarium- Smithsonian

Catalog #: US 862128
Occurrence ID: http://n2t.net/ark:/65665/301f60dc3-0c92-4b81-934a-84d3fb4b6447
Taxon: Bactris mexicana var. trichophylla Mart.
Family: Arecaceae
Collector: O.F. Cook & C. Doyle
Number: 1b
Date: 1914-04-29
Literal Date: 29 Apr 1914
Location: Guatemala, Alta Verapaz, Trece Aguas
Elevation: 823-823 meters (2699-2699ft)
Habitat: Mountain forest
Life Stage: Vegetative
Single Count: 1
Rights of Use: CC0 1.0 (Public-domain)
Record ID: 5977d556-610c-4a41-abb1-7253ded9a73d

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APPENDIX B

Where has *Bactris major* and *Bactris mexicana* been located in Guatemala Based on herbaria of Guatemala (Herbario CECON USAC. USCG)

Last November 2022, researchers Victor Mendoza and Diana Sandoval had the opportunity to visit the USCG Herbarium of CECON USAC. Where they were very kindly assisted by Maura Quezada and gave the authorization to observe samples of *Bactris mexicana* and *Bactris major* to confirm the species and its distribution in Guatemala.

Two herbarium samples of these species were scanned and are cited in this section of the photographic essay. (Mendoza. 2022)

Species: *Bactris major* Jacq.
Family: Arecaceae
Determiner: J. Morales
Date: 1988-10-00
Literal Date: October 1988
Location: Guatemala,
15.459291 -90.164395 +-273771m. WGS84
Description: Common name: güiscoyol

Species: *Bactris mexicana* Mart.
Family: Arecaceae
Determiner: J. Morales
Collector: J. Morales
Number: 2652
Date: 2004-10-08
Literal Date: October 8, 2004
Additional collectors: R. Ávila, J. García
Location: Guatemala, Izabal, La Conga, Exmibal, El Estor, Coordinates: 0243184/ UTM 1718222, 0243331/UTM 1718060
15.528528 -89.394203 +-3036m. WGS84
Literal Coordinates: 16N 0243184E 1718222N

Bactris major.

Herbario USCG del CECON USAC, Jardín Botánico de Guatemala. Colecta No. 16143. Escaneada por Victor Mendoza

Bactris mexicana.

Herbario USCG del CECON USAC, Jardín Botánico de Guatemala. Colecta No. 012704. Escaneada por Victor Mendoza

APPENDIX C

List of *Bactris mexicana* found in Livingston, Izabal.

Bactris mexicana

PLACE	DATE	PHOTOGRAPHER
Cerro Sarstún	Dec 20 2020	Nicholas Hellmuth
Finca Where the Pirates Hide	Dec 19 2020	Alejandra Gutierrez
Finca Where the Pirates Hide	Dec 19 2020	Nicholas Hellmuth
Tapón Creek	Dec 4 2020	Nicholas Hellmuth
Taponcito Creek	Dec 3 2020	Nicholas Hellmuth
Cerro San Gil	Jan 30 2021	Nicholas Hellmuth
Reserva Mirador del Cañón	Mar 21 2021	Alejandra Gutierrez
Reserva Mirador del Cañón	Mar 23 2021	David Arrivillaga
Aldea Buena Vista	Apr 27 2021	David Arrivillaga
Aldea Buena Vista	Apr 27 2021	Brandon Hidalgo
Aldea Buena Vista	Apr 27 2021	Nicholas Hellmuth
Bioestación Carboneras	May 7 2021	Nicholas Hellmuth
Bioestación Carboneras	May 9 2021	Nicholas Hellmuth
Cerro San Gil	May 9 2021	Nicholas Hellmuth
Cerro San Gil	May 7 2021	Haniel López
Cerro San Gil	May 8 2021	Nicholas Hellmuth

PLACE	DATE	PHOTOGRAPHER
Bioestación Carboneras	May 7 2021	Roxana Leal
Cerro San Gil	May 7 2021	Nicholas Hellmuth
Río Rosul	Jun 19 2021	Nicholas Hellmuth
Cerro San Gil	Jul 2 2021	Nicholas Hellmuth
Aldea Buena Vista	Jul 4 2021	Roxana Leal
Aldea Buena Vista	Jul 4 2021	Nicholas Hellmuth
Vuelve Mujer	Jul 30 2021	Nicholas Hellmuth
Playa Quehueche	Jul 29 2021	Nicholas Hellmuth
Playa Quehueche	Jul 29 2021	Victor Mendoza
Río Cáliz	Sep 6 2021	Nicholas Hellmuth
Río Lámpara	Sep 7 2021	David Arrivillaga
Río Chocón Machacas	Sep 6 2021	David Arrivillaga
Río Chocón Machacas	Sep 6 2021	Norma Cho
Río Chocón Machacas	Sep 6 2021	Nicholas Hellmuth
Río Chocón Machacas	Sep 6 2021	Roxana Leal
Aldea Buena Vista	Oct 14 2021	Alexander Cuz
La Guaira	Oct 4 2021	Victor Mendoza
Playa 7 Altares	Oct 4 2021	Alejandra Gutierrez

Prepared by: Victor Mendoza, Researcher of FLAAR Mesoamérica.

List of Bactris major found in Livingston, Izabal.

Bactris major

PLACE	DATE	PHOTOGRAPHER
Río Chocón Machacas	Jan 24 2021	Nicholas Hellmuth
Río Chocón Machacas	Jan 24 2021	David Arrivillaga
Río Chocón Machacas	Mar 21 2021	Alejandra Gutiérrez
Río Chocón Machacas	Mar 21 2021	Nicholas Hellmuth
Lago de Izabal	Nov 12 2021	Nicholas Hellmuth
Barra San Marcos	Nov 12 2021	Nicholas Hellmuth
Lagartos Lago de Izabal	Nov 12 2021	David Arrivillaga
Barra San Marcos	Nov 12 2021	Roxana Leal
Río Chocón Machacas	Dec 11 2021	Nicholas Hellmuth
Río Chocón Machacas	Dec 11 2021	Victor Mendoza
Río Chocón Machacas	Dec 11 2021	David Arrivilalga

Prepared by: Victor Mendoza, Researcher of FLAAR Mesoamérica

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is in charge of the financial administration of the institution and supports the supervision of daily activities.

Vivian Hurtado is the current project manager of the FLAAR divisions: Flora & Fauna and MayanToons.

Victor Mendoza environmental engineer in charge of the photographic database and its taxonomic identification. He also helps with the coordination of research activities.

Sergio Jerez agronomy engineering student involved in the identification of plants and support in research topics.

Belén Chacón biology student who organizes, tabulates and updates our ethnobotanical list.

Diana Sandoval agricultural engineer who compiles scientific information that is added to our flora and fauna reports.

María José Toralla biology student collects information and bibliographic references to feed our electronic library of flora and fauna and support research for reports and websites.

Samuel Herrera is in charge of processing maps of our field trips and helping with the identification and investigation of species.

Pedro Pablo Marroquín is part of the editing team, review and add information to our photographic reports

Alejandra Valenzuela is a biology student and part of the photographic reports editing team. She also supports the realization and analysis of web statistics.

Maria José Rabanales is part of the photographic reports editing team

Byron Pacay is our assistant during the field trips.

Norma Cho is our assistant during the field trips.

Roxana Leal degree in communication. Manage all our social networks and digital community.

Isabel Rodriguez Paiz is in charge of fundraising and partnership development.

Edwin Solares is a photographer and videographer during our expeditions. Later, he edits this content to be used in our different materials.

Pedro Pablo Ranero is responsible for editing videos of flora and fauna to create content on our sites.

Andrea de la Paz graphic designer who helps prepare the graphic line of our publications. She is our editorial art director.

Jaqueline González graphic designer who combines text layout and photo editing to create our reports

Heidy Galindo graphic designer who combines text layout and photo editing to create our reports.

Alexander Gudiel graphic designer who combines text layout and photo editing to create our reports.

Cristina Ríos graphic designer who combines text layout and photo editing to create our reports.

David Arrivillaga is an experienced photographer and graphic designer. Sometimes he is a photographer during our expeditions, but he also designs our flora and fauna reports.

María Alejandra Gutiérrez is an experienced photographer who is now in charge of the preparation of photographic catalogs. She was also coordinator of the field trips for the research project in Livingston, Izabal.

Paulo Núñez is our webmaster. He is the person in charge of the maintenance and programming of the entire network of FLAAR websites.

Juan Carlos Hernández is part of the web team. Receive the material we produce to place on our sites.

María José García is part of the web team. Receive the material we produce to place on our sites.

Andrés Fernández is in charge of keeping our websites updated and more efficient for the user.

Valeria Áviles is a graphic designer and illustrator. She is in charge of coordinating the activities of MayanToons, as well as making illustrations for the different materials that we prepare.

Laura Morales is a digital content engineer He is in charge of directing the animation area of our MayanToons project.

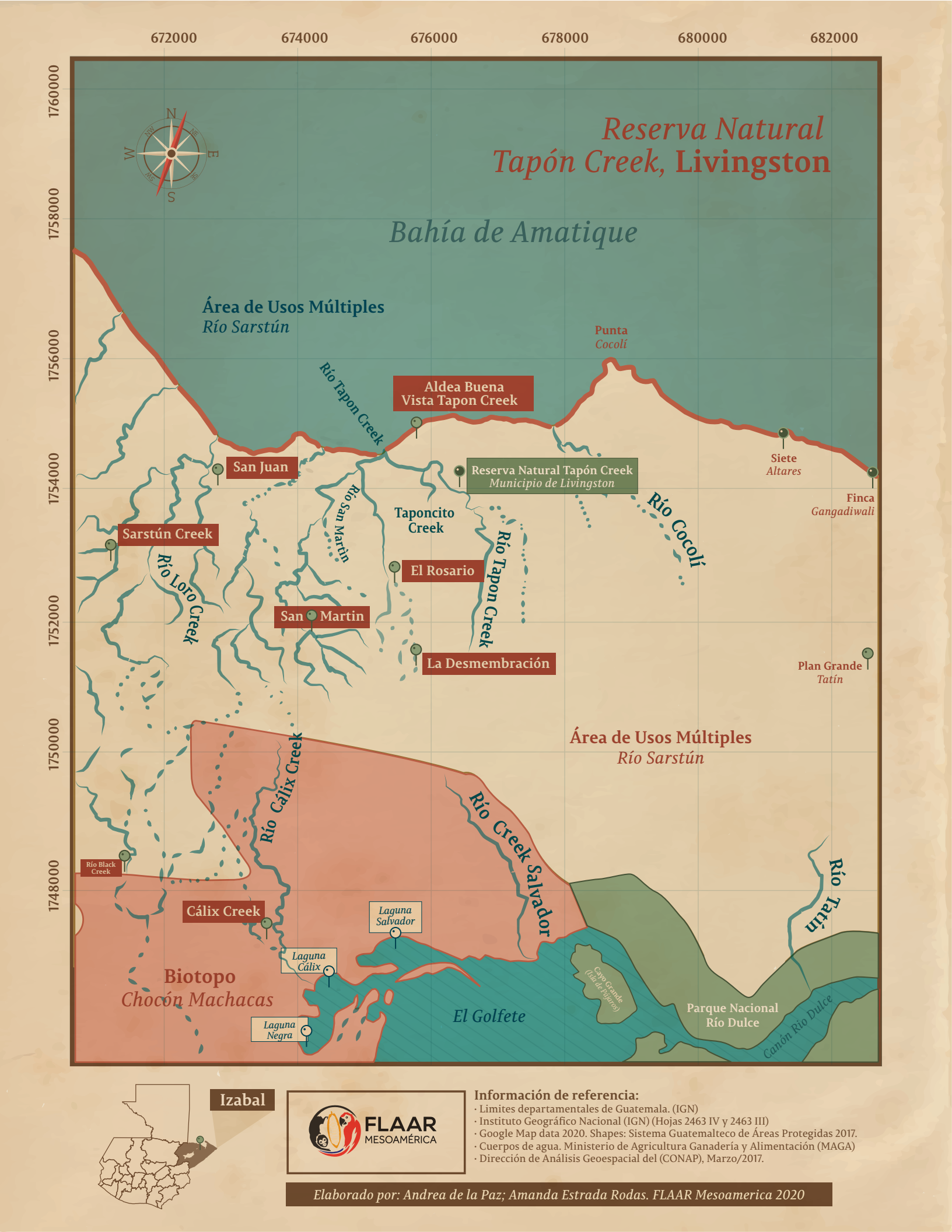
Paula García is part of our MayanToons Animation team. His job is to bring our favorite characters to life.

Niza Franco is part of our MayanToons Animation team. His job is to bring our favorite characters to life.

Isabel Trejo is a graphic designer and illustrator for MayanToons. Josefina Sequén is an illustrator for MayanToons.

Rosa Sequén is an illustrator for MayanToons.

Elaborado por: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020



Información de referencia:

- Limites departamentales de Guatemala. (IGN)
- Instituto Geográfico Nacional (IGN) (Hojas 2463 IV y 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), Marzo/2017.

Elaborado por: 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

Guadua longifolia Jimba 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	***Lacmellea standleyi*** Lechemiel MLW#26

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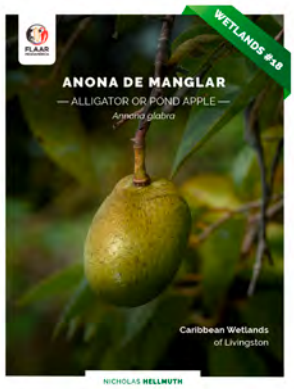

Annona glabra
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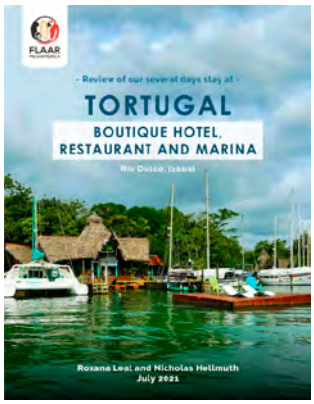

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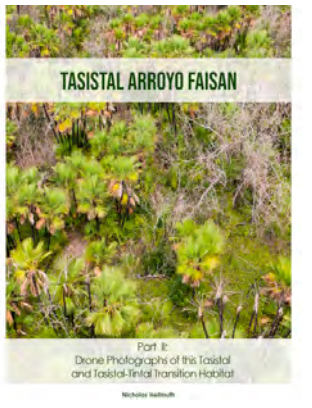

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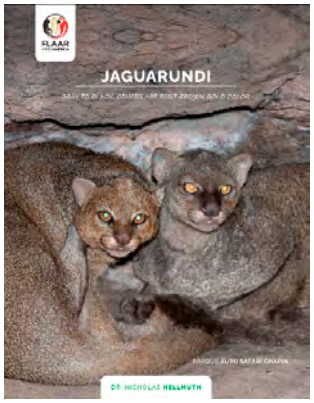

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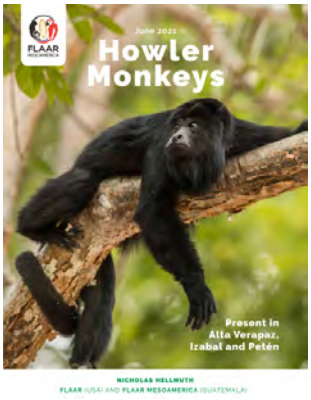

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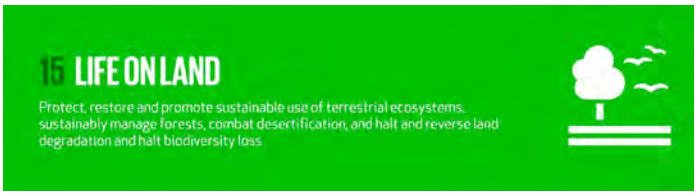

The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team on the Division of International Cooperation, has set the goal of achieving the municipality development in the years 2020-2024 based on the goals and indicators proposed by the 2030 Agenda for Sustainable Development. In this regard, bot FLAAR (USA) and FLAAR Mesoamerica (Guatemala) will collaborate whit this Municipality achieve the Sustainable Development Goal (SDG), number 15 "Life on Land".

Throughout this cooperation project, different materials will be and publishes prepared, as this Photo Essay. These will help to collect information on species, different ecosystems (terrestrial, wetlands and fresh water asociated) and biodiversity. This information will also be useful as it is considered in various conservation estrategies to protect threatened species and prevent their extinction. Moreover, the municipality goals also look forward to promote the sustainable use, conservation and research of the flora and animal species of all terrestrial, wetlands, aquatic shore and coastal associated ecosystems of the Guatemalan Caribbean region. You can learn more about this project and the SDG indicators wich are being pursued 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

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Huiscoyol Palms, *Bactris major and Bactris mexicana*. Municipio de Livingston, Izabal, Guatemala. FLAAR (USA) and FLAAR Mesoamérica (Guatemala). Wetlands series 3: rivers, lagoons, swamps, or ocean, Wetlands #19

BACK COVER PHOTO
Bactris major.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 11, 2021, 3:50 p.m. Río Chocon Machacas, Livingston, Izabal.
Camera: iPhone 13 Pro Max.

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