



WETLANDS #26

LECHEMIEL LECHE DE VACA TREE

— *Lacmellea standleyi* —

Municipio de Livingston,
Izabal, Guatemala

NICHOLAS HELLMUTH & SERGIO D'ANGELO JEREZ

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Izabal, Guatemala

JULY 2022



CREDITS

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 are not the same for each report.

Authors

Nicholas Hellmuth
Sergio D'angelo Jerez

Compilation of Basic Data From Earlier Botanists

Nicholas Hellmuth
Sergio D'angelo Jerez

Plant Identification Team

Nicholas Hellmuth
Victor Mendoza

Bibliography Team

Nicholas Hellmuth
Sergio D'angelo Jerez
Vivian Hurtado

Photographers

Nicholas Hellmuth
David Arrivillaga
Roxana Leal
Boris Llamas

Editors

Nicholas Hellmuth

Manager of Design and Layout

Andrea Sánchez Díaz

Layout of this English Edition

Jaqueline González

APPRECIATION

Assistance for local Access, Municipio de Livingston

Daniel Esaú Pinto Peña, Alcalde of Livingston
(Izabal, Guatemala).

Initiation of the Project of Cooperation,

Edwin Marmol Quiñonez, Coordinator of
Livingston Cooperation
(Izabal, Guatemala).

Lancheros from Muelle Municipal to field trip base camp

Keneth William De La Cruz
Omar Suchite

FRONT COVER PHOTOGRAPH

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sec; f/14; ISO 2,500.

TITLE PAGE PHOTOGRAPH

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Edible Wetlands Plants of Municipio de Livingston, Izabal

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



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



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





GLOSSARY

Bajo: is a low forest over totally flat land. Bajos often have a few centimeters of standing water in the wet season. In the dry season they are dry to the point that the ground has the typical surface fissures of completely dried mud. So a bajo is a seasonally inundated wetland. If the bajo has palo de tinto it is called a tinal. But there are lots of bajos with few and often no logwood whatsoever. Bajos occupy a lot of the land of Petén (the rest are hills that have different vegetation, usually with taller trees).

Ciénaga: one of the traductions in Spanish for bog, swamp and marsh. Swampy area with soft mud or silt. Often could be a bog, swamp or marsh, soft mud, wet, and often a bog or swamp or marsh.

Ferns: (class Polypodiopsida), are a class of nonflowering yet vascular plants that possess true roots, stems, and complex leaves (but they have no flowers or seeds). Ferns reproduce by spores.

Manglar: is Spanish for mangrove swamp. Each area of each coast has slightly different mangrove species. In the Municipio de Livingston the most common mangrove is the *mangle rojo* (*Rhizophora mangle*). Black mangrove (*Avicennia germinans*) is also present in Izabal coastal areas. Rio San Pedro (Petén) is an inland area that surprises us all with its mangrove trees.

Marsh: usually has water all year but has no total tree cover. Grasses, reeds and low plants are more common; plus, underwater plants and floating plants. If there are trees everywhere, then I consider it a swamp.

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, then it is a swamp. The definition of each of these words depends a bit whether you are in the wetlands of Tabasco, or Rio San Pedro, or near Monterrico (inland from Pacific Ocean coast of Guatemala) or in the Municipio de Livingston or in Petén.

15 LIFE ON LAND



Life on land is the Sustainable Development Goal (number 15 of the United Nations proposal) 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.



GLOSSARY

Plants: any of a kingdom Plantae of multicellular eukaryotic mostly photosynthetic organisms typically lacking locomotive movement or obvious nervous or sensory organs and possessing cellulose cell walls.

Riperian: the bank that belongs to 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.

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.

Wetlands or Wetland: to me is a generic word to cover swamps, marshes, rivers, lakes, lagoons and seasonally inundated areas (including bajos, savannas, cibles, etc.). 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 tinal swamps to see what was 100 to 200 meters inland (namely the two tasistal areas that FLAAR has documented).

15 LIFE ON LAND



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Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 18, 2021.

Camera: Sony Alpha A7R IV. Settings: 1/200, sec; f/14; ISO 2,500.

MY PERSONAL EXPERIENCE WITH *LACMELLEA STANDLEYI* **BY NICHOLAS HELLMUTH AND VIVIAN HURTADO**

The team of FLAAR Mesoamérica has been studying *Lacmellea* trees for more than two years. In mid-August of 2020, one of these trees was found with the help of FUNDAECO, although it didn't have prickles or thorns. Later, another tree was spotted in the Tapón Creek nature reserve, also managed by FUNDAECO (in that opportunity, it was the local guides who helped us find this tree, given that they knew about it and were aware of it).

In October of that same year, Daniel Pinto (the municipality alcalde) invited the team to see another tree that they had found earlier. In that same trip Senaida Ba, our Q'eqchi' Mayan plant scout, found a second exemplar of the species.

At that point, Nicholas was so curious that he tried the latex. Later he recalled:

Triple WOW; it was the most delicious creamy milk I have had in my entire life. Yummy, tasty, delicious. I let the latex dribble onto my finger and then I tipped my finger up to drink the latex. Heavenly taste (this is not a stimulant; this is not a drug; this is simply wonderful taste; no after-effect whatsoever).

Then a few minutes later I noticed my two fingers were literally glued together; total stuck to each other; I could not pull them apart except with force. I am not a chemist but many tree resins are like glue or varnish. I hope none of my intestines get glued together! But I have spoken with other people who have told me local people have drunk from the trunk.

We have now learned that given that the tree visited in August was a very tall tree, definitely not a bush or shrub, or even a "low tree", as it is noted by several botanists, it is probable that it might not be a *Lacmellea* species. The presence of prickles on some trees in Belize, and not one single solitary prickle or spine or anything on this tree, suggest that it might have been another species with edible latex, and the same local name lechemiel as well. For instance, we have concluded that it could be a tree in the *Couma* genus.

Nevertheless, this still needs to be studied in more detail. We have considered if there is a second species in Belize (that has prickles) or is there a regional sub-species. In a previous report Nicholas noted:

It is notable that nowhere (that I could notice) does Standley and Record (1969) or Standley and Williams (1969) give the measurements of the prickles on the trunk. Nor any information, whatsoever, about how many prickles are on a square meter or any other portion of the trunk. Actually Morales says this Guatemalan species rarely has any prickles whatsoever! Maybe the second tree is *Couma guatemalensis* Standl. (palo de vaca). This is a synonym of the new accepted name of *Couma macrocarpa* Barb. Rodr.

It helps to know in advance when it flowers (March to June) and when it fruits (June to September). Our team of FLAAR Mesoamerica found in with immature fruits in August, so we estimate they would ripen in September.



Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021. Camera: Sony Alpha A7R IV. Settings: 1/200; sec; f/14; ISO 2,500.



Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021. Camera: Sony Alpha A7R IV. Settings: 1/200; sec; f/14; ISO 2,500.

On the other hand, Vivian Hurtado, who is part of the research team and was present on a later occasion in which this tree was photographed, said this about how they encountered the species:

In December 2020 I had the opportunity to visit the Municipality of Livingston with the FLAAR Mesoamerica team. We found many interesting plants that I saw and learned about for the first time. Among them was the *Lacmellea standleyi* tree.

I remember that Nicholas was looking for trees with edible latex, and this species was one of them. So when we found one, one of the rangers who went with us grabbed his machete and made a cut in the trunk to let us try the latex. Immediately, a white substance came out and I grabbed a little with my finger. Its texture was sticky and its taste seemed a bit sweet to me, combined with a hint of mint. It was an amazing moment because I didn't know about this tree and I wasn't expecting to try its latex either.

Nowadays, we know a lot of many edible plants, but it is curious how little we know about our native plants. So far, with FLAAR Mesoamerica I have not only learned a lot, but also shared those lessons with many people. I wish that more Guatemalan people had this kind of experience.



Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021.
Camera: Sony Alpha A7R IV. Settings: 1/200; sec; f/13; ISO 2,500.

At this point, Nicholas Hellmuth has kept doing research on the *Lacmellea standleyi* tree as part of his constant improvement of his lists of edible native plants that grow wild in Guatemala. He has noted:

In addition to being edible, the tree trunk looks like a *Ceiba pentandra* on steroids: often with prickles up and down the trunk. Although this tree is known to botanists, we could consider the *Lacmellea standleyi* tree as one of the most forgotten and unknown trees to iconographers and ethnobotanists (myself included until we found it over and over again in the forests of western Izabal, Guatemala).

As an iconographer it is considered that all conical spines on Maya ceramics are of *Ceiba pentandra* (though often *Ceiba aesculifolia* spines can be up to 5 cm or more in amazing length, as we found in the km. 60 – km. 80 forests of CA-9 (the highway through the Bosque Seco to Puerto Barrios)). We now have a more complete list of all trees with conical spines. Of these, spines of the *Lacmellea standleyi* are very impressive. So the present FLAAR Report is for iconographers as well as ethnobotanists.

If I were a Mayan king, I would prefer cacao with latex of *Lacmellea standleyi* trees far more than all the other drugs that a Mayan king routinely took during ceremonies (the Aztec were by no means the only ones into these tasty plant chemicals). But, I do not yet propose that the latex of *Lacmellea standleyi* is a drug or narcotic or comparable: it is simply yummy and delicious beyond belief. If you used the latex of *Lacmellea standleyi* in your chocolate you would need any hallucinogenic plants or other chemicals in your cacao (such as *Bufo marinus* (now renamed *Rhinella marina*)).

Note that we do not propose that latex of *Lacmellea standleyi* was indeed consumed as “milk chocolate.” We also do not propose that spines on Teotihuacan Tiquisate and Peten urns and comparable ceramics were spines of *Lacmellea standleyi*. The point is that it is essential to realize that LOTS of TOTALLY DIFFERENT SPECIES OF TREES of Mesoamerica had spines similar to *Ceiba* trees. And, surely the indigenous inhabitants of Izabal would have enjoyed the super tasty latex of *Lacmellea standleyi* (just be aware that this latex is a super-glue). Multiple botanists list *Lacmellea* as being edible (Standley and Steyermark; Balick, Nee and Atha). But there is not yet any MS thesis or PhD dissertation on this remarkable tree. We hope our two FLAAR Report inspire a student to tackle all aspects of this tree’s potential use thousands of years ago.

FULL BOTANICAL NAME

Lacmellea standleyi (Woodson) Monach.

SYNONYMS FOR

LACMELLEA STANDLEYI

Lacmellea edulis H. Karst.

Zschokkea standleyi Woodson



LOCAL NAMES FOR

LACMELLEA STANDLEYI

L. standleyi is a species with a wide variety of local names, among which are:

Lechemiel (Soto et al. 2013), palo de vaca, vaca tree, and prickly vaca (Williams 1981).

The name *lechemiel* (honey milk) states the same meaning as *Lacmellea*, the genus name, which derives from the latin “lac” (milk) and “mellea” (resembling honey or as sweet as honey).

On the other hand, and given that *L. standleyi* is also known in South America, a greater number of local names can be found online.

Finally, Morales (1998) points out that *L. panamensis* is known throughout Mesoamerica as lagarto negro and this name could refer to *L. standleyi* as well. This is due to the fact that Morales establishes *L. panamensis*’ distribution from Belize to Brazil, which later was proved to be inaccurate. The only species that is currently considered to reach Guatemala and Belize is *L. standleyi*. Therefore, Morales might have been referring to both species and the name *lagarto* could be used in both cases.

Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021.

Camera: Sony Alpha A7R IV. Settings: 1/200; sec; f/13; ISO 2,500.

HOW MANY OTHER PLANTS OF GUATEMALA HAVE THE SAME SPANISH NAME?

No other species appears to be called by the names *palo de vaca*, *vaca tree* or *prickly vaca*. Nevertheless, it is probable that local people know *Couma* species by the name *lechemiel*, and there are several species that are called *lagarto*.

For instance, many tree species with conical spines are called *lagarto*. These include *Ceiba aesculifolia* and various species of *Zanthoxylum*. In this regard, the name *lagarto* figures in many publications of the Maya Biosphere Reserve referring to *Zanthoxylum* species. Often the species are not determined, but it is certain that more than one species of *Zanthoxylum* is called by this name.

HABIT FOR **LACMELLEA STANDLEYI**

Tree. It is described by most of the publications found online as a small tree.

Lacmellea standleyi

Photo by: Roxana Leal, FLAAR Mesoamerica, Jul 3, 2021.

Camera: Google Pixel 3XL

HABITAT, IN WHAT ECOSYSTEM(S) CAN YOU FIND NATIVE **LACMELLEA STANDLEYI**?

Standley and Williams mention that this species grows in:

Wet mixed lowland forests, sometimes on open pasture land; 300 meters or lower (Standley and Williams 1969: 356).

Similarly, Morales (2009) states that the species can be found in very humid forests, between 100 and 400 meters above sea level.



WHAT OTHER TREES OR PLANTS ARE FOUND IN THE SAME HABITAT?

According to the life zone classification made by the IARNA research institute, some of the species that are common among the same habitat, and therefore, could be found in proximity to *L. standleyi* include:

Acoelorrhaphe wrightii, *Alseis yucatenensis*, *Annona glabra*, *Aspidosperma cruentum*, *Asterogyne martiana*, *Astronium graveolens*, *Attalea cohune*, *Bactris mexicana*, *Bactris trichophylla*, *Bourreria oxyphylla*, *Brosimum allicastrum*, *Bursera simaruba*, *Calophyllum brasiliense*, *Carapa guianensis*, *Cedrela odorata*, *Ceiba pentandra*, *Chrysobalanus icaco*, *Chrysophylla stauracantha*, *Chrysophyllum mexicanum*, *Coccoloba schiediana*, *Cochlospermum vitifolium*, *Cordia gerescanthus*, *Cupania belizensis*, *Dalbergia ecastaphyllum*, *Desmonchus orthacantos*, *Dialium guianensis*, *Dracaena americana*, *Eugenia capuli*, *Euterpe macrospadix*, *Grias integrifolia*, *Guazuma ulmifolia*, *Guettarda combsii*, *Hamelia rovirosae*, *Ledembergia macrantha*, *Lonchocarpus guatemalensis*, *Mannicaria saccifera*, *Montricardia arborescens*, *Morinda panamensis*, *Pachira aquatica*, *Palicourea triphylla*, *Psychotria capitata*, *Pterocarpus hayesi*, *Pterocarpus officinalis*, *Sabal mauritiiformis*, *Sebastiana longicuspis*, *Sloanea ampla*, *Souroubea triandra*, *Spondias mombin*, *Swietenia macrophylla*, *Symphonia globilifera*, *Trophis racemosa*, *Unonopsis pittieri*, *Vismia camparaguey* y *Zamia splendens*.

(IARNA-URL 2018: 51).

So far, our expedition team has been able to find several of these species. Actually, many of them are described in the *Edible Wetland Plants of Municipio de Livingston, Izabal* series to which this report belongs.

BOTANICAL DESCRIPTION OF *LACMELLEA STANDLEYI* IN STANDLEY AND CO-AUTHORS CHICAGO BOTANICAL MONOGRAPHS

The description that figures in Flora de Guatemala by Standley and Williams is the following:

A glabrous tree of 5-11 m.; leaves on petioles 6-10mm. long, chartaceous, oblong or elliptic-oblong, 10-15 cm. long, 3-5 cm. broad, abruptly acuminate, obtuse or rounded at the base; inflorescences axillary, pedunculate, 5 cm. long or less, many-flowered, the stout pedicels 3 mm. long or less; calyx lobes ovate-subreniform, rounded at the apex, 2-2.5 mm. long, ciliolate; corolla white or greenish white, the tube 2-2.5 cm. long, glabrous outside, the lobes obliquely ovate-lanceolate, acuminate, 8 mm. long, spreading; anthers narrowly oblong, 6 mm. long; fruit broadly ovoid, yellow, 1.5-2 cm. long, 1-seeded.

(Standley and Williams 1969: 156).

An important feature, which might be very helpful to locate this tree in the wild is the fact that the trunk apparently is covered in spines.

CLOSE RELATIVE(S) OF *LACMELLEA STANDLEYI*

L. standleyi belongs to the Apocynaceae family. Other genera that belong to the same family and which we have also found in our expeditions throughout Izabal, Petén and the *corredor seco* (dry corridor) of Guatemala include *Tabernaemontana*, *Rhabdadenia*, *Thevetia*, *Plumeria* and *Mandevilla*.

Many publications mention that *L. standleyi* can be found in Belize. Here is one example:

Lacmellea standleyi (Woodson) Monach. — **Reg Use:** BEV, FOOD. — **Nv:** milk tree, palo de vaca, prickly vaca, vaca, vaca tree. — **Habit:** Tree.

(Balick, Nee and Atha 2000: 122)



Lacmellea standleyi

Photo by: Roxana Leal, FLAAR Mesoamerica, Jul. 3, 2021.
Camera: Google Pixel 3XL

WHERE IN MEXICO CAN ***LACMELLEA STANDLEYI* BE FOUND?**

It has been suggested that the natural distribution of *L. standleyi* ranges from Belize and Guatemala to Colombia, so it doesn't naturally occur anywhere in México. Indeed this tree is not listed in Villaseñor's 2016 *Checklist of the native vascular plants of Mexico*.



WHERE HAS *LACMELLEA STANDLEYI* BEEN FOUND IN THE MUNICIPIO OF LIVINGSTON?

The current notes are written before we have dedicated time to check each botanical herbaria database for where *Lacmellea standleyi* has been found in Izabal. But we do have an initial list for where found so far for Izabal:

- RPM Cerro San Gil (CONAP, FUNDAECO and TNC 2008: 152).
 - North of Lago Izabal (Morales 2009: 156)
 - Entre Rios, Izabal (Standley and Williams 1969: 356)
 - Montaña del Mico (Ibid.).
 - Northwest of Lake Izabal (Morales 1993: 262).
-
- > Is *Lacmellea standleyi* listed for Biotopo Protegido Chocón Machacas, CECON/USAC?
Not mentioned.

 - > Is *Lacmellea standleyi* listed for Tapón Creek Nature Reserve (including Taponcito Creek), FUNDAECO?
No data found.

 - > Is *Lacmellea standleyi* listed for Buena Vista Nature Reserve?
No data found.

 - > Is *Lacmellea standleyi* listed for Cerro San Gil (south side of Rio Dulce)?
Yes; it is included in a flora inventory, in the reserve's 2008-2012 official master plan.

 - > Is *Lacmellea standleyi* listed for Ecoalbergue Lagunita Creek (Área de Usos Múltiples Río Sarstún)?
No data found.

 - > Is *Lacmellea standleyi* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)?
Yes. Meerman et al. (2003) report it for the Toledo district area of the park.

 - > Is *Lacmellea standleyi* listed for Refugio de Vida Silvestre Punta de Manabique?
No data found.

 - > Is *Lacmellea standleyi* listed for Bocas de Polochic?
No data found.



Lacmellea standleyi

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jul. 2, 2021.
Camera: iPhone 12 Pro.

ARE *LACMELLEA STANDLEYI* TREES **REGISTERED FOR PARQUE NACIONAL TIKAL?**

No data found.

It is probable that the species' range doesn't go further north in Guatemala, up to the Maya Biosphere Reserve (RBM). Some of the registers furthest north have been found several kilometers north of Alta Verapaz, but not close to the Reserve. Nevertheless it appears that it does reach a higher latitude in Belize.

There is a possibility, perhaps, that this species has not yet been collected or reported in this area. Although, if this species was present in the RBM, it is most probable that it could also be found in the neighboring Mexican states, and so far, this has not occurred.

Nevertheless, Nicholas has found that archaeological remains which contain *Lacmellea* traces were reported in Peten (Thompson 2013: 153, Appendix 3). This should encourage more field work to be done in order to find if there are still any *Lacmellea* trees growing in the northern portion of Petén, including both Tikal, and Yaxhá, Nakum and Naranjo National Parks. Nicholas has stated:

Remains of *Lacmellea* were found in paleoethnobotanical remains of woody species recovered at Tikal by the UCTAP and the University of Pennsylvania project (1956-1969) (Thompson 2013: 153, Appendix 3). This suggests that *Lacmellea* should be findable in many areas of Peten, including Parque Nacional Tikal and also Parque Nacional Yaxha Nakum Naranjo). No botanical list of any park has all species. What you get are The most common, The best known to local people, The plants close to easy-to-reach areas, etc. Our project at PNYNN was to go-off-the-beaten-path but with no outside funding our time-per-field-trip was limited to one week-per-month for 12 months. And most of each day was literally hiking at full speed to reach a remote area we were curious about. What would help is a multi-year project with adequate funding. Nonetheless we found plants not in any previous list for this park area. Plus, we were the first project to accomplish panorama photography of each ecosystem. But we definitely did not find as many plants as we know are present.

ARE *LACMELLEA STANDLEYI* TREES REGISTERED FOR PARQUE NACIONAL, YAXHA, NAKUM AND NARANJO, IS ***L. STANDLEYI* PRESENT OR MISSING FROM EARLIER LISTS?**

No data found.

As explained in the previous section, there are not herbaria samples in the region surrounding Yaxhá, Nakum and Naranjo National Parks, but the archaeological finds should encourage better documentations of the flora in this area, in order to determine if *Lacmellea standleyi* can be found in Northern Peten.

IS *LACMELLEA STANDLEYI* FROM THE HIGHLANDS OR FROM THE LOWLANDS (OR BOTH)?

Based on the ecological information that has been presented so far in this document, it could be said that *L. standleyi* is a lowland species. In fact, the humid ecosystems in which it grows are generally at sea level and proximate to the ocean. For instance, this has been true for the specimens we could photograph in Livingston, and many herbaria samples that can be consulted online.

Yet, one of the herbarium samples consulted online was collected in the highlands of Alta Verapaz at more than 1000 meters above sea level. Here, the highlands are distinguished by humid ecosystems that form a narrow ecosystem fringe with similar conditions. While considering how this species could spread in this fringe (locally known as “franja transversal del norte”) that goes from Izabal to Huehuetenango, there is the possibility that *L. standleyi* could be found both in the lowlands and sporadically, in the highlands.

WORLD RANGE FOR ***LACMELLEA STANDLEYI***

Throughout the years, the global distribution of *L. standleyi* has changed often. This is because of the different names with which it has been reported in diverse publications. Today, information from both leading botanical institutions and scientific publications showcase inconsistent information in this regard. This could have to do with the fact that they are based on the work of different authors.

According to tropicos.org, and the Royal Botanic Gardens at Kew, the species is distributed throughout Belize, Guatemala and Honduras. It is worth mentioning that tropicos.org categorizes this species as endemic.

On the other hand, there are several publications that suggest that *L. standleyi* could spread throughout Central America and the amazonian forests of South America. For example, Soto et al. (2013) conducted a bioprospecting study of the species' fruits in the Colombian Orinoco region.

Lastly, it should be considered that there are many other publications which include *L. edulis*, a synonym of *L. standleyi*. In that sense, most of the reports and documentation of *L. edulis* are based almost exclusively on samples from South America.

Lacmellea standleyi

Photo by: Roxana Leal, FLAAR Mesoamerica, Jul. 3, 2021.
Camera: Google Pixel 3XL



DOES *LACMELLEA STANDLEYI* **ALSO GROW IN HOME GARDENS?**

There are two main reasons why this species might not still be grown in home gardens. First, it grows in a habitat with higher than average conditions of humidity. So as it happens with cacao trees for instance, not every garden might have the suitable characteristics. Second, people might haven't yet decided to grow it in home gardens. A few publications state that people tend to harvest produce from wild trees, so this means that the species has not yet been cultivated (despite the fact that the sap and fruits are desirable and flavorful).

Cogollo et al. (2003) indicate that some trees were propagated by seed and planted in the botanical garden of Medellín *Joaquín Antonio Uribe*. In that regard, they brightly make the addition that the trees have developed a deep root system and have a shape that is suitable for an urban tree.



USES OF **LACMELLEA STANDLEYI**

Certainly, the people that live where *L. standleyi* grows are not unaware of this species. This was the case for the ranger that let us try the latex in Livingston, but also, people in South America harvest the fruits and latex as both are edible. In that sense, there are many authors that have documented the edibility of this species.

Standley and Williams add the following description on this topic:

The fruit is said to have the odor of mangos. It probably is edible. (...) The abundant latex obtained from incisions in the trunk is said to be drunk sometimes, although not altogether agreeable in consistency

(Standley and Williams 1969: 356).

In addition, the following has been said about how the fruits and latex are consumed:

First, Cogollo et al. (2003) indicate that the latex of every part of the plant has a nice flavor and can be consumed both alone, or by mixing it with coffee. Likewise, they state that it has been employed in chewing gum elaboration. On the other hand, they say that the aril which covers the seeds has a very nice flavor and can be consumed raw.

In regards to the latex being used in chewing gum elaboration, the U.S. Food and Drug Administration (2022) has included *L. standleyi* as a reliable source of food additives permitted for human consumption.

Idarraga et al. (2016) assure that the latex is as sweet as honey, and therefore it is consumed by some communities, including the people at los Llanos Orientales (Colombia).

Finally, Cartay (2005) describes the fruits as fleshy berries; both yellow or orange, and sweet. He also indicates that the latex has the same consistency as milk.

A research study carried out by Soto et al. (2013), found the following properties in the fruits of *Lacmellea standleyi*:

The results show that green fruits are suppliers of antioxidant compounds. Higher levels of nutrients are found in the intermediate state and mature fruit has attractive organoleptic properties and a relatively high nutrient content. (...) The antioxidant capacity of *Lacmellea standleyi* fruits was evident in the three ripening stages, giving the plant a promising future in the pharmaceutical industry, standing out in this field the fruits in the green stage. Furthermore, the results suggest the application of the intermediate and mature fruits in the finished products development. The safety observed in the plant material warrants its use in human consumption

(Soto et al. 2013: 412).

While describing *L. cf. gracilis*, López et al. (2006) mention that generally most of the *Lacmellea* species have sweet, and mildly acidic fruits. They also state that *L. cf. gracilis* fruits are usually harvested by local people in Tarapacá (Colombia) by climbing the trees, which tend to be small, or by shaking the tree and then picking the fruits that fell on the ground. This harvesting method might be applicable for *L. standleyi* as well.

As a last point, there are some interesting descriptions made by Alexander Von Humboldt during his eighteenth century expeditions, which refer to a tree which was known as *palo de vaca* or *árbol de la leche* (vaca tree or the tree of milk). He found this tree in Venezuela, where he reported that many of the local people used to drink the latex. According to him, the látex was more abundant in the sunrise, when the people went to harvest the trees and drink it, as if they were milking a cow. Humboldt (1826) said that during his expedition, he himself had an abundance of this milk both in the mornings and in the evenings, before going to sleep and he never experienced any harmful effect. He also said that people used to soak corn or cassava bread in this milk, as it is nowadays a tradition in Guatemala and other countries to soak bread in coffee.

By the descriptions of the latex, as an aromatic, nice flavored substance, and the fact that Humboldt reported that each fruit had two seeds, it is probable that this *palo de vaca* was one species in the *Lacmellea* genus.



Lacmellea standleyi

Photo by: Boris Llamas, FLAAR Mesoamerica, Oct. 11, 2020

Camera: Nikon D850 Settings: 1/250; sec. f/8; ISO 250.



Lacmellea standleyi

Photo by: Boris Llamas, FLAAR Mesoamerica, Oct. 11, 2020

Camera: Nikon D850 Settings: 1/60; sec; f/6.3; ISO 800.



Lacmellea standleyi

Photo by: Boris Llamas, FLAAR Mesoamerica, Oct. 11, 2020

Camera: Nikon D850 Settings: 1/1,000; sec; f/7; ISO 3,200.

IS THERE POTENTIAL MEDICINAL USAGE OF **LACMELLEA STANDLEYI** BY LOCAL PEOPLE?

Leeuwenberg (1987) mentions that the jivaro indigenous people of the Peruvian Amazonas used two *Lacmellea* species for ectoparasites and as a tonic. Perhaps, it could be inferred that the sap constituted the tonic that he is referring to.

Furthermore, Giraldo-Tafur (1996) notes that *L. edulis* (a synonym for *L. standleyi*) was used in the region of the Putumayo river. People drank the latex to relief the pain and loose stools caused by gastrointestinal illnesses related to the river's increasing contamination.

ARE ANY PARTS OF *LACMELLEA STANDLEYI* EATEN BY MAMMALS?

Yes. It has been reported that the fruits are eaten by different primates in Panama, two species of which are also distributed in Guatemala and could eat the fruits locally as well.

WHAT ARE THE PRIMARY POLLINATORS OF **LACMELLEA STANDLEYI** FLOWERS?

There is not much information available online on how *L. standleyi* flowers are pollinated. However, some of the pollinators that have been reported to be involved with the pollination of other species in the same genus include bees, butterflies and hawkmoths (*L. panamensis*) (Tropical Plant Database, 2015); *Eulaema meriana*, a bee in the Euglossini tribe (*L. lactescens*, which could be a synonym of *L. standleyi*) (Ramírez et al. 2002), and nocturnal moths in general, given that phalenophily has been reported (*L. arborescens*) (Sousa et al. 2021).

As it happens with other flowers of the Apocynaceae family, the length of the tube is very distinctive. This is an interesting feature considering how the pollinators might have long tongues in order to extract nectar from the flowers. This characteristic might be applicable with moths.

CONCLUDING DISCUSSION **AND SUMMARY ON *LACMELLEA STANDLEYI***

Given its edibility, *Lacmellea standleyi* stands out as an interesting species with huge potential. For what has been described of its flavorful latex and fruits, there should be a great interest in cultivating the species. On the other hand, it could be very productive to better understand the nutrient composition of the latex, and therefore conduct research on this topic, as it has already happened with the fruits. In that sense, considering if the latex could be commercialized as a milk substitute is an attractive idea that pops immediately.

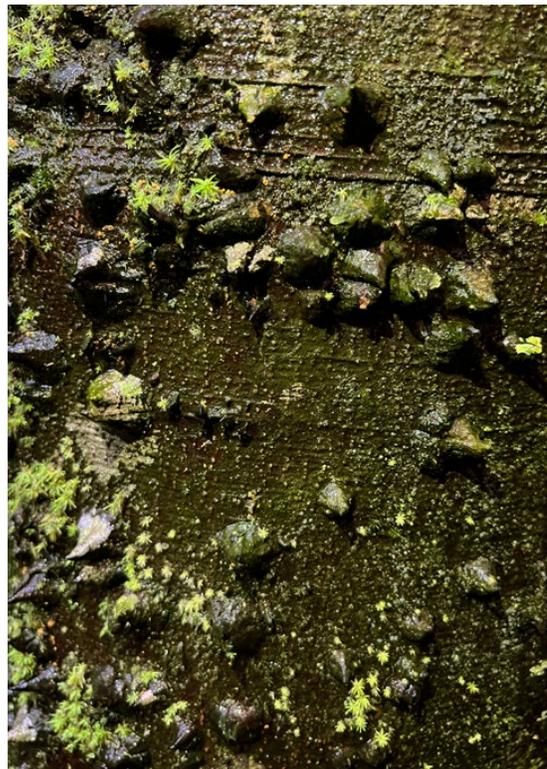
In regards to the distribution and range of *Lacmellea standleyi*, it could be said that molecular phylogenetics would be very helpful to determine if this single species distributes all the way throughout Central and South America, or if it is confined to Guatemala, Belize and Honduras, as some sources suggest.

Lastly, since this is a plant native in several parts of Izabal (and Peten), but rare, it might help if the Municipio de Livingston would create a Vivero of Underutilized Edible and Useable Native Plants of Municipio de Livingston. This could not only promote the sustainable use of species that are underutilized but could also be important to conserve species such as *Lacmellea standleyi*.



Lacmellea standleyi

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Dec. 13, 2021.
Camera: iPhone 13 Pro Max.



Lacmellea standleyi

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
Dec. 13, 2021.
Camera: iPhone 13 Pro Max.



Lacmellea standleyi

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021.

Camera: Sony Alpha A7R IV. Settings: 1/200, sec; f/14; ISO 2,500.

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Download online: <https://bdigital.zamorano.edu/bitstream/11036/4831/1/01.pdf>

HELPFUL WEB SITES FOR **ANY AND ALL PLANTS**

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

However, most popular web sites are copy-and-paste (a polite way of saying that their authors do not work out in the field, or even in a botanical garden). Many of these web sites are click bait (they make money when you buy stuff in the advertisements that are all along the sides and in wide banners also). Therefore, 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 the collection of the Field Museum herbarium of 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/imagetatabase/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, the botanical garden in Singapore, and El Jardín Botánico, (the open forest botanical garden in Guatemala City).

www.ThePlantList.org

This is one of the most reliable botanical web site to find synonyms.

WEB SITES SPECIFICALLY **ON *LACMELLEA STANDLEYI***

<https://www.tropicos.org/name/1801326>

Accepted names and synonyms

<https://biodiversidad.gt/portal/taxa/taxonomy/taxonomydynamicdisplay.php?target=8909>

Biodiversity portal of Guatemala, allows you to consult online herbaria samples of this species

<https://eol.org/pages/5326697>

Lacmellea species list and its range distribution

<http://herbanwmex.net/portal/taxa/index.php?taxon=130553>

Herbarium photos and references

<http://legacy.tropicos.org/name/01801326?projectid=3>

General description and map distribution

<http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:134507-2>

Range and distribution

<http://www.theplantlist.org/tpl1.1/record/kew-106787>

Accepted synonym provided by The Plant List: *Zchokkea standleyi* Woodson

<http://tropical.theferns.info/viewtropical.php?id=Lacmellea+standleyi>

Information

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is the office manager, overseeing all the diverse projects around the world. We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Hurtado is the actual project manager for FLAAR's divisions: Flora & Fauna and MayanToons. She is also environmental engineer and passionate researcher

Victor Mendoza environmental engineer, is in charge of the photographic database of FLAAR Mesoamerica and its taxonomic identification. He also supports as a research assistant.

Sergio Jerez He is involved with plant identification, bibliographic research and map design for the trails explored on each expedition.

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

Senaida Ba has been our photography assistant for several years. Now, she puts together PowerPoint presentations for students and teachers to learn about several subjects like Flora, Fauna and Mayan Iconography.

Jaqueline González designer who puts together the text and photographs to create the actual report.

Roxana Leal major in Communication who manages all our social media and digital community. She's sometimes part of our fieldwork trips, since she has a special interest for adventure and Guatemala's diverse nature.

María Alejandra Gutiérrez is an experienced photographer who now prepares all the Photography Catalogs for the project we're currently working on the RBM. She also contributed to the coordination of several trips we made during our Livingston, Izabal research project.

David Arrivillaga is an experienced photographer 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.

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.

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

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

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

Paula García is part of our MayanToons Animation team. Her job brings our favorite jungle, wetland and savanna characters to life.

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

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

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

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

Byron Pacay handles GPS mapping of where we hike or go in the lancha (boat) each field trip day. He also lists where we stop to take photos and what each one of us is photographing and then has that tabulation ready each night.

Edwin Solares environmental engineering. He is a photographer and videographer during our expeditions and later edits this content to be able to use it in the materials we generate.

Belén Chacón her job includes organizing and tabulating data on useful and edible flora, which is listed in FLAAR's bibliography and many other references, in order to keep a complete list of plant species that are useful, along with updated taxonomical information.

Diana Sandoval her work consists of the recompilation of scientific information, which later is transformed into the FLAAR reports that are published on our websites.

María José Toralla she gathers information and bibliographies that are added to our Flora & Fauna electronic library and also make part of the information found in research, reports and websites.

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

Niza Franco is part of our MayanToons Animation team. Her job brings our favorite jungle, wetland and savanna characters to life.

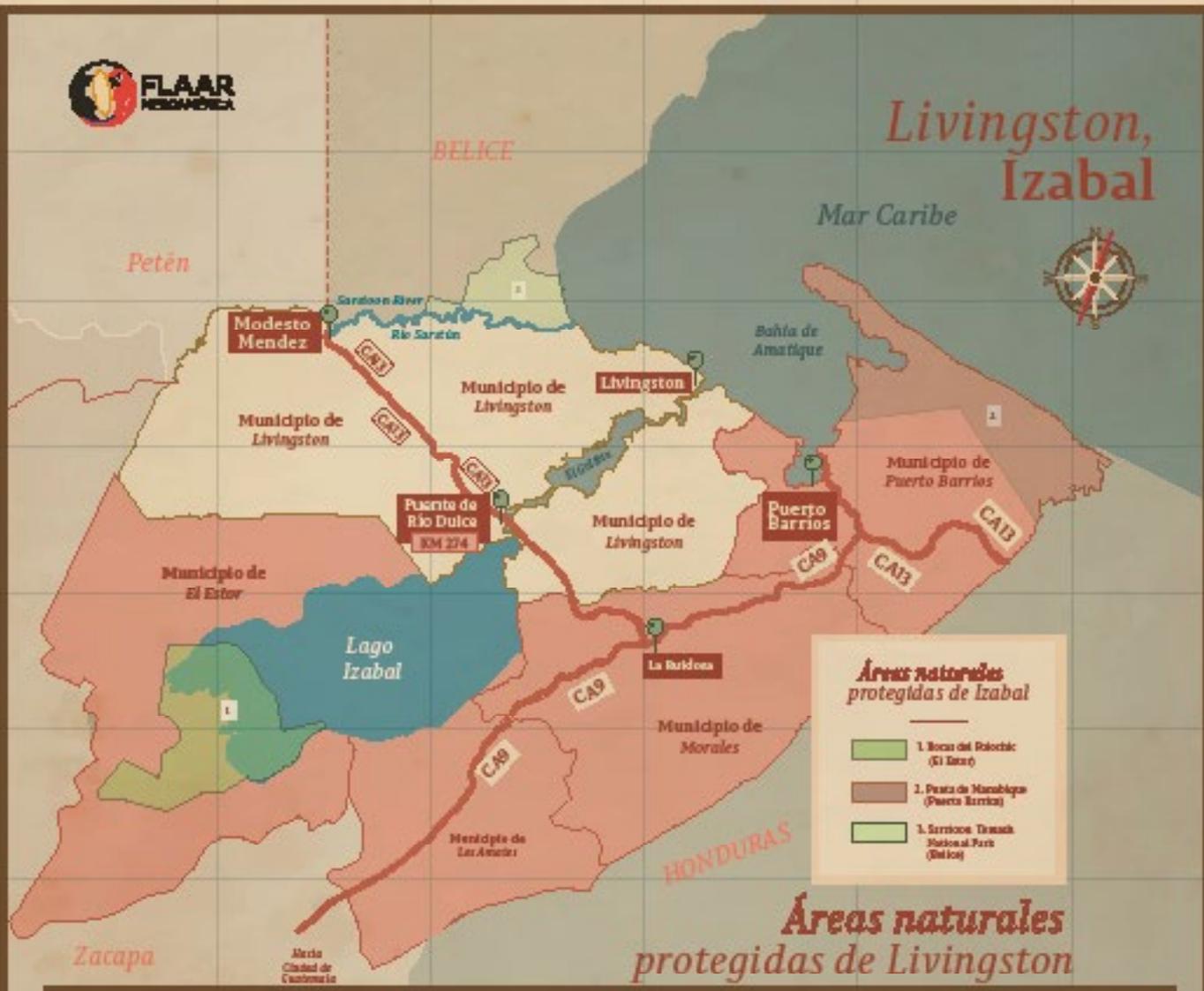
Josefina Sequén is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Isabel Rodríguez Paiz is in charge of the fundraising. She is experienced in networking, social media, and organizing meetings to experience what FLAAR does out in the remote rain forest ecosystems

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Áreas naturales protegidas de Livingston



Izabal

- 1. Área sin protección
- 2. Parque Nacional Río Dulce
- 3. El Higuierito
- 4. Área de Usos Múltiples Río Sarstún
- 5. Sierra de Santa Cruz
- 6. Biotopo Protegido Chocón Machacas
- 7. Reserva Protectora de Manantiales Cerro San Gil



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1748000



Reserva Natural Tapón Creek, Livingston

Bahía de Amatique

Área de Usos Múltiples
Río Sarstún

Punta
Cocolí

Aldea Buena
Vista Tapon Creek

Siete
Altares

San Juan

Reserva Natural Tapón Creek
Municipio de Livingston

Finca
Gangadtwali

Sarstún Creek

Taponcito
Creek

El Rosario

Río Cocolí

Plan Grande
Totón

San Martín

La Desmembración

Área de Usos Múltiples
Río Sarstún

El Mac
Creek

Cállx Creek

Laguna
Salvador

Río Creek Salvador

Río Totón

Biotopo
Chocón Machacas

Laguna
Cállx

El Golfete

Parque Nacional
Río Dulce

Laguna
Negra

Canal Río Dulce



Izabal



Información de referencia:

- Límites 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.

Edible Wetlands Plants of Municipio de Livingston, Izabal

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

<p>Cyperus esculentus</p> <p>Chufa, Yellow Nutsedge, Earth Almond</p> <p>MLW#1</p>	<p>Eleocharis geniculata Eleocharis caribaea</p> <p>Caribbean Spike-Rush</p> <p>MLW#2</p>	<p>Montrichardia arborescens</p> <p>Camotillo Water Chestnut</p> <p>MLW#3</p>	<p>Nymphoides indica</p> <p>Floating Heart Water Snowflake</p> <p>MLW#4</p>
<p>Pachira aquatica</p> <p>Zapoton</p> <p>MLW#5</p>	<p>Pontederia cordata</p> <p>Pickereel Weed</p> <p>MLW#6</p>	<p>Sagittaria latifolia</p> <p>Water Potatoes</p> <p>MLW#7</p>	<p>Typha domingensis</p> <p>Cattail</p> <p>MLW#8</p>

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

<p>Amphitecna latifolia</p> <p>Black calabash</p> <p>MLW#9</p>	<p>Coccoloba uvifera</p> <p>Uva del mar</p> <p>MLW#10</p>	<p>Manicaria saccifera</p> <p>Confra, Manaca</p> <p>MLW#11</p>	<p>Chrysobalanus icaco</p> <p>Coco Plum</p> <p>MLW#12</p>	<p>Avicennia germinans</p> <p>Black Mangrove</p> <p>MLW#13</p>	<p>Rhizophora mangle</p> <p>Red Mangrove</p> <p>MLW#14</p>
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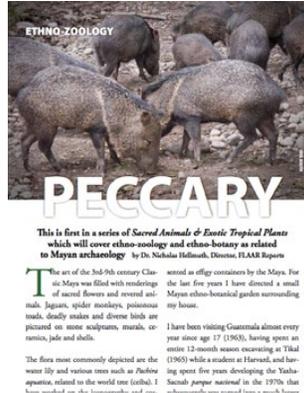
Wetland Series 3: plants that grow alongside water: rivers, lagoons, swamps, or ocean

<p>Guadua longifolia</p> <p>Jimba</p> <p>MLW#15</p>	<p>Acoelorrhaphe wrightii</p> <p>Pimientillo, Tasiste, Palmetto Palm</p> <p>MLW#16</p>	<p>Acrostichum aureum</p> <p>Mangrove Fern</p> <p>MLW#17</p>	<p>Annona glabra</p> <p>Alligator Apple</p> <p>MLW#18</p>	<p>Bactris major</p> <p>Huiscoyol Palm</p> <p>MLW#19</p>	<p>Diospyros nigra</p> <p>Zapote negro</p> <p>MLW#20</p>
<p>Grias cauliflora</p> <p>Palo de Jawuilla</p> <p>MLW#21</p>	<p>Inga vera Inga multijuga Inga thibaudiana</p> <p>River Koko</p> <p>MLW#22</p>	<p>Pithecellobium lanceolatum</p> <p>Bastard Bully Tree Chucum Red Fowl</p> <p>MLW#23</p>	<p>Coccoloba belizensis</p> <p>Papaturre</p> <p>MLW#24</p>	<p>Symphonia globulifera</p> <p>Barillo</p> <p>MLW#25</p>	<p>Lacmellea standleyi</p> <p>Lechemiel</p> <p>MLW#26</p>

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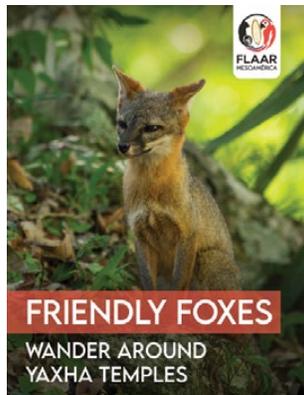
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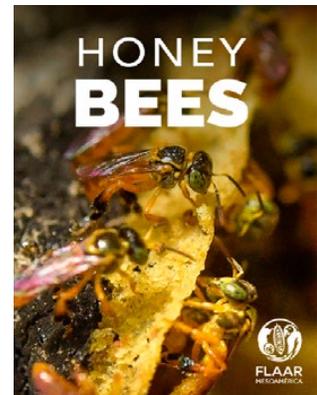
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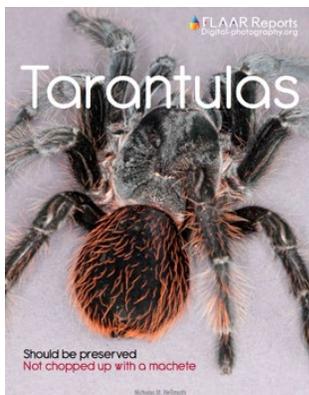
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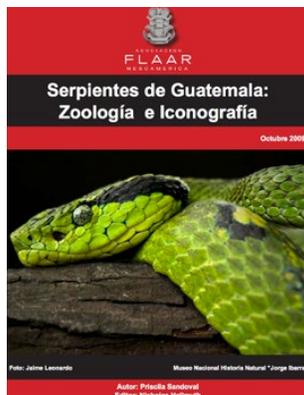
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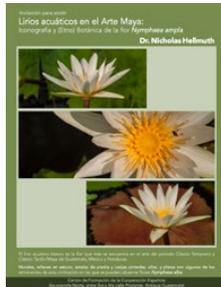
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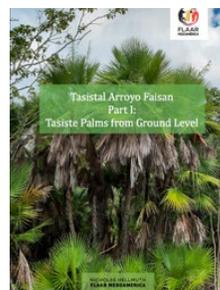
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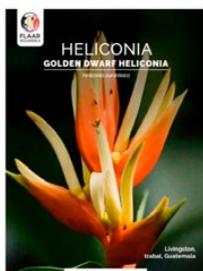
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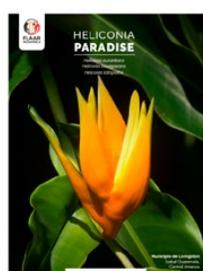
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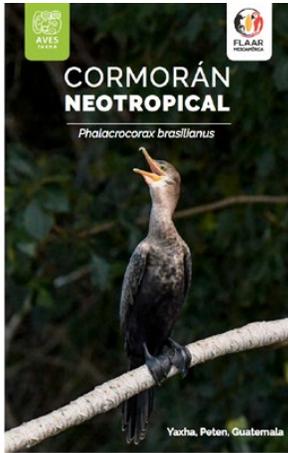
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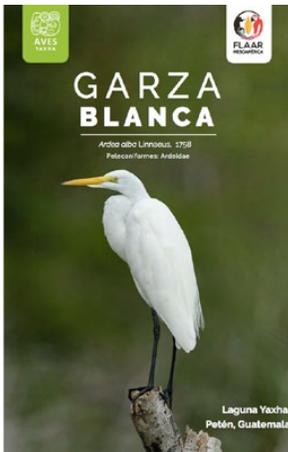
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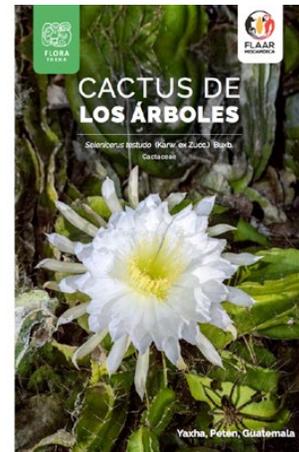
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The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team on the Division of International Cooperation, has set the goal of achieving the municipality development in the years 2020-2024 based on the goals and indicators proposed by 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 estrategias 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/>

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 Lechemiel, Leche de Vaca Tree, *Lacmellea standleyi*, Municipio de Livingston, Izabal, Guatemala. FLAAR (USA) and FLAAR Mesoamérica (Guatemala). Wetlands series 3: rivers, lagoons, swamps, or ocean, Wetlands #15

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Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 23, 2021, .
 Camera: iPhone 13 Pro Max.

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