



FLAAR
MESOAMÉRICA

FINAL REPORT

BIODIVERSITY DOCUMENTATION PROJECT OF THE MUNICIPALITY OF LIVINGSTON, IZABAL



GUATEMALA, OCTUBRE 2020 - ENERO 2022

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MESOAMÉRICA



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Iguana verde - *Iguana iguana*

Photo by: Victor Mendoza, FLAAR Mesoamerica, Jun. 4, 2021.
Camera: Sony RX10 IV. Settings: 1/640,200 sec; f/4; ISO 800.

SUMMARY

In September 2020, the municipal mayor of Livingston, engineer Daniel Pinto, authorized the project agreement: Livingston Biodiversity Documentation. This to illustrate through high resolution photography (300dpi) the different species of flora, fauna and fungi that are found in the protected areas of the municipality. This agreement lasted 15 months where 8-day expeditions were carried out in three different mega-diverse areas of the municipality: Área de Usos Múltiples Río Sarstún, Parque Nacional Río Dulce y Reserva Protectora de Manantiales Cerro San Gil.

During the project, more than 500 species were documented, including flora, fauna, and fungi. Different materials were generated from this documentation:

- **Photo essays:** Digital reports in pdf format of the most interesting species that we found during this documentation, accompanied by professional photographs and information.
- **Catalog of high-resolution images:** A compilation of all the photographic material generated, classified by family, species, and location so that it can be used by the mayor's office.
- **Audiovisual:** Audiovisual documentation (photos and videos) can be used for publicity of the visited areas and/or educational material for the public.
- **List of documented species:** To leave an inventory of the biodiversity of the municipality.



Anonillo - *Annona grabla* (Alligator apple)

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Jun. 29, 2021.
Camera: Sony RX10 IV. Settings: 1/1,600 sec; f/4; ISO 800.

INTRODUCTION

Guatemala is in one of the richest regions on the planet in terms of biological diversity. In 2010 it was declared a megadiverse country, being included in the list of related countries, which includes 20 countries and safeguarding more than 70% of the planet's biodiversity. Despite this, megadiverse countries face different problems to continue protecting this large amount of biodiversity, such as the lack of legislation, illegal logging and hunting of species, fires, climate change, among others. (CONAP. 2018)

In Guatemala there is a great lack of information in relation to the biological diversity that it has, although several investigations have been carried out by public and private entities, much valuable information that our ecosystems possess has yet to be recovered. Another problem would be the deficiencies in the environmental legislation, being overshadowed the laws and sanctions that there are of diverse treaties and agreements.

The purpose of this project is to publicize the great wealth that Guatemala has in the Caribbean area, specifically in the municipality of Livingston.

Here we find a great wealth of species due to the relationship that exists in this great variability of aquatic, marine and terrestrial ecosystems.

The project had the authorization of the municipality of Livingston and the unconditional support of the local COCODES, CONAP and regional FUNDAECO to be able to enter the different protected areas of the municipality where the expeditions were carried out and a large part of the biodiversity was documented.

FLAAR Mesoamerica is committed to disseminating and sharing the material generated by collecting photos, videos, and information, with the different entities that provided support for this project and with the public.

Thanks in advance to the different government entities and the Garifuna and Maya Q'eqechi' communities for having supported this project. Together we have made a great effort with the aim of raising awareness among the population for the conservation and protection of the biological diversity that our country protects.

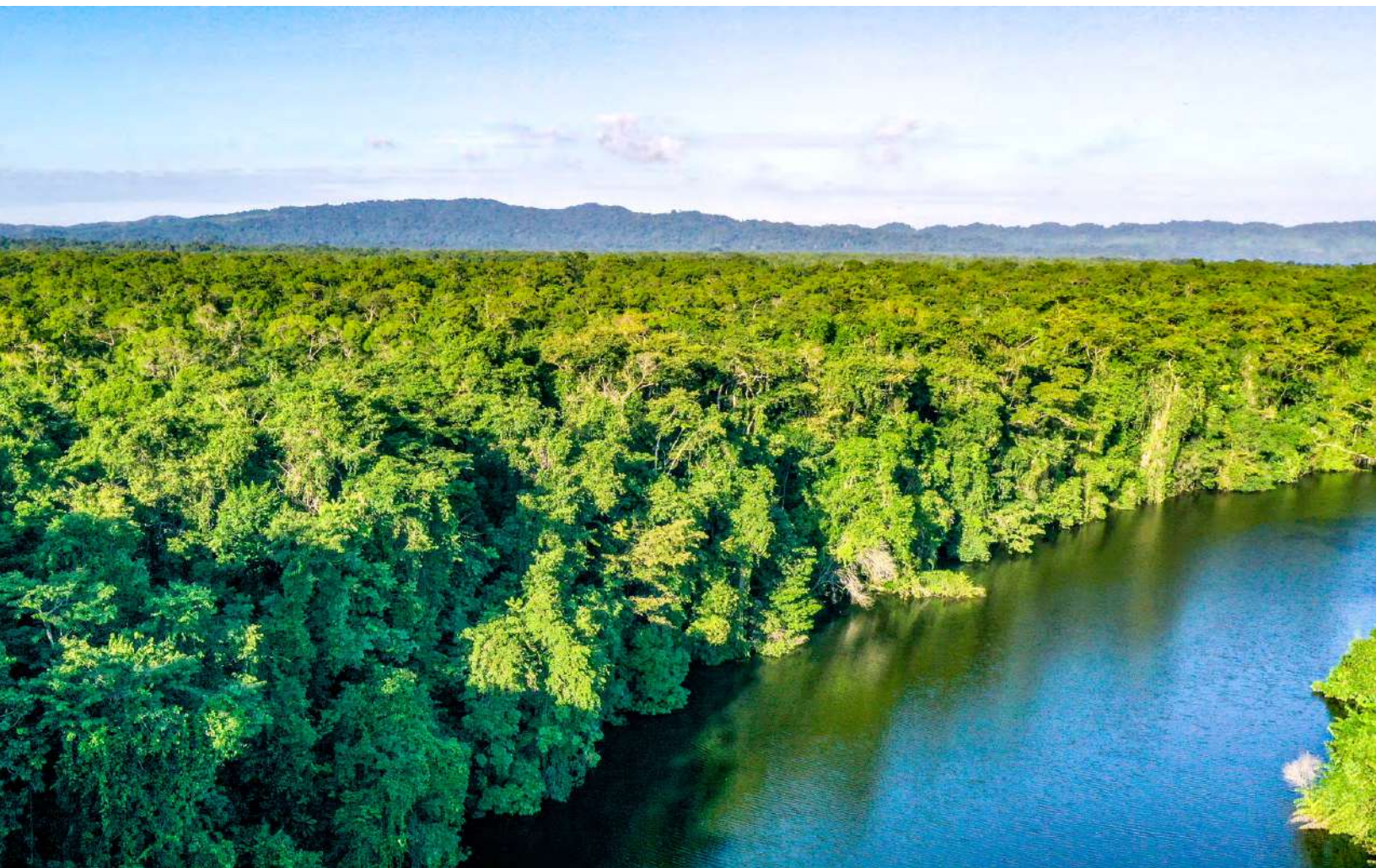
OBJETIVES

General

- Document Livingston's biodiversity through high-resolution photography and video.

Specific

- Carry out ethnobotanical research on the flora species found to be of greatest interest.
- Generate teaching material with the information and documentation collected.



Río Chocón Machacas

Photo by: Haniel López, FLAAR Mesoamerica, Dec. 11, 2021.
Camera: Drone Mavic 2Pro - 28mm.

WETLANDS GLOSSARY

Tree: A woody perennial plant having a single usually elongate main stem generally with few or no branches on its lower part.

Shrub: It is a perennial woody plant that exceeds the herbaceous stratum of the forest and differs from the trees having heights of between 2m.

Protected Area: A Protected Area is a clearly defined geographical space, recognized, dedicated, and managed through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Vine: Any plant with a growth habit of stems, lianas, or creeping runners or climbers.

Environmental goods and services: are products manufactured or services rendered for the main purpose of: preventing or minimizing pollution, degradation or natural resources depletion; repairing damage to air, water, waste, noise, biodiversity and landscapes; reducing, eliminating, treating and managing pollution, degradation and natural resource depletion; carrying out other activities such as measurement and monitoring, control, research and development, education, training, information and communication related to environmental protection or resource management.

Biodiversity: It is the variety of life forms on earth. It includes all living things with their genetic structure and ranges from microscopic viruses to the largest animals on the planet. Human beings are also an integral part of biodiversity (UNESCO, 2017).

Guatemalan Humid Tropical Forest: This biome is representative of the Petén region, the northern part of Guatemala. It is characterized by its plain land, with poor soils but exuberant jungles, and a very diverse fauna. In this biome several types of vegetation are present, such as high- and low-altitude forest, savanna, and wetlands systems (from lakes and flooding). In general, a Tropical Humid biome is defined by a very hot and humid climate, an altitude below 2953 feet above sea level, and no clear difference between the rainy season and dry season, although it is assumed that the dry season occurs between November and June. The dominant vegetation type is broad-leafed trees, and there are also some pines (*Pinus caribbea*).

Bryophytes: Division of plants provided with structures like stems, leaves, and roots, but without vessels, they do not have a developed vascular system. They are low or terrestrial plants, small and that live in humid environments.

Ecology: The scientific study of the processes influencing the distribution and abundance of organisms, the interactions among organisms, and the interactions between organisms and the transformation and flux of energy and matter

Ecosystem: An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity.

Environmental Education: It is a training process that allows awareness of the importance of the environment, promotes in citizenship the development of values and new attitudes that contribute to the rational use of natural resources and the solution of environmental problems. (Secretaría del Medio Ambiente, n.d.)

Epiphytes: These are organisms that grow on the surface of a plant and obtain their moisture and nutrients from the air, rain, or debris that accumulates around them. Epiphytes differ from parasites in that they grow on other plants for physical support and will not adversely aggravate the host.

Fauna: Fauna is the set of animals that live in a specific geographical area, that inhabited or inhabit a specific period or that are part of a certain ecosystem. The science that studies the geographical distribution of animals (fauna) is zoogeography and within this field, it is studied how factors such as water, temperature or fauna contribute to the distribution of animals, since they have a highly sensitive to changes in its habitat (Juste, 2020).

Flora: At the botanical level, flora are all plant organisms such as: trees, shrubs, herbaceous plants, vines, macrophytes, among others, that we find in a specific geographical area, whether it is a mountain, a mountain range, a region, a peninsula, or an entire continent. We can also talk about the flora in a geological period or a different one. This refers to how plant species are distributed, the relationship they have between them, the changes that occur with the climate or with the fauna with which they coexist (Juste, 2020).

Habit: In botany, the growth form of a plant, comprising its size, shape, texture, and orientation.

Fern: (Class Polypodiopsida), Class of nonflowering vascular plants that possess true roots, stems, and complex leaves and that reproduce by spores.

Herbaceous: Are vascular plants that have no persistent woody stems above ground. This broad category of plants includes many perennials, and nearly all annuals and biennials.

Wetland: Are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.

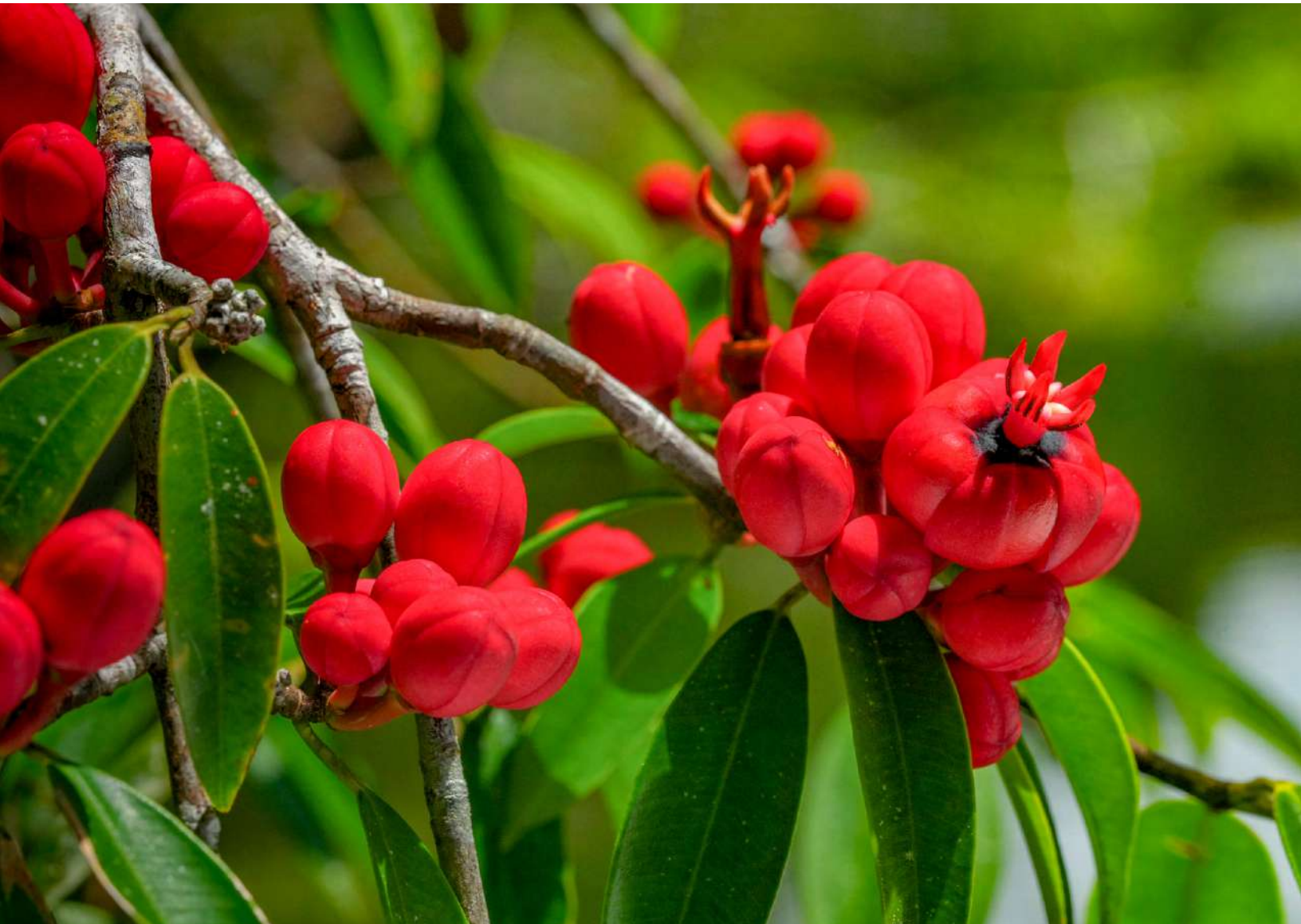
Macrophytes: Plants that grow in or near water and are emergent, submerged, or floating. In lakes and rivers, macrophytes provide cover for fish, substrate for aquatic invertebrates, produce oxygen, and act as food for some fish and wildlife.

Environment: These are the sets of physical, chemical, biological, social, economic, and cultural components capable of causing direct and indirect effects, in a short or long term, on living beings (Ecología y Medio Ambiente, 2016).

Natural resources: Are resources that are drawn from nature and used with few modifications. This includes the sources of valued characteristics such as commercial and industrial use, aesthetic value, scientific interest, and cultural value. On Earth, it includes sunlight, atmosphere, water, land, all minerals along with all vegetation, and animal life.

Swampo: Local Livingston term that refers to partially or permanently flooded areas where plant organisms such as aquatic macrophytes, trees and shrubs develop.

Life zone: The life zone is defined as a natural territorial unit in which vegetation, animal activity, climate, physiography, geological formation, and soil are interrelated, in a recognized and unique combination, which has the appearance or typical physiognomy (Holdridge, 2000).



Varillo - *Symphonia globulifera*

Photo by: Brandon Hidalgo, FLAAR Mesoamerica, Sep. 5, 2021.
Camera: Sony Alpha A7C. Settings: 1/400 sec; f/10; ISO 800.

STUDIED AREAS

During the development of the project, 3 protected areas of great importance for Guatemala were visited: Parque Nacional Río Dulce, Área de Usos Múltiples Río Sarstún and La Reserva Protectora de Manantiales Cerro San Gil. At the same time, these 3 main areas were subdivided into 5 to facilitate documentation and data collection: La Buga, Tapón Creek, Río Dulce, Río Sarstún and Cerro San Gil.

Natural reserves visited

Parque Nacional Río Dulce

It is comprised of a 1-kilometer-wide strip on both banks of the Río Dulce from the Castillo de San Felipe to the mouth of the Bahía de Amatique. Having a territorial extension of 7,200 hectares of mainland plus the surface of the waterbody that corresponds to about 5,800 hectares.

It is categorized as Very Humid Tropical Warm Forest (Bmh-Sc) by its acronym in Spanish. Classified within the Tropical Rain Forest Biome. The area belongs to the humid forest of the Atlantic of Central America, which is why it is considered a megadiverse point. (CONAP, 2004)



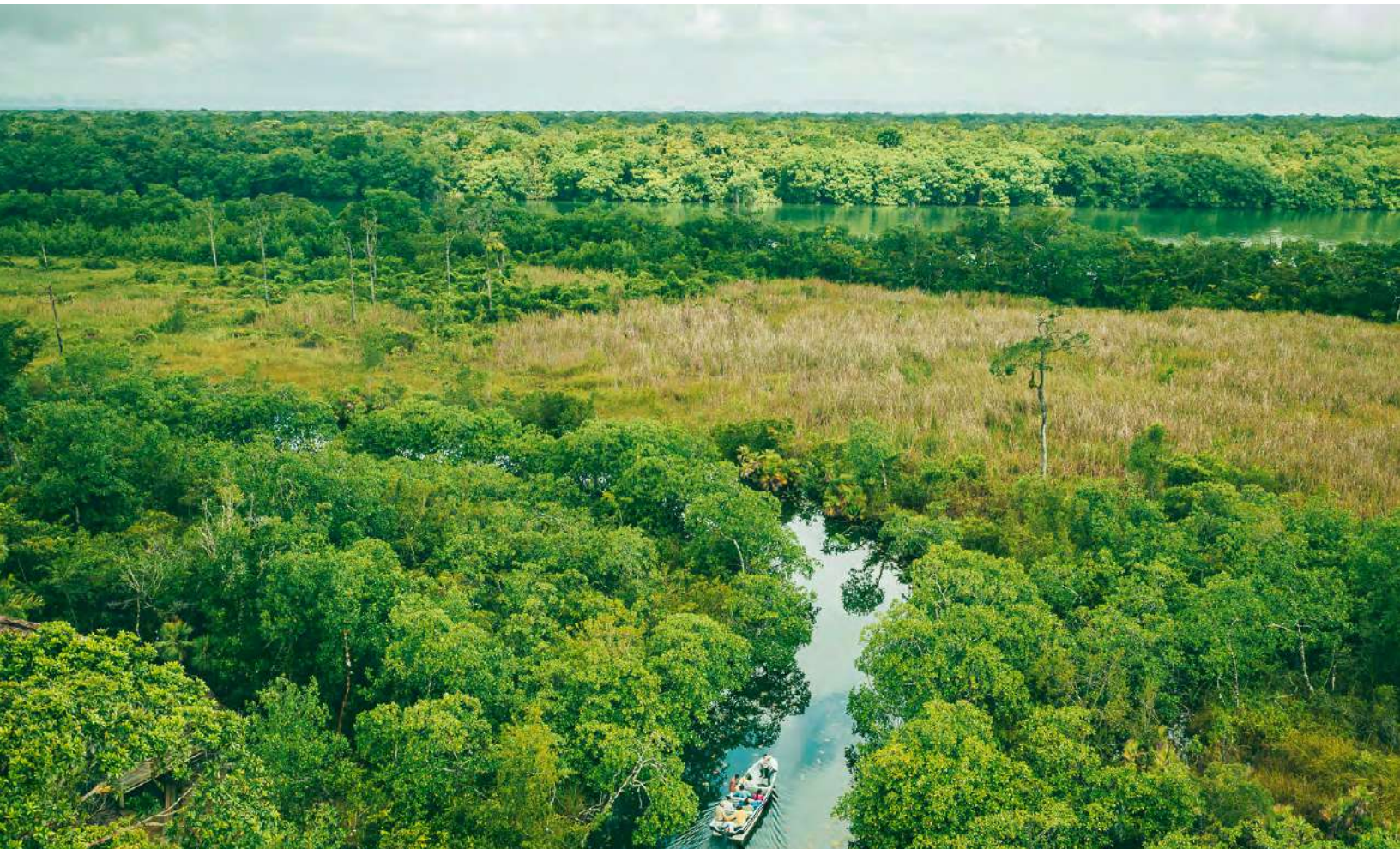
Río Dulce

Photo by: Haniel López, FLAAR Mesoamerica, Mar. 25, 2021.
Camera: Drone Mavic 2Pro - 28mm.

Área de Usos Múltiples Río Sarstún

This is located between the political division of Guatemala, department of Izabal in the municipality of Livingston, on the southern border of Belize, and adjoins Amatique Bay.

Its altitude ranges from 0 to 402 meters above sea level with 35,202 hectares. Including the entire Tapón Creek Protected Area, Punta de Cocolí with its polygons that include wetlands and mangroves reaching the urban area of La Buga Livingston. It is categorized as Very Humid Sub-Tropical Warm Forest (Bmh-Sc, Spanish acronym), to the west of the area and Very Humid Tropical Forest (Bmh-T) to the east of its extension. (FUNDAECO, 2002)



Lagunita Creek, Río Sarstún

Photo by: Haniel López, FLAAR Mesoamerica, Feb. 26, 2021.
Camera: Drone Mavic 2Pro - 28mm.

Reserva Protectora de Manantiales Cerro San Gil

It is located politically and administratively in the department of Izabal, between the municipalities of Puerto Barrios, Livingston, and Morales. It has an altitude between 0 and 1267 meters above sea level. The reserve borders to the north of Río Dulce; northeast of El Golfete with Amatique Bay and the Caribbean Sea.

The reserve belongs to the classification of Very Humid Tropical Forest (Bmh-T) at elevations lower than 900 m; It is also classified as Very Humid Sub-Tropical Warm Forest (Bmh-Sc) from 901 to 1267 meters above sea level. Comprising a total of 46,698 hectares in all its territorial extension. (CONAP, 2006).



Delimited areas for the project

- **La Buga Livingston**

The places where there is still biodiversity within the urban area of the municipality are considered.

- **Río Dulce**

It is distributed from the Castle of San Felipe, crossing El Golfete to the mouth of the Río Dulce to the Amatique Bay.

- **Tapón Creek**

The Tapon Creek Reserve and its surroundings were mainly taken, such as the area of Cocolí, Aldea Buena Vista and Playa Blanca

- **Río Sarstún**

Covering the area of the main river, its streams, Laguna Grande, and Cerro Sarstún located in Lagunita Creek.

- **Cerro San Gil**

Specifically, the area of the Carboneras y Quebrada del Ávila eco station.

Below is the following table where the places visited during the project are described in chronological order.

Chart No. 1. Chronological tabulation of the places documented during the project.

YEAR	MONTH	DATE	DOCUMENTED PLACES	PROTECTED AREA
2020	October	from 6 to 13	Reserva Tapón Creek, Aldea Buena Vista, Finca Santa Ana, Taponcito Creek.	Área de Usos Múltiples Río Sarstún
	November	from 4 to 11	Cañón de Río Dulce, Mirador del Cañón, Río Lámpara, El Golfete, Río Chocón Machacas, Río Cáliz, Isla de Pájaros, Río Negro, Lagunita El Salvador, Río Tatín.	Parque Nacional Río Dulce
	December	from 15 to 20	Plan Grande Tatín, Cueva del Tigre, Río Tatín, Vuelve Mujer, Finca Where the Pirates Hide, Río Quehueche, Playa Quehueche, Finca Gangadiwali, Río Sarstún, Tapón Creek Reserva.	Área de Usos Múltiples Río Sarstún y Parque Nacional Río Dulce

YEAR	MONTH	DATE	DOCUMENTED PLACES	PROTECTED AREA
2021	January	from 23 to 31	Cañón de Río Dulce, Río Chocón Machacas, Biotopo Chocón Machacas, Río Lámpara, Río Tatín, Río Manzanita, Isla de Pájaros, El Golfete, Sendero Las Escobas, Cerro San Gil, Bioestación Carboneras, Quebrada del Ávila	Parque Nacional Río Dulce y Reserva Protectora de Manantiales Cerro San Gil
	February	from 24 to 27	Río Sarstún, Lagunita Creek, Cerro Sarstún, Laguna Grande, Finca Blue Creek.	Área de Usos Múltiples Río Sarstún
	March	from 21 to 26	Cañón de Río Dulce, Mirador del Cañón, Río Lámpara, El Golfete, Río Chocón Machacas, Río Cáliz, Isla de Pájaros, Río Negro, Lagunita El Salvador, Río Tatín, Río Higuero, Río Bonito, Río Sirenas, Laguna Sirenas, Río Tamejá	Parque Nacional Río Dulce
	April	from 25 to 30	Reserva Tapón Creek, Aldea Buena Vista, Finca Santa Ana, Taponcito Creek, Río Cocolí, Punta de Cocolí.	Área de Usos Múltiples Río Sarstún
	May	from 7 to 10	Cerro San Gil, Bioestación Carboneras, Quebrada del Ávila.	Reserva Protectora de Manantiales Cerro San Gil
	June	from 19 to 22	Río Dulce, Castillo de San Felipe, Río Ciénega, Río Sejá, Parte del Lago de Izabal, Río Esmeralda, Fuerte San Carlos, Casa Guatemala, Las Camelias, Río Pedernales	Parque Nacional Río Dulce
	July	from 1 to 5	Río Sarstún, Lagunita Creek, Cerro Sarstún, Laguna Grande, Playa Blanca, Aldea Buena Vista, Finca Santa Ana	Área de Usos Múltiples Río Sarstún
	July - August	from 18 to 31 - from 1 to 2	Vuelve Mujer, Playa Quehueche, Plan Grande Tatín, Cueva del Tigre, Río Tatín, Aldea San Juan, Playa Blanca	Área de Usos Múltiples Río Sarstún y Parque Nacional Río Dulce
	September	from 3 to 8	Cañón de Río Dulce, Mirador del Cañón, Río Chocón Machacas, Biotopo Chocón Machacas, El Golfete, Río Manzanita, Río Higuero, Río Lámpara.	Parque Nacional Río Dulce
	October	from 6 to 10	Río Sarstún, Cerro Sarstún, Lagunita Creek, Laguna Grande, Taponcito Creek, Aldea El Rosario.	Área de Usos Múltiples Río Sarstún
	November	from 11 to 14	El Tortugal, Río Dulce, Punta Arenas, El Golfete, Cayo Grande, 4 Cayos, Río Ciénega, Barra San Marcos, Punta Lechuga, Lagartos, Lago de Izabal, Castillo de San Felipe, Las Camelias, Isla de Zanates, Fuerte San Carlos.	Parque Nacional Río Dulce
	December	from 10 to 15	Río Blanco, Río Tampico, Creek Chino, Cañón de Río Dulce, Río Chocón Machacas, Sarstún Creek, Río de En Medio, Aldea El Rosario, Taponcito Creek, Punta de Cocolí, Río Cocolí, Bahía de Amatique, Río Santa María, Punta Herrería, Río Salado, Santa María del Mar.	Área de Usos Múltiples Río Sarstún y Parque Nacional Río Dulce



Map 1. Study areas for the biodiversity documentation project in the municipality of Livingston. Prepared by the FLAAR Mesamerica team

PROCEDURE AND MATERIALS GENERATED

Photo essays

The photo essays were made from our main lines of research, such as: edible wetland plants. In this case, a bibliographic review of the plants that we physically found in the wetlands was carried out to determine which ones had edible properties and complement it with the information provided by the locals during each field visit.

During the project, forty-five photo essays were prepared in total, of which twenty-seven are uploaded on the FLAAR Mesoamerica website (flaar-mesoamerica.org) with four editions translated into Spanish of this total, twenty-six belong to the series of edible wetland plants (see page 15). They were also divided into series: plants, birds, parks and nature reserves, wetland food plants.

In the photo essays you can find information on the geographical location of the documented species, as well as their scientific names and synonyms, common names, characteristics, uses (if applicable), bibliographical references and a summary of how this species was found and documented. species in Livingston ecosystems.



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



EDIBLE PLANTS OF WETLANDS IN THE MUNICIPALITY OF LIVINGSTON, IZABAL

Series 1: Swamps and seasonally flooded areas of Izabal

Species	Common name
<i>Cyperus sculentus</i>	Chufa, cebollín (earth almond)
<i>Eleocharis geniculata</i>	Cebollín, pajuelas
<i>Montrichardia arborescens</i>	Pica pica, camotillo (water chestnut)
<i>Nymphoides indica</i>	Lirio de agua (water snowflake)
<i>Pachira aquatica</i>	Zapotón
<i>Pontederia cordata</i>	Espiga de agua (Pickerel weed)
<i>Sagittaria lancifolia</i>	Flecha de agua (Water Potatoes)
<i>Typha domingensis</i>	Tule (Cattail)

Series 2: Plants that grow on the shores of the Amatique Bay beaches

Species	Common name
<i>Amphitecna latifolia</i>	Morro de mar (Black Calabash)
<i>Coccoloba uvifera</i>	Uva de mar
<i>Manicaria saccifera</i>	Confra
<i>Chysobalanus icaco</i>	Icaco (coco plum)
<i>Avicennia germinans</i>	Mangle negro (Black mangrove)
<i>Rhizophora mangle</i>	Mangle rojo (Red Mangrove)

Series 3: Plants that grow by rivers, ponds, swamps, or oceans

Species	Common name
<i>Guadua longifolia</i>	Jimba
<i>Acoelorrhapha wrightii</i>	Tasiste o pimientillo (Palmetto Palm)
<i>Acrostichum aureum</i>	Helecho de manglar (Mangrove fern)
<i>Annona grabla</i>	Anonillo (Alligator Apple)
<i>Bactris major</i>	Huiscoyol
<i>Diospyrus nigra</i>	Zapote negro
<i>Grias cauliflora</i>	Jawuillo
<i>Inga vera</i>	Paterna de río (River koko)
<i>Pithecellobium lanceolatum</i>	Espino de vaca (Red Fowl)
<i>Coccoloba belizensis</i>	Papaturro
<i>Symphonia globulifera</i>	Varillo
<i>Lacmellea standleyi</i>	Lechemiel

Contact Sheets catalogs

The photos taken during each expedition were collected and classified to create five catalogues. Contact sheets are pages that contain at the top the name of the species, genus, family, and common name of each species of animal, plant, algae or fungus documented during the project.

In addition, it contains a thumbnail sample of the photos captured from them. Below each thumbnail is the code or name of each photograph (at 300 dpi resolution) to identify them in the photo library provided to the Mayor of Livingston for the use of documents or educational material.

In this way it will be easier to search for photos and you will have a preliminary view of all the contents of the photo library. The folders have been grouped by month and at the same time, they were divided by natural group that was documented. 11TB of photographic and video material was generated



Five catalogs of photographs generated in the project.

Audiovisual

Drone flights and shots with professional cameras were made to create videos. In total, 11 videos were generated that emphasize the places we visited and the work that was done on the expeditions. You can access these videos by clicking on the image:



List of documented species

The methodology of natural photography sessions was implemented, which consists of taking walks in various ecosystems accompanied by local guides to be able to photograph and document species of natural, cultural, social, economic and environmental interest.

Most of the flora species that were photographed and documented during the fifteen months of the expedition were mainly in their flowering and fruiting stages. As for the species of animals and fungi, they were photographed when observed during the journeys.



For the identification of species, bibliographical consultations, visits to herbariums (in the case of flora) and taking notes in the field were carried out. A final inventory of the observed species was made, as well as a photographic record of them. Species were grouped by family, except for insects, which were grouped only by order. This list is found in Annex 11.2





Pica pica* (Water Chestnut) - *Montricardia arborescens

Photo by: Nicolas Hellmuth, FLAAR Mesoamerica, Nov. 12, 2021.

Camera: Sony Alpha A7C. Settings: 1/640 sec; f/9; ISO 2,500.



***Pontederia Cordata* - Espiga de agua (Pickerel weed)**

Photo by: David Arrivillaga, FLAAR Mesoamerica, Feb. 15, 2020. Lagunita Morales, Izabal.
Camera: Sony Alpha A9 II. Settings: 1/250 sec; f/11; ISO 250.

RESULTS OF DOCUMENTATION OF SPECIES AND DISCUSSION

Flora documentation

The largest record obtained from this documentation was flora. Considering each area, 637 species were documented:

- 85 for La Buga
- 212 for Río Dulce
- 161 for Tapón Creek
- 121 for Río Sarstún
- 58 for Cerro San Gil.

However, when unifying this inventory, 361 unique species corresponding to 105 families were determined.

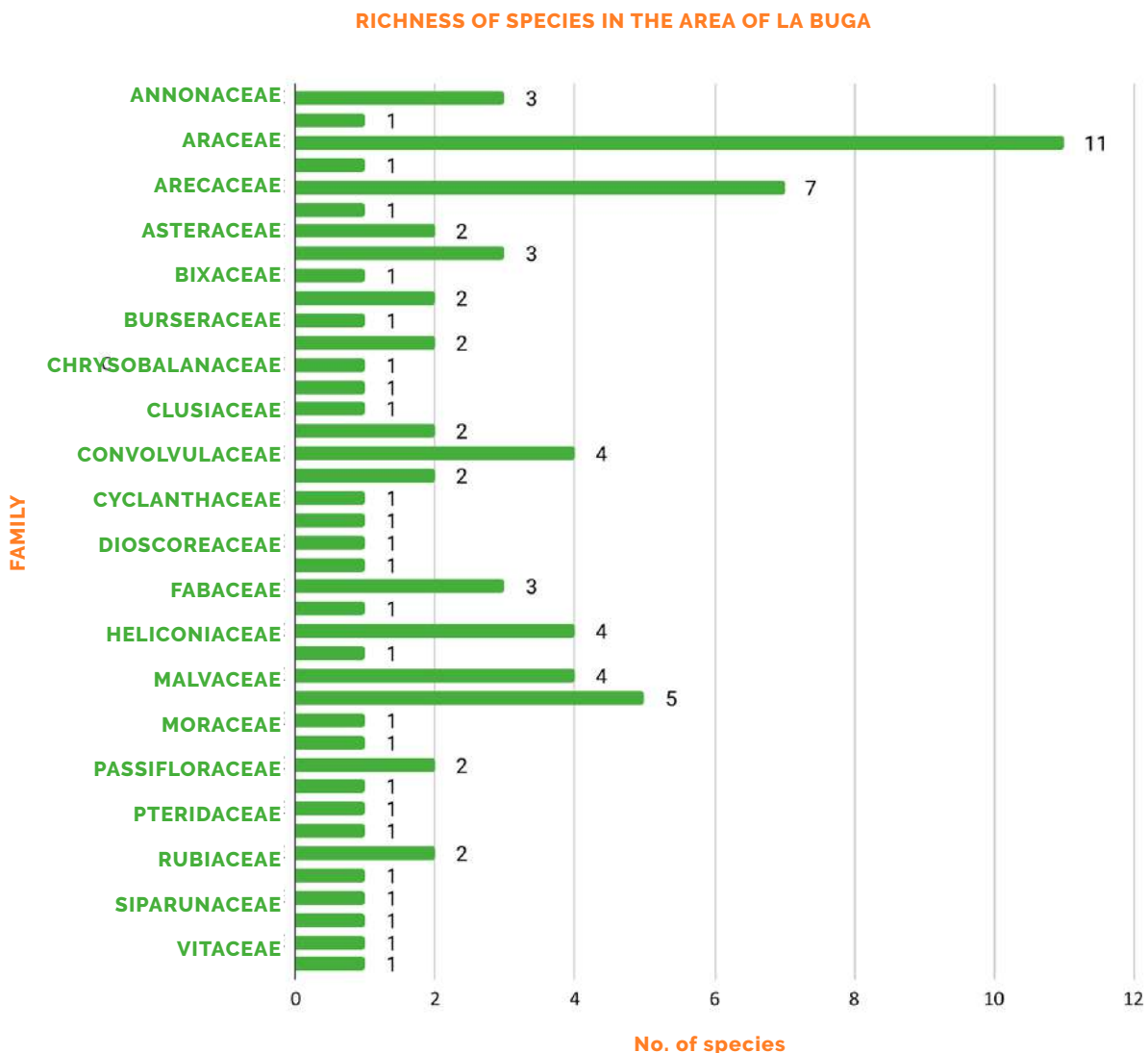
The individual record of each area is presented as follows:

Richness of flora in La Buga Livingston

In this area, 41 families were recorded, of which 85 species are included. Being the ARACEAE family the richest in species since 11 were identified. Next, we have the ARECACEAE family of which 7 species were identified and the MELASTOMATACEAE family where 5 species were identified.

It should be noted that this documentation was made in the urban area of Livingston, where biodiversity is limited by urbanization and the agricultural frontier. In the results we can see that this is the area where we find considerably lower numbers in relation to its species richness.

Graph No. 1 Richness of flora in La Buga Livingston





Epiphyte ecosystem

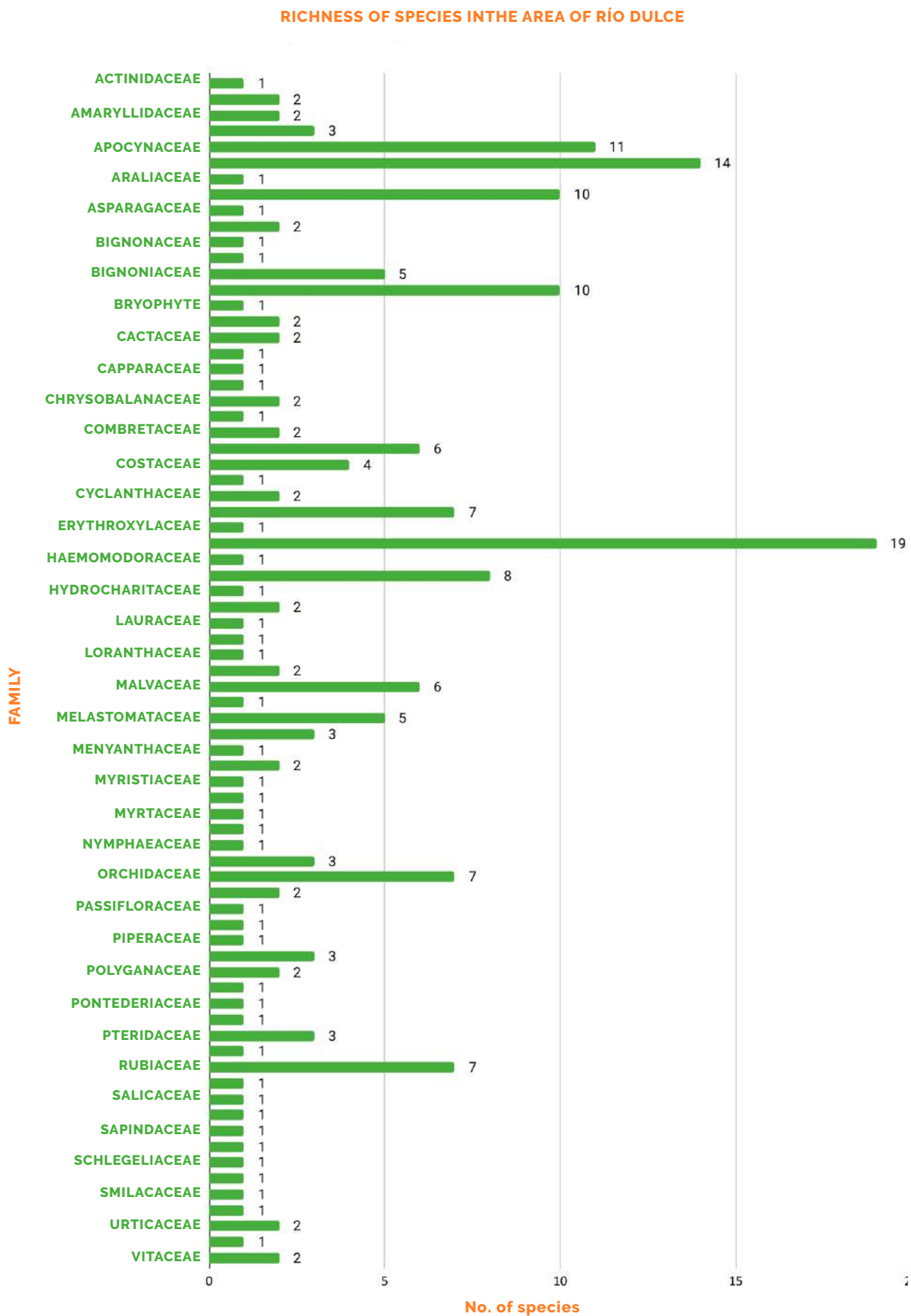
Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Jun. 20, 2021.
Camera: iPhone 12 Pro Max.

Richness of flora in Río Dulce

In this area, 78 families were recorded, of which 212 species are included. The FABACEAE family being the richest in species, since 19 were identified. Next we have the ARACEAE family, of which 14 species were identified, and the APOCYNACEAE family, where 11 species were identified.

This was the area with the highest number of registered and documented species.

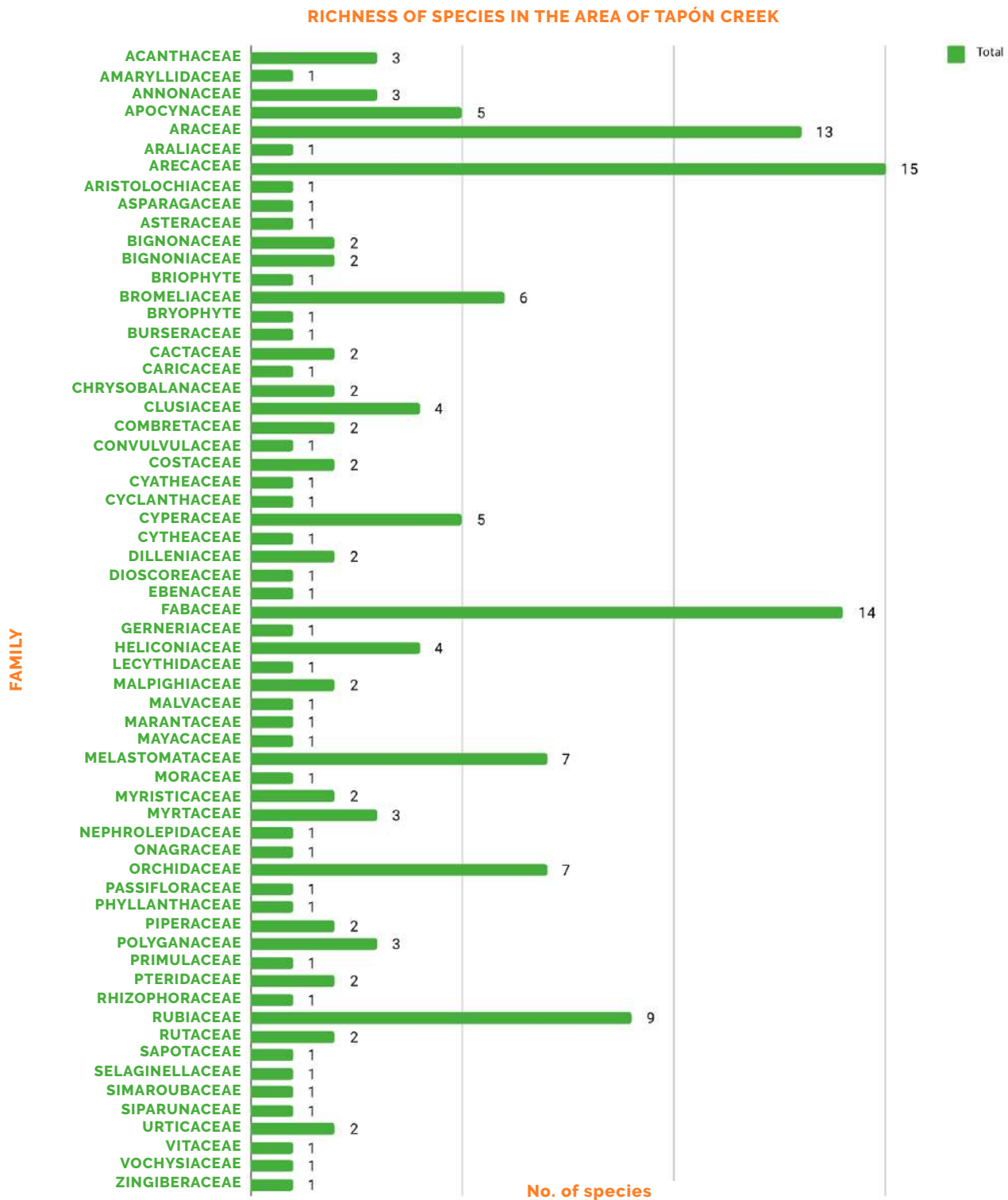
Graph No. 2 Richness of flora in Río Dulce



Richness of flora in Tapón Creek

In this area, 62 families were recorded, of which 161 species are included. Being the ARECACEAE family the richest in species since 15 species of palms were identified. Next, we have the FABACEAE family with 14 species identified and the ARACEAE family with 13 species identified.

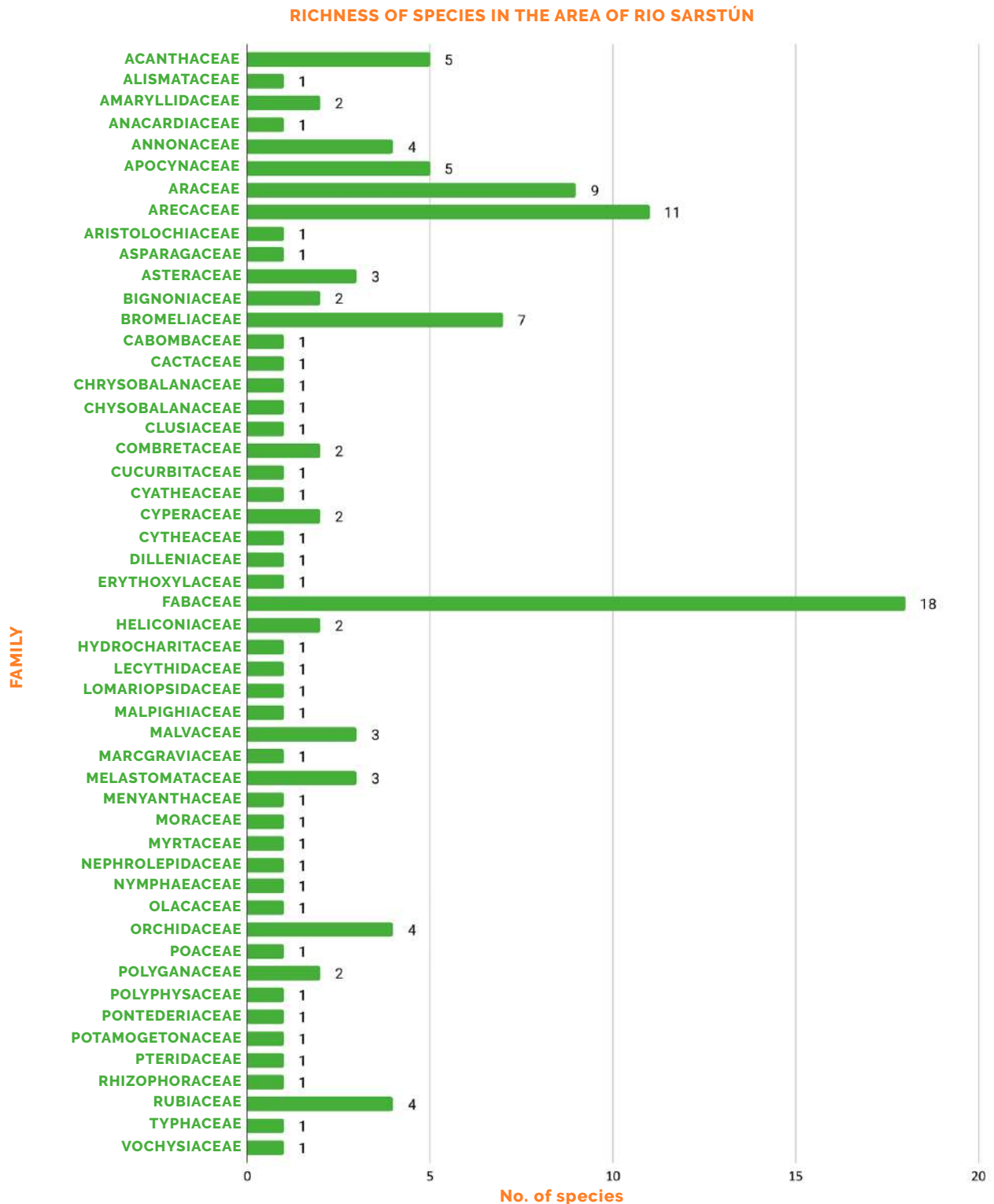
Graph No. 3 Richness of flora in Tapón Creek



Richness of flora in Río Sarstún

In this area, 53 families were recorded, of which 121 species are included. Being the FABACEAE family the richest in species since 18 species were identified. Next, we have the ARECACEAE family of which 12 species were identified and the ARACEAE family where 9 species were identified

Graph No. 4 Richness of flora in Río Sarstún

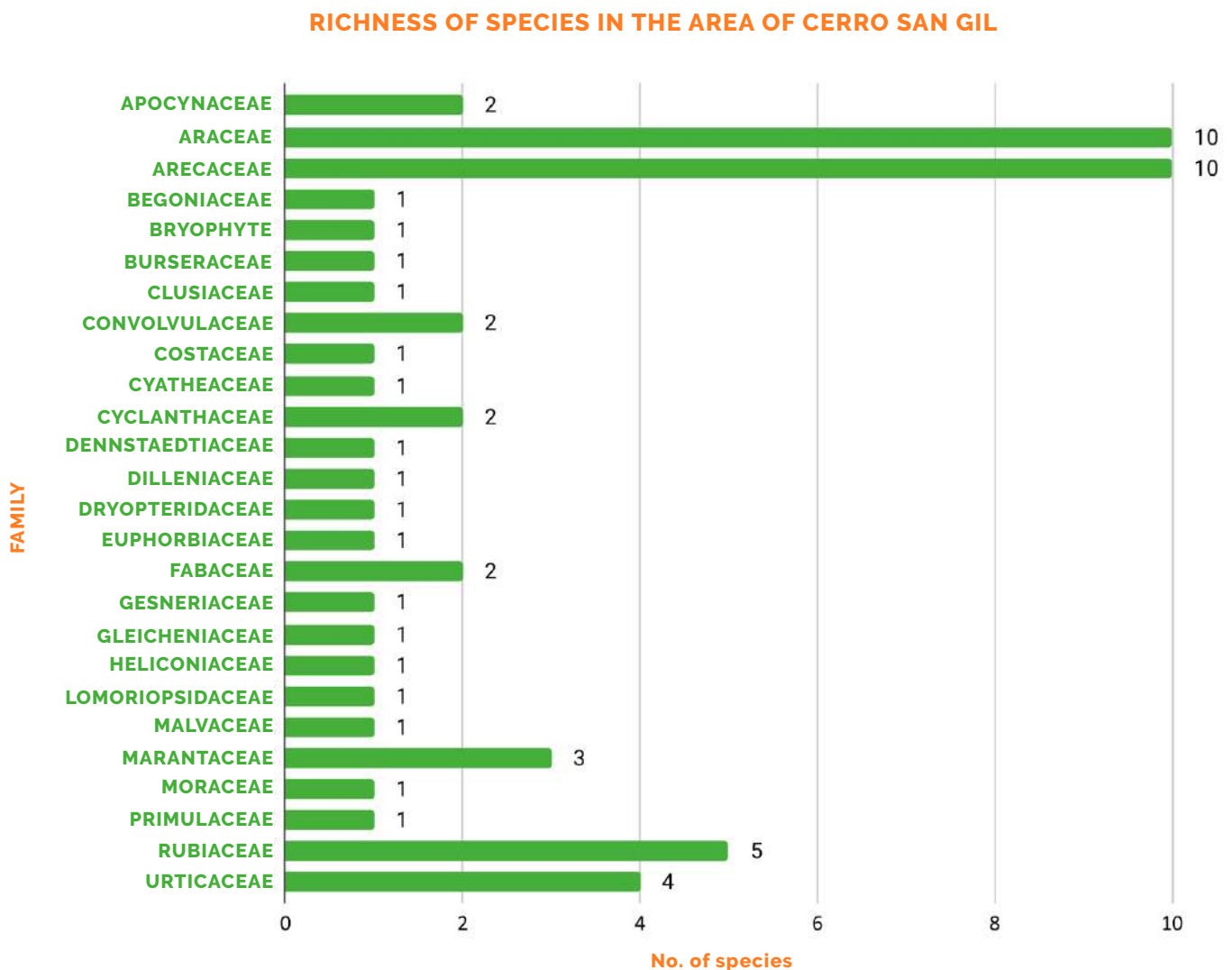


Richness of flora in Cerro San Gil

In this area, 27 families were recorded, of which 58 species are included. The ARACEAE family is the richest in species, since 10 species were identified. Next, we have the ARECACEAE family of which 10 species were identified and the RUBIACEAE family where 5 species were identified.

This is one of the areas with the lowest species richness, justifying that this area was only visited twice during the entire project, so it was not possible to document a greater diversity of species linked to their seasonality.

Graph No. 5 Richness of flora in Cerro San Gil



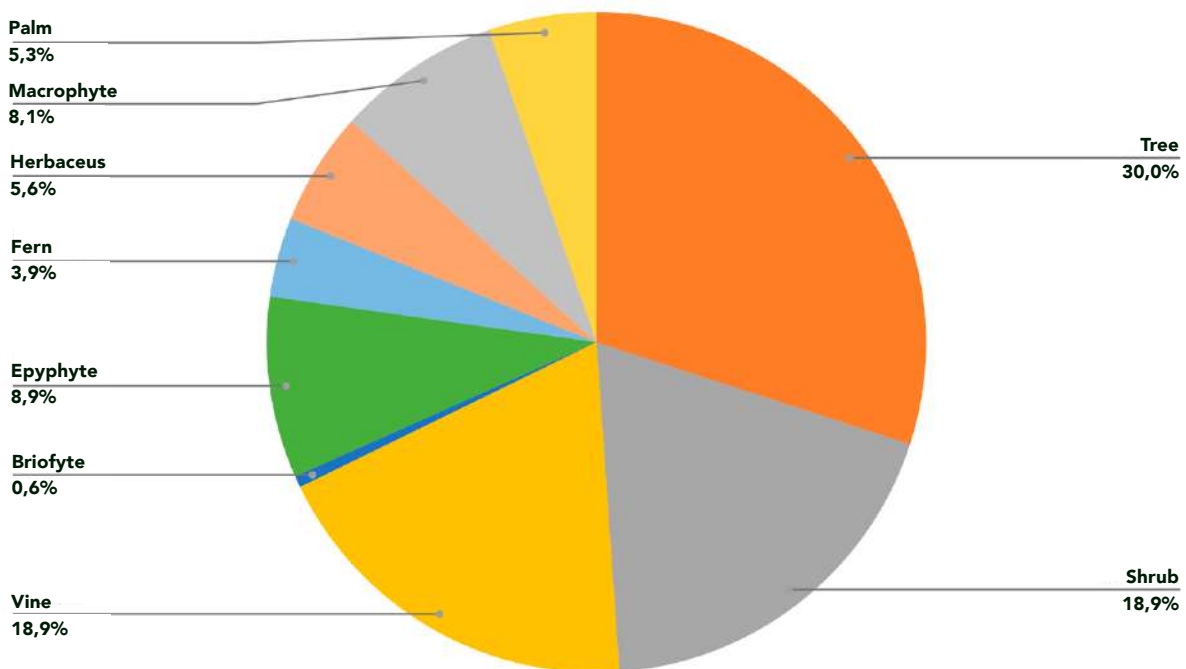
By unifying the data collected from each place, a total richness of 360 species of flora could be determined. In addition, the flora was classified by habit of plant organisms, resulting in 108 trees, 95 shrubs, 87 vines, 2 bryophytes, 40 epiphytes, 18 ferns, 26 herbaceous, 38 aquatic macrophytes and 37 palms

Chart No. 2 Richness of flora species documented in the municipality of Livingston classified by habit

HABIT	NO. OF RECODED SPECIES
Árbol	108
Arbusto	68
Bejuco	68
Briofita	2
Epifita	32
Helecho	14
Herbácea	20
Macrófitas	29
Palma	19
Total	360

Graph No. 6 Percentages of flora species documented in the municipality of Livingston classified by habit

RICHNESS OF FLORA SPECIES IN THE MUNICIPALITY OF LIVINGSTON



Graph No. 6 shows the documented habits throughout the municipality and their percentages. The predominant habit is "tree" with 33.3% and the least predominant is "bryophyte" with 0.6%.

The documentation of species carried out by FLAAR Mesoamerica in the municipality of Livingston focused on photographing plant organisms in a state of flowering or fruiting, for this reason, plant organisms that lack flowers such as bryophytes and pteridophytes (ferns) are found in smaller numbers. In addition, trees are also predominant due to our interest in trees with thorns and cauliflower trees, that is, trees whose flowers and fruits grow directly from the trunk or its branches.



***Hymenocallis littoralis* - Spiderlily**

Photo by: Nicolas Hellmuth, FLAAR Mesoamerica, Nov. 12, 2021.

Camera: Sony Alpha A7C. Settings: 1/800 sec; f/1,6; ISO 32.



***Aechmea tillandsioides* - Bromelia espinosa**

Photo by: David Arrivillaga, FLAAR Mesoamerica, Nov. 5, 2021.

Camera: Nikon D5. Settings: 1/125 sec; f/6,3; ISO 2,500.

Fauna documentation

The second largest record of documented species in the municipality was fauna with 165 in total.

Birds were the predominant group. During the project, 62 specimens were documented and when unifying the 5 explored areas, it gives us a total of 25 families and 50 identified species. ARDEIDAE was the family with the highest number of identified species (8).

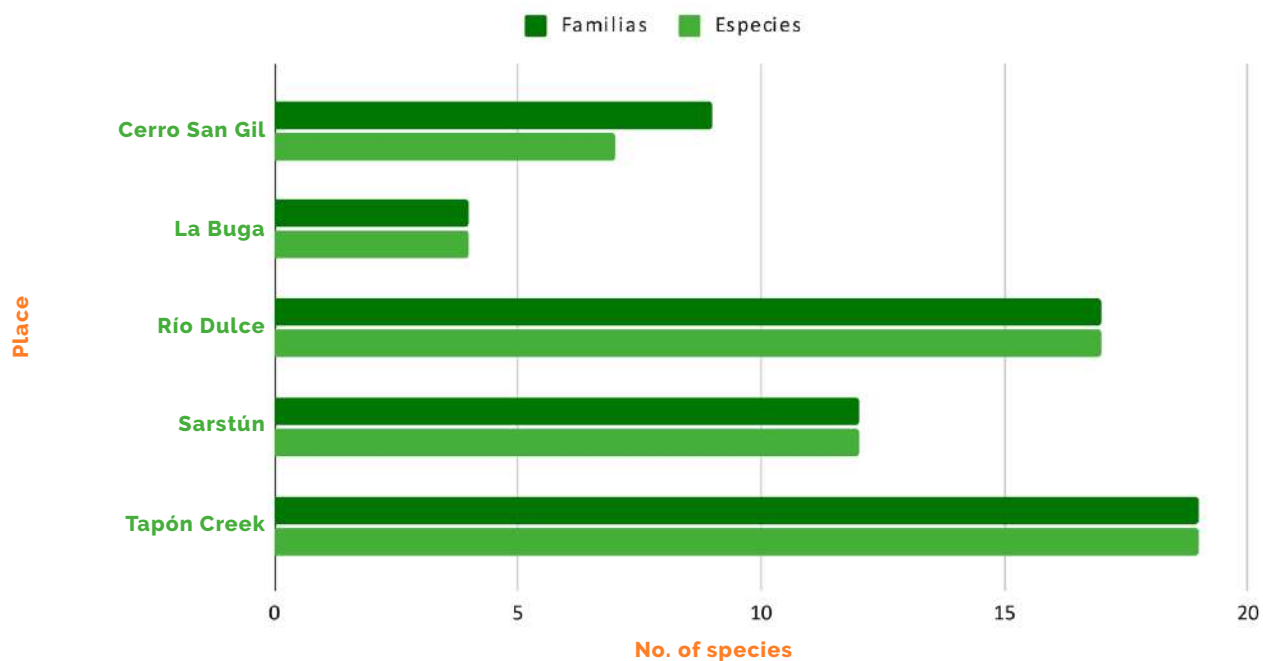
By region, 10 specimens were documented in Cerro San Gil that are grouped into 7 families, of which only 7 could be identified to the species. In the La Buga area, a total of 4 species were documented, each corresponding to a different family. In the Río Dulce area, a total of 17 species were documented, grouped into 11 families. In the Sarstún area, a total of 12 species grouped into 8 families were obtained. Finally, for the Tapón Creek area, 18 species were identified, grouped into 13 families, being the area with the greatest richness of bird species.

Chart No. 3 Bird species richness in the municipality of Livingston classified by study area.

REGION	FAMILY	SPECIES
Cerro San Gil	7	7
La Buga	4	4
Río Dulce	11	17
Sarstún	8	12
Tapón Creek	13	18

Graph No. 7 Bird species richness in the municipality of Livingston

RICHNESS OF BIRDS IN THE MUNICIPALITY OF LIVINGSTON



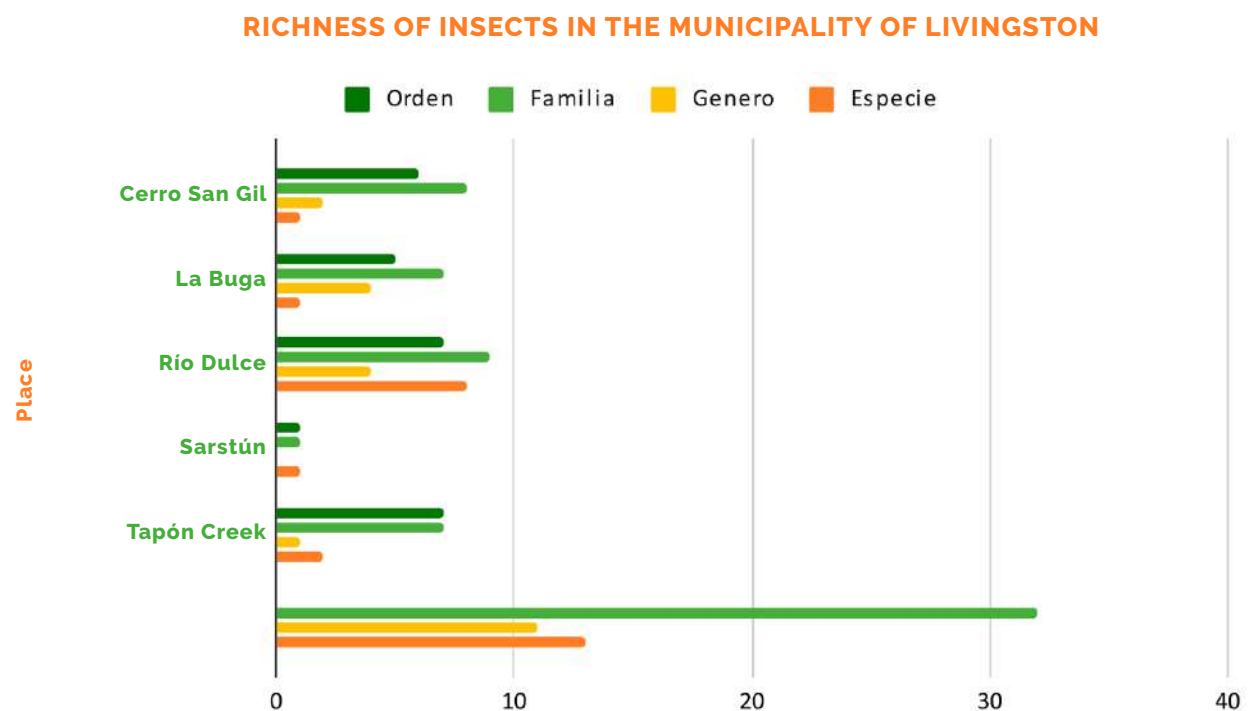
The next group of fauna with the highest record was insects, with a total of 60 organisms. Due to the complexity involved in the identification of species, since no collections were made, only 13 organisms were identified up to the species, 11 up to the genus and 22 up to the family; grouped into 9 orders: Blattodea, Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Mantodea, Odonata, Orthoptera, and Trombiformes.

Records by area are presented in the following chart:

Chart No. 4 Insect species richness in the municipality of Livingston classified by study area

REGION	ORDER	FAMILY	GENDER	SPECIES
Cerro San Gil	6	8	2	1
La Buga	5	7	4	1
Río Dulce	7	9	4	8
Sarstún	1	1	-	1
Tapón Creek	7	7	1	2

Graph No. 8 Insect species richness in the municipality of Livingston classified by study area



Finally, we have the groups of fauna with the least recorded richness, which are divided into: Reptiles, Arachnids, Fish, Molluscs, Crustaceans, Amphibians and Mammals.

17 reptile specimens, grouped into 10 families, were documented. All were identified to family, 4 to genus and 13 to species.

Chart No. 5 Reptile species richness in the municipality of Livingston classified by study area.

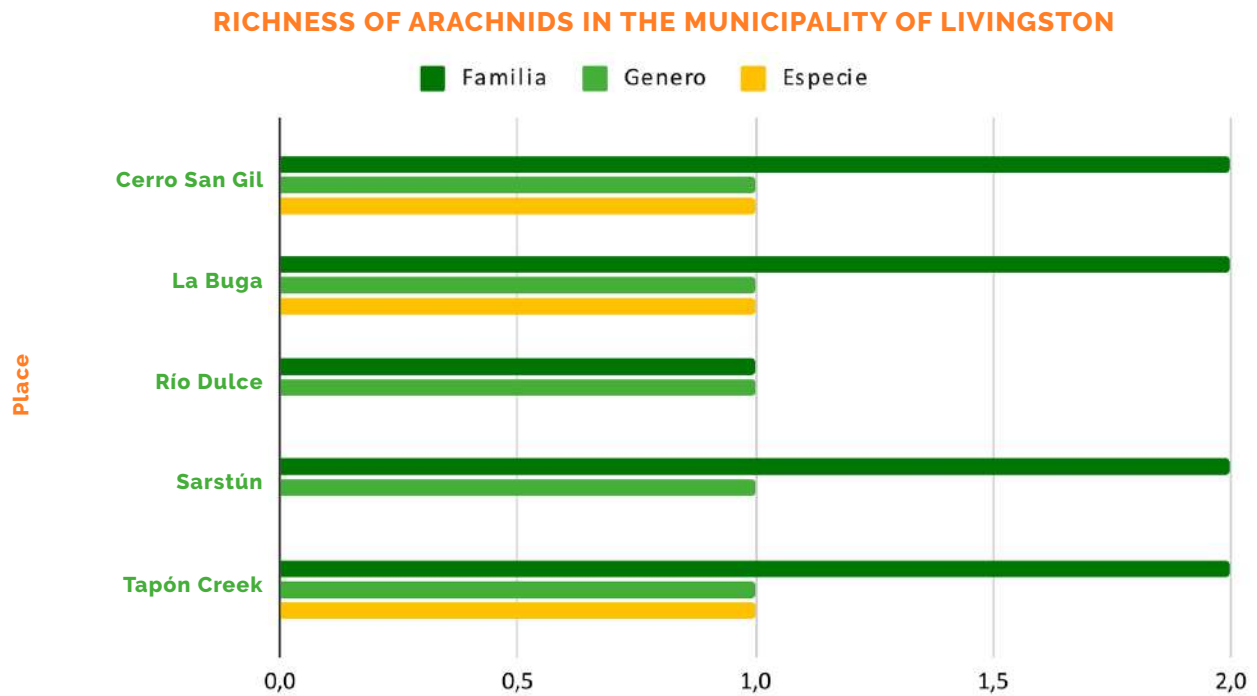
REGION	FAMILY	GENDER	SPECIES
Cerro San Gil	3	2	1
La Buga	2	-	1
Río Dulce	7	1	6
Sarstún	1	-	1
Tapón Creek	4	1	3

In the case of arachnids, 9 specimens were documented, which are grouped into 7 families. All were identified to family, 5 to genus and 3 to species.

Chart No. 6 Arachnid species richness in the municipality of Livingston classified by study area.

REGION	FAMILY	GENDER	SPECIES
Cerro San Gil	2	1	1
La Buga	2	1	1
Río Dulce	1	1	-
Sarstún	1	1	-
Tapón Creek	2	1	1

Graph No. 10 Richness of arachnid species in the municipality of Livingston



Very little documentation of fish, molluscs and amphibians was done. This does not mean that there is little species richness but rather that it was not the focal point of the project. In the case of fish, 3 families were identified: Cichlidae, Lutjanidae and Characidae, for the latter a species of the genus *Astyanax* was observed. When talking about molluscs, a snail of the genus *Strombus*, family Strombidae and a jute snail of the genus *Pachychilus*, family Pachychilidae were documented, both quite common in the municipality. Of crustaceans, only the blue crab (*Cardisoma guanhumi*) was identified, also quite common in the area. In the case of amphibians, only toads of the genus *Incilius*, family Bufonidae, were documented.

An important finding during this project was the sighting of the mantled howler monkey (*Alouatta palliata*) in Río Higuero and Río Esmeralda. Although its natural distribution occurs in the municipality, it is threatened by severe deforestation south of Lago Izabal-Río Dulce, according to the study by Baumgarten and Williamson (2007). For this reason, it is uncommon to observe them today and it is important to highlight the populations that can still be found in the area to strengthen conservation plans. Other important sightings of mammals were bottlenose dolphins (*Tursiops truncatus*) and bats of the species *Artibeus lituratus*.



***Pelecanus occidentalis* - Brown Pelican**

Photo by: David Arrivillaga, FLAAR Mesoamerica, Nov. 5, 2021.

Camera: Sony Alpha A7C. Settings: 1/3,200
sec; f/5,6; ISO 1,600.



***Trachemys sp* - Tortuga pintada**

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Jan. 25, 2021.

Camera: Sony RX10 IV. Settings: 1/1,250 sec; f/4; ISO 800.

Fungal Documentation

During the project, 43 fungal specimens were documented, classified into 17 families, of which 25 genera and 14 species were identified. The area with the greatest richness was Tapon Creek, with 13 documented individuals, and the area with the lowest documented species richness was Cerro San Gil, with only 3. The most recurrent family found was POLYPORACEAE with 11 individuals in total.

The individual count by region is presented in the following table:

Chart No. 7 Richness of fungal species in the municipality of Livingston classified by study area.

REGION	FAMILY	GENDER	SPECIES
Cerro San Gil	3	2	1
La Buga	8	4	5
Río Dulce	8	5	8
Sarstún	5	5	-
Tapón Creek	10	8	2



***Phallus indusiatus* - Hongo Net**

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Jan. 25, 2021.

Camera: Canon 1D X Mark II.

Settings: 1/1,000 sec; f/8; ISO 3,200

Total documentation of species of flora, fauna, and fungi

In total, 568 species were documented, including flora, fauna and fungi. It is important to highlight that some of them were identified to genus, others to family and a few to order (in the case of insects), this is due to the difficulties in making collections and the existing information gaps. However, visits were made to herbariums (in the case of plants), bibliographic reviews of taxonomic keys and identification guides, and consultations with specialists from the different documented biological branches.

It is also necessary to mention that the focus of this project was the documentation of biodiversity, but not the determination of biodiversity indices in the area, for that reason only the inventory of species prepared is presented. In addition, it does not mean that in the municipality of Livingston there is less diversity of fauna and fungi compared to flora, but rather that plant documentation was prioritized due to the potential uses they may have for interested locals and researchers.

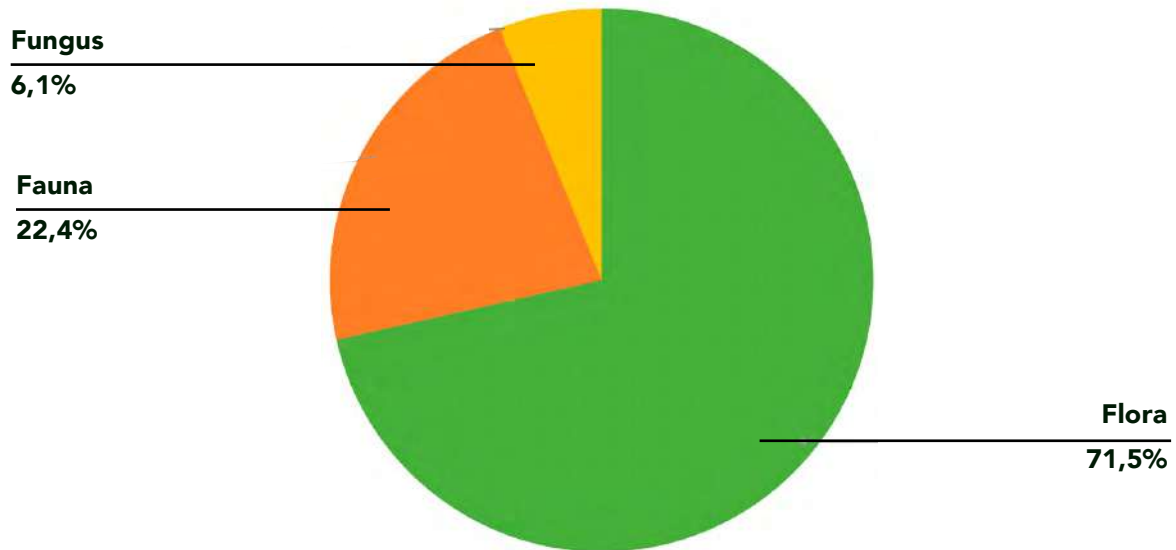
Chart No. 8 Total richness of species of flora, fauna and fungi documented in the municipality of Livingston

CLASIFICACION	NO. OF RECORDED SPECIES
Flora	360
Fauna	165
Hongos	43
Total	568

At the conclusion of the biodiversity documentation project, we can highlight that the place where the greatest number of species recorded was in the wetlands of the Río Dulce National Park. This diversity may be due to the chemical composition of its waters, since in this area it was possible to document a higher number of plant species tolerant to fresh and saline waters, with brackish waters being more productive for the development of said organisms.

Graph No. 11 Total richness of species of flora, fauna and fungi documented in the municipality of Livingston represented in percentages.

TOTAL RICHNESS OF DOCUMENTED SPECIES IN THE TOWN OF LIVINGSTON



In these documented wetlands we find various benefits that make their conservation important. We classify these benefits as follows:

- Charge and discharge of aquifers
- Coastal protection against wind and wave erosion
- Habitat of juvenile stages of fish, molluscs, crustaceans
- Migratory bird season
- Stabilization of microclimates
- Water for human consumption and crops
- Fishery resources and aquaculture production
- Flood Control
- Conveyance
- Recreation
- Tourism
- Associated cultural colors

Mangroves are formed by species tolerant to salinity, these are tropical and subtropical with aquatic and terrestrial characteristics. During the documentation, they were in the intertidal zone of protected or little exposed coasts, mouths of rivers that periodically receive fresh water by runoff or mouth of lotic systems.

Different functions that these ecosystems provide were noticeable, such as: Absorb CO² and release O²; protect coastlines from erosion, strong tides, winds, and hurricanes; be the habitat of many species of flora and fauna; trap pollutants and sediments to maintain the balance of nutrients in the water and delay eutrophication processes; generate economic benefit (goods and services) through the promotion of tourism and recreation.

The municipality of Livingston is of great importance for conservation because it protects this type of ecosystems with a high richness of species and with essential functions for sustaining life in all its forms. According to the National University of Mexico (2020) in 1988, the English professor Norman Myers established that there were places in the world with high concentrations of endemic species, facing high degrees of threat and which he called a hotspot. At that time, it established that there were 10 of these sites in the world, by 2020 the list grew to 36 and Guatemala is in one of these points, the Mesoamerica Hotspot, due to the high rate of biodiversity that it protects in its different protected areas and having among them the Guatemalan Caribbean. It is worth noting that this Hotspot is the third largest in the world (GBIF, 2022).

The results of this project seek to highlight not only the species found during its execution, but also the importance of continuing with research that deepens the current state of Guatemala's ecosystems and reinforce their protection through environmental education, scientific dissemination, and sustainable development.



***Lentinus sp.* - Hongo peludo**

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, April. 8, 2021.

Camera: Google Pixel 4a.



***Columnea* sp. - Flor de delfín**

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica,
April. 26, 2021.

Camera: Sony Alpha A7R IV. Settings: 1/250 sec; f/9;
ISO 1,000.

CONCLUSIONS

- A total of 568 species of flora, fauna, and fungi were documented within the municipality of Livingston.
- The area with the greatest richness of recorded species is Río Dulce, with 212 total species that include plants, animals, and fungi.
- The area with the lowest recorded species richness is Cerro San Gil with 58 total species that include plants, animals, and fungi.
- This documentation only considered the richness of species within the municipality, but not the abundance of each one, so no data was generated on the conservation status of these species. However, it is hoped that this record will be helpful and a reference for new research on other topics related to ecology and biodiversity that may be carried out in Livingston.



Flecha de agua - *Sagittaria lancifolia*

Photo by: Alejandra Gutiérrez, FLAAR Mesoamerica, Sep. 5, 2021.
Camera: Sony Alpha A7C. Settings: 1/320 sec; f/9; ISO 640.

RECOMENDATIONS

- Invest more in the documentation, research and conservation of the municipality's biodiversity, as it contains sites of international importance.
- Make national and international alliances to facilitate this documentation and conservation of species.
- Strengthen the implementation and use of environmental regulation instruments in the municipality to promote the conservation of ecosystems.
- That future research implements methodologies that complement the information about the diversity and richness of species in the municipality, since this study did not consider abundance data and focused mainly on flora species. The results collected from the project are a significant sample, but they do not represent the total biodiversity of the municipality.
- Train local guides on documented species to promote ecotourism.



Hormigas rojas (red ants) - HYMENOPTERA

Photo by: David Arrivillaga, FLAAR Mesoamerica, Oct. 8, 2021.
Camera: Sony Alpha A7C. Settings: 1/400 sec; f/7,1; ISO 2,500.

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ANNEXES

Most important documented species



***Alouatta palliata* - Mantled howler monkey**

They are in danger of extinction due to fragmentation of the forest, it was documented in Río Higuerito, El Golfete area of Parque Nacional Río Dulce



***Erblichia odorata* - Passiflora árbol (Tree passionflower)**

This species is very rare to see, it was documented at Finca Santa Ana in the Tapón Creek region. Interestingly, it is a tree of the PASSIFLORACEAE family, it flowers in May and is also called "Flor de mayo" (May flower).



Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Jun. 31, 2021.
Camera: Sony RX10 IV. Settings: 1/5 sec; f/4; ISO 800.

Chamaedorea castillo-montti

During the investigation, different lists of species generated in each protected area were consulted and it was found in "Especies de Flora Endémica y Amenazada en la Reserva Protectora de Manantiales Cerro San Gil" that this species is endemic to the region.



Photo by: Victor Mendoza, FLAAR Mesoamerica, Dic. 14, 2021.
Camera: Sony RX10 IV. Settings: 1/400 sec; f/4; ISO 400.

***Tursiops truncatus* - bottlenose dolphins**

During the transfers in Amatique Bay, it was possible to take shots and photograph impressive sightings of dolphins. These cetaceans are commonly called "tonitas" in the municipality of Livingston.



Photos by: Nicolas Hellmuth, FLAAR Mesoamerica, Oct. 11, 2021.
Camera: Nikon D810. Settings: 1/80 sec; f/7,1; ISO 1,800.

Cauliflora plants, with thorns and with defense mechanisms

Impressive blooms and defense mechanisms of some plant organisms. (*Grias cauliflora*), (*Pithecellobium lanceolatum*) y (*Guettarda combsii*)



Photo by: Victor Mendoza, FLAAR Mesoamerica, Oct. 11, 2021.
Camera: Sony RX 100 Underwater. Settings: 1/250 sec; f/7,1; ISO 640.

***Vallisneria americana* - Manatee food plant**

Photograph taken with aquatic equipment.



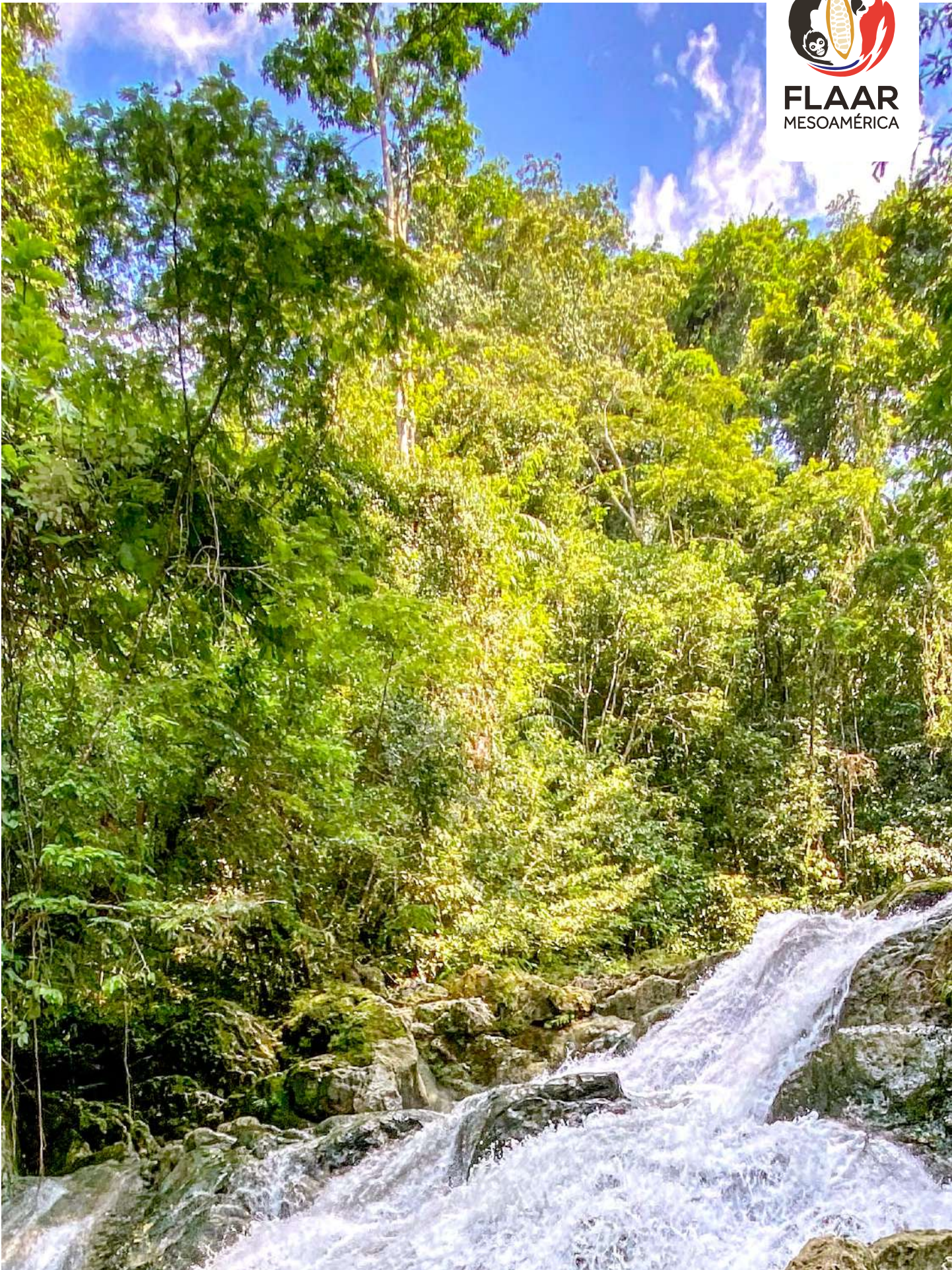
FLAAR
MESOAMÉRICA

SPECIES LISTS OF LIVINGSTON DOCUMENTATION PROJECT

2020 - 2021

VICTOR MENDOZA & VIVIAN HURTADO





FLAAR
MESOAMÉRICA

TREES

Symphonia globulifera, Río Cáliz, Municipality of Livingston
Photograph by: Brandon Hidalgo, FLAAR Mesoamerica.

LIVINGSTON

Plantas



TREES

FAMILY	SPECIES	COMMON NAME
ACANTHACEAE	<i>Avicennia germinans</i> (L.) L.	Mangle negro (Black mangrove)
ACANTHACEAE	<i>Louleridium donnell-smithii</i> S.Watson	
ANACARDIACEAE	<i>Spondias mombin</i> L.	Jobo
ANNONACEAE	<i>Annona squamosa</i> L.	Anona
ANNONACEAE	<i>Annona glabra</i> L.	Anonillo (Alligator apple)
ANNONACEAE	<i>Guatteria amplifolia</i> Triana & Planch.	Corona
ANNONACEAE	<i>Xylopia frutescens</i> Aubl.	Malagueta
APOCYNACEAE	<i>Tabernaemontana donnell-smithii</i> Rose ex J.D.Sm.	Huevos de toro
APOCYNACEAE	<i>Lacmellea standleyi</i>	Leche miel, vaca
APOCYNACEAE	<i>Couma macrocarpa</i> Ducke.	Palo de leche
APOCYNACEAE	<i>Tabernaemontana alba</i> Mill.	
ARALIACEAE	<i>Dendropanax arboreus</i> (L.) Decne. & Planch.	Cuernos de venado
ASPARAGACEAE	<i>Dracaena americana</i> Vand. ex L.	Izote de montaña
BIGNONIACEAE	<i>Amphitecna latifolia</i> (Mill.) A.H.Gentry.	Morro del mar (Black Calabash)
BIGNONIACEAE	<i>Crescentia alata</i> Kunth.	Jícara, Morro
BIXACEAE	<i>Bixa orellana</i> L.	Achiote
BURSERACEAE	<i>Bursera simaruba</i> L. Sarg.	Palo de jiote
BURSERACEAE	<i>Protium copal</i> (Schltdl. & Cham.) Engl.	Copal pom
CARICACEAE	<i>Jacaratia dolichaula</i> (Donn.Sm.) Woodson	Bonete de selva
CHRYSOBALANACEAE	<i>Chrysobalanus icaco</i> L.	Icaco (coco plum)
CHRYSOBALANACEAE	<i>Licania platypus</i> (Hemsl.) Fritsch.	Zunso, zunsapote
CLUSIACEAE	<i>Symphonia globulifera</i> L. F.	Varillo, Leche verde
CLUSIACEAE	<i>Calophyllum brasiliense</i> Cambess.	Leche amarilla, Santa María

FAMILY	SPECIES	COMMON NAME
CLUSIACEAE	<i>Clusia grandiflora</i> Splitg.	Clusia
COMBRETACEAE	<i>Laguncularia racemosa</i> (L.) C.F.Gaertn.	Mangle blanco (White mangrove)
COMBRETACEAE	<i>Conocarpus erectus</i> L.	Mangle gris, Botoncillo
COMBRETACEAE	<i>Terminalia amazonia</i> (J.F.Gmel.) Exell.	Naranja o bolitri
EBENACEAE	<i>Diospyros nigra</i> (J.F.Gmel.) Perrier	Zapote negro
ERYTHOXYLACEAE	<i>Erythroxylum areolatum</i> L.	Icaco blanco
FABACEAE	<i>Lonchocarpus</i> sp.	Chaperno
FABACEAE	<i>Acacia cornigera</i> (L.) Willd.	Cuernos de toro
FABACEAE	<i>Cojoba arborea</i> (L.) Britton & Rose	Frijolillo, cola de coche
FABACEAE	<i>Swartzia simplex</i> (Sw.) Spreng.	Limoncillo
FABACEAE	<i>Gliricidia sepium</i> (Jacq.) Walp.	Madre cacao
FABACEAE	<i>Senna alata</i> (L.) Roxb.	Mazorquilla
FABACEAE	<i>Pithecellobium platylobum</i> (DC.) Barneby & J.W.Grimes	Palo de San Pedro
FABACEAE	<i>Inga vera</i> Willd.	Paterna (river koko)
FABACEAE	<i>Zygia gigantifoliola</i> (Schery) L.Rico	Paterna de montaña
FABACEAE	<i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby	Senna
FABACEAE	<i>Dialium guianense</i> (Aubl.) Sandwith	Tamarindo de montaña
FABACEAE	<i>Erythrina</i> sp.	Pito
FABACEAE	<i>Hymenaea courbaril</i> L.	Guapinol
FABACEAE	<i>Inga vera</i>	Paterna (River Koko)
FABACEAE	<i>Leucaena leucocephala</i>	Huaje, Guaje
FABACEAE	<i>Leucaena collinsii</i> Britton & Rose	Guaje
FABACEAE	<i>Lonchocarpus heptaphyllus</i> (Poir.) DC.	Lonchocarpus
FABACEAE	<i>Lonchocarpus hondurensis</i> Benth.	Gusano

FAMILY	SPECIES	COMMON NAME
FABACEAE	<i>Machaerium falciforme</i> Rudd	
FABACEAE	<i>Ormosia schippii</i> Standl. & Steyerem.	Palo macho
FABACEAE	<i>Pithecellobium lanceolatum</i> (Willd.) Benth.	Espina de vaca (Bastard bully)
FABACEAE	<i>Pterocarpus hayesii</i> Jacq.	Cahue de montaña
FABACEAE	<i>Pterocarpus officinalis</i> Jacq.	Sangre de drago (dragonsblood tree)
FABACEAE	<i>Pterocarpus rohrii</i> Vahl	Cahue
FABACEAE	<i>Zygia recordii</i> Britton & Rose	Paterna de montaña
LAURACEAE	<i>Licaria velutina</i> van der Werff	
LECYTHIDACEAE	<i>Grias cauliflora</i> L.	Jahuillo
MALPIGHIACEAE	<i>Byrsonima crassifolia</i> (L.) Kunth	Nance de montaña
MALPIGHIACEAE	<i>Byrsonima bucidaefolia</i>	Nance negro
MALPIGHIACEAE	<i>Bunchosia</i> sp. Rich. Ex Kunth.	Nance rojo
MALVACEAE	<i>Ceiba pentandra</i> (L.) Gaertn.	Ceiba
MALVACEAE	<i>Pachira aquatica</i> Aubl.	Zapotón
MALVACEAE	<i>Ochroma pyramidale</i> (Cav. Ex Lam.) Urb.	Bálsamo
MALVACEAE	<i>Pseudobombax ellipticum</i> (Kunth) Dugand	Amapola
MALVACEAE	<i>Trichospermum galeottii</i> (Turcz.) Kosterm.	
MELASTOMATAACEAE	<i>Bellucia pentamera</i> Naudin.	Manzano
MELASTOMATAACEAE	<i>Clidemia septuplinervia</i> Cogn.	Clidemia
MELASTOMATAACEAE	<i>Miconia longifolia</i> Aubl.	Sarín
MELIACEAE	<i>Swietenia macrophylla</i> King	Caoba (mahogany)
MELIACEAE	<i>Cabrlea</i> sp.	
MORACEAE	<i>Ficus insipida</i> Willd.	Amate
MYRISTICACEAE	<i>Compsonura sprucei</i> (A.DC.) Warb.	Matapalo
MYRISTICACEAE	<i>Virola guatemalensis</i> Aubl.	Palo de sangre

FAMILY	SPECIES	COMMON NAME
MYRTACEAE	<i>Calypttranthes pallens</i> Griseb.	Murta
MYRTACEAE	<i>Pimenta dioica</i> (L.) Merr.	Pimienta (peper)
MYRTACEAE	<i>Syzygium jambos</i> (L.) Alston	
OLACACEAE	<i>Ximenia americana</i> L.	
PASSIFLORACEAE	<i>Erblichia odorata</i> Seem.	Copa de oro, Flor de San Pedro, Flor de mayo
PHYLLANTHACEAE	<i>Amanoa guianensis</i> Aubl.	Palo blanco
POLYGANACEAE	<i>Coccoloba belizensis</i> Standl.	Papaturro
POLYGANACEAE	<i>Coccoloba barbadensis</i> Jacq.	Papaturro
POLYGANACEAE	<i>Coccoloba uvifera</i> (L.) L.	Uva del mar (Sea grape)
PRIMULACEAE	<i>Rapanea ferruginea</i>	Fierrillo
RHIZOPHORACEAE	<i>Rhizophora mangle</i> L.	Mangle rojo (red mangrove)
RUBIACEAE	<i>Guettarda combsii</i> L. Vent	Guayabillo
RUBIACEAE	<i>Genipa americana</i> L.	Irayol
RUTACEAE	<i>Amyris</i> sp.	Palo de gas
RUTACEAE	<i>Zanthoxylum</i> sp.	Palo de lagarto
SALICACEAE	<i>Casearia aculeata</i> Jacq.	Vara blanca
SAPOTACEAE	<i>Pouteria sapota</i>	Zapote
SAPOTACEAE	<i>Pouteria sapota</i> (Jacq.) H.E.Moore & Stearn	Zapote mamey
SIMAROUBACEAE	<i>Simarouba amara</i>	Aceituno
URTICACEAE	<i>Cecropia peltata</i> L.	Guarumo
URTICACEAE	<i>Pourouma</i> sp.	Guarumo de montaña
URTICACEAE	<i>Urera alceifolia</i> (Poir.) Gaudich.	Ramiflora naranja
VOCHYSIACEAE	<i>Vochysia guatemalensis</i> Donn. Sm.	San Juan

Source: : (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

SHRUBS

Calliandra houstoniana, Río Sarstún, Municipality of Livingston
Photograph by: David Arrivillaga, FLAAR Mesoamerica.



LIVINGSTON

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SHRUBS

FAMILY	SPECIES	COMMON NAME
ACANTHACEAE	<i>Justicia aurea</i> Schltld.	Pavón
ANNONACEAE	<i>Mosannonna depressa</i> (Baill.) Chatrou	Corona roja
APOCYNACEAE	<i>Thevetia ahouai</i> (L.) A.DC.	Huevos de chucho, Huevos de gato
ARACEAE	<i>Dieffenbachia wendlandii</i> Schott	Millonaria
ARACEAE	<i>Montrichardia arborescens</i> (L.) Schott.	Pica pica
ARACEAE	<i>Urospatha friedrichsthalii</i> Schott	
ASTERACEAE	<i>Neurolaena lobata</i> (L.) R.Br.	3 puntas
ASTERACEAE	<i>Fleischmannia pycnocephala</i> (Menos) RMKing & H.Rob	Lilas
ASTERACEAE	<i>Ageratum corymbosum</i> Zuccagni	
ASTERACEAE	<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	Girasol silvestre (Mexican Sunflower)
ASTERACEAE	<i>Zinnia elegans</i> L.	Flor de papel
CAPPARACEAE	<i>Cleoserrata serrata</i> (Jacq.) Iltis	
CARICACEAE	<i>Carica papaya</i> L.	Papaya
CHYSOBALANACEAE	<i>Hirtella racemosa</i> Lam.	Amento rosado
COSTACEAE	<i>Costus scaber</i> Ruiz & Pav.	Caña de indio
CYCLANTHACEAE	<i>Carludovica palmata</i> Ruiz & Pav.	Kalá, Junco
EUPHORBIACEAE	<i>Acalypha costaricensis</i> (Kuntze) Knobl.	Planta dioica
EUPHORBIACEAE	<i>Manihot esculenta</i> Crantz.	Yuca
FABACEAE	<i>Calliandra hosustonia</i> (Mill.) Standl.	Caliandra
FABACEAE	<i>Mimosa pigra</i> L.	Mimosa
HELICONIACEAE	<i>Heliconia bourgaeana</i> Petersen	Heliconia manchada
HELICONIACEAE	<i>Heliconia psittacorum</i> L. F.	Pico de loro, flor de loro
HELICONIACEAE	<i>Heliconia latispatha</i> Benth.	Platanillo, ave del paraíso
HELICONIACEAE	<i>Heliconia aurantiaca</i> Ghiesbr. ex Lem.	Cabeza de ave
HELICONIACEAE	<i>Heliconia wagneriana</i> Petersen.	Heliconia rosada

FAMILY	SPECIES	COMMON NAME
LAMIACEAE	<i>Cornutia pyramidata</i> L.	
LAMIACEAE	<i>Ocimum micranthum</i> Willd.	Albahaca silvestre
MALVACEAE	<i>Pavonia paludicola</i> Nicolson ex Fryxell	Rosa de río
MARANTACEAE	<i>Calathea lutea</i> (Aubl.) E.Mey	Calatea café
MARANTACEAE	<i>Stromanthe tonckat</i> (Aubl.) Eichler	Flauta
MARANTACEAE	<i>Calathea crotalifera</i> S. Watson	Calatea
MELASTOMATACEAE	<i>Conostegia</i> sp.	Conostegia
MELASTOMATACEAE	<i>Miconia</i> sp.	Miconia
MELASTOMATACEAE	<i>Miconia lacera</i> (Bonpl.) Naudin	Miconia
MELASTOMATACEAE	<i>Arthrostemma ciliatum</i> Pav. ex D. Don	Planta de almuerzo
MELASTOMATACEAE	<i>Conostegia bernoulliana</i> Cogn.	Conostegia
MELASTOMATACEAE	<i>Conostegia icosandra</i> (Sw. Ex Wikstr.) Urb.	Conostegia
MELASTOMATACEAE	<i>Conostegia xalapensis</i> (Bonpl.) D. Don ex DC	Palo de uva
MELASTOMATACEAE	<i>Miconia impetiolearis</i>	Miconia
MELASTOMATACEAE	<i>Miconia impetiolearis</i> (Sw.) D. Don	Miconia
ONAGRACEAE	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven.	Calavera
PHYTOLACCACEAE	<i>Phytolacca rivinoides</i> Kunth & CD Bouché	Jaboncillo
PIPERACEAE	<i>Piper peltatum</i> L.	Santa María
PIPERACEAE	<i>Piper umbellatum</i> L.	Piper
POACEAE	<i>Guadua longifolia</i> (E. Fourn.) R.W.Pohl	Jimba, bambú nativo
PRIMULACEAE	<i>Ardisia pellucida</i> Oerst.	Falsa rubiácea
RUBIACEAE	<i>Psychotria glomerulata</i> (Donn.Sm.) Steyerf.	Flor gelatina
RUBIACEAE	<i>Palicourea guianensis</i> Aubl.	Cafecillo
RUBIACEAE	<i>Psychotria elata</i> (Sw.) Hammel	Labios de mujer (Hot lips)
RUBIACEAE	<i>Alibertia edulis</i> (Rich.) A.Rich.	

FAMILY	SPECIES	COMMON NAME
RUBIACEAE	<i>Augusta rivalis</i> (Benth.) J.H.Kirkbr.	
RUBIACEAE	<i>Palicourea triphylla</i> DC.	Albahaca silvestre
RUBIACEAE	<i>Psychotria amplifolia</i> Raeusch.	
RUBIACEAE	<i>Psychotria deflexa</i> DC.	
RUBIACEAE	<i>Psychotria grandis</i> Sw.	
RUBIACEAE	<i>Psychotria poeppigiana</i> Müll.Arg.	Labios de mujer (sore-mouth Bush)
RUBIACEAE	<i>Tournefortia bicolor</i> Sw.	
URTICACEAE	<i>Myriocarpa longipes</i> Liebm.	Llorona
VERBENACEAE	<i>Lantana camara</i> L.	
ZINGIBERACEAE	<i>Renealmia alpinia</i> (Rottb.) Maas.	Chucho de monte

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

VINES

Aristolochia grandiflora, El Rosario, Tapón Creek, Municipality of Livingston
Photograph by: David Arrivillaga, FLAAR Mesoamerica.

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VINES

FAMILY	SPECIES	COMMON NAME
ACANTHACEAE	<i>Odontonema callistachyum</i> (Schltdl. & Cham.) Kuntze	Coral
APOCYNACEAE	<i>Pentalinon luteum</i> (L.) B.F.Hansen & Wunderlin	Copa de oro
APOCYNACEAE	<i>Mandevilla hirsuta</i> (Rich.) K.Schum.	
APOCYNACEAE	<i>Mandevilla villosa</i> (Miers) Woodson	
APOCYNACEAE	<i>Prestonia portobellensis</i> (Beurl.) Woodson	Bejuco rosado
APOCYNACEAE	<i>Rhabdadenia biflora</i> (Jacq.) Müll.Arg.	Copa blanca
ARACEAE	<i>Philodendron sagittifolium</i> Liebm	Bejuco sagitario
ARACEAE	<i>Syngonium podophyllum</i> Schott.	Cachito
ARACEAE	<i>Anthurium lucens</i> Standl.	Corazón de indio
ARACEAE	<i>Anthurium scandens</i> (Aubl.) Engl.	Espádice lila
ARACEAE	<i>Philodendron fragrantissimum</i> (Hook.) G.Don	Filodendron
ARACEAE	<i>Philodendron hederaceum</i> Jacq. Schott	Hoja de corazón
ARACEAE	<i>Monstera tuberculata</i> Lundell	Hoja pegada
ARACEAE	<i>Philodendron radiatum</i> Schott	Mano de león
ARACEAE	<i>Rhodospatha wendlandii</i> Schott.	Sainillo
ARACEAE	<i>Monstra</i> sp.	Teléfono
ARACEAE	<i>Anthurium pentaphyllum</i> (Aubl.) G.Don	Tabacon
ARACEAE	<i>Philodendron Smithii</i> Engl.	Corazón de indio
ARECACEAE	<i>Desmoncus orthacanthos</i> Mart.	Bayal
ARISTOLOCHIACEAE	<i>Aristolochia</i> sp.	Aristolochia
ARISTOLOCHIACEAE	<i>Aristolochia grandiflora</i> Sw.	Aristolochia
BIGNONIACEAE	<i>Arrabidaea floribunda</i> Kunth. L.G.	
BIGNONIACEAE	<i>Bignonia</i> sp.	
BIGNONIACEAE	<i>Fridericia floribunda</i> (Kunth) L.G.Lohmann.	Bejuco morado (purple vine)
BIGNONIACEAE	<i>Bignonia binata</i> Thunb.	Uña de gato

FAMILY	SPECIES	COMMON NAME
BIGNONIACEAE	<i>Amphilophium crucigerum</i> (L.) L.G.Lohmann	Bejuco blanco (White vine)
BIGNONIACEAE	<i>Fridericia</i> sp.	Bejuco rosado (Pink vine)
BIGNONIACEAE	<i>Tynanthus guatemalensis</i> Donn.Sm.	Bejuco de estrella
COMBRETACEAE	<i>Combretum fruticosum</i> (Loefl.) Stuntz	Flor de cepillos (orange flame vine)
COMBRETACEAE	<i>Combretum cacoucia</i> Exell.	Guacamaya
CONVOLVULACEAE	<i>Ipomoea</i> sp.	Campanitas
CONVOLVULACEAE	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Ipomea de playa
CONVOLVULACEAE	<i>Ipomoea purpurea</i> (L.) Roth	Ipomea azul (puple morning-glory)
CONVOLVULACEAE	<i>Ipomoea rubens</i> Choisy	Morning glory
CONVOLVULACEAE	<i>Ipomoea setifera</i> Poir.	Ipomea
CONVOLVULACEAE	<i>Merremia tuberosa</i> (L.) Rendle	Flor de madera
CONVOLVULACEAE	<i>Merremia umbellata</i> (L.) Hallier f.	Merremia
CONVOLVULACEAE	<i>Ipomoea philomega</i> Vell.	Quiebracajete
CUCURBITACEAE	<i>Gurania makoyana</i> (Lem.) Cogn.	
CYCLANTHACEAE	<i>Asplundia labela</i> (R.E.Schult.) Harling	Colocha, Jilote, Jilotillo
DILLENIACEAE	<i>Tetracera portobellensis</i> Beurl.	Bejuco de agua o colorado
DIOSCOREACEAE	<i>Dioscorea bartlettii</i> C.V.Morton	Cocolmea
FABACEAE	<i>Entada polystachya</i> (L.) DC.	Bejuco de gusano
FABACEAE	<i>Bauhinia guianensis</i> Aublet.	Escalera de mico
FABACEAE	<i>Centrosema plumieri</i> (Pers.) Benth.	Centrosema
LORANTHACEAE	<i>Struthanthus acostensis</i> L.A. González & JF Morales	Falsa Cascuta
MARCGRAVIACEAE	<i>Souroubea sympetala</i> Gilg	
ORCHIDACEAE	<i>Vanilla</i> sp.	Vainilla
PASSIFLORACEAE	<i>Passiflora biflora</i> Lam.	Flores de la pasión
PASSIFLORACEAE	<i>Passiflora choconiana</i> S. Watson	Flores de la pasión

FAMILY	SPECIES	COMMON NAME
PIPERACEAE	<i>Peperomia obtusifolia</i> (L.) A. Dietr.	
RHAMNACEAE	<i>Gouania lupuloides</i> (L.) Urb.	
RUBIACEAE	<i>Bouvardia ternifolia</i> Cav. Schltdl	Cafecillo
SAPINDACEAE	<i>Paullinia pinnata</i> L.	Costilla
SCHLEGELIACEAE	<i>Schlegelia parviflora</i> (Oerst.) Monach.	Quiebra huevos
SIPARUNACEAE	<i>Siparuna thecaphora</i> (Poepp. & Endl.) A.DC.	Café de montaña
SMILACACEAE	<i>Smilax</i> sp.	Zarzaparrilla
VITACEAE	<i>Cissus</i> sp.	Cusia
VITACEAE	<i>Cissus biformifolia</i> Standl.	Cusia
VITACEAE	<i>Vitis bourgaeana</i> Planch	Uva silvestre, bejuco de uva

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

EPIPHYTES

***Myrmecophila* sp.** Lago de Izabal, Municipality of Livingston
Photograph by: Nicholas Hellmuth, FLAAR Mesoamerica.

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EPIPHYTES

FAMILY	SPECIES	COMMON NAME
ARACEAE	<i>Anthurium schlechtendalii</i> Kunth.	Hoja de piedra, Cola de faisán
ARACEAE	<i>Anthurium bakeri</i> Hook. F.	
BROMELIACEAE	<i>Billbergia viridiflora</i> H. Wendl.	Bilbergia
BROMELIACEAE	<i>Aechmea tillandsioides</i> (Mart. ex Schult. & Schult.f.) Baker	Bromelia espinosa, Piñuela
BROMELIACEAE	<i>Tillandsia bulbosa</i> Hook.	Gallito bulboso
BROMELIACEAE	<i>Tillandsia</i> sp.	Tillandsia
BROMELIACEAE	<i>Aechmea bracteata</i> (Sw.) Griseb.	
BROMELIACEAE	<i>Androlepis skinneri</i> (K.Koch) Brongniart	
BROMELIACEAE	<i>Bromelia</i> sp.	
BROMELIACEAE	<i>Catopsis berteroniana</i> (Schult. Y Schult. F.) Mez.	
BROMELIACEAE	<i>Guzmania scherzeriana</i> Mez.	Gallinazco
BROMELIACEAE	<i>Tillandsia streptophylla</i> Scheidw.	Tillandsia rosada
BROMELIACEAE	<i>Tillandsia utriculata</i> L.	
BROMELIACEAE	<i>Werauhia gladioliflora</i> (H. Wendl.) J. R. Grant	
CACTACEAE	<i>Epiphyllum phyllanthus</i> (L.) Haw.	Pitaya
CACTACEAE	<i>Selenicereus testudo</i> (Karw. Ex Zucc.) Buxb.	Pitaya de tortuga
CACTACEAE	<i>Hylocereus trigonus</i> (Haw.) Saff.	
GESNERIACEAE	<i>Columnnea sulfurea</i> Donn.Sm.	
ORCHIDACEAE	<i>Epidendrum nocturnum</i> Jacq.	Dama de noche
ORCHIDACEAE	<i>Encyclia bractescens</i> (Lindl.) Hoehne	Enciclia
ORCHIDACEAE	<i>Myrmecophila exaltata</i> (Kraenzl.) G.C.Kenn.	Orquídea de hormigas
ORCHIDACEAE	<i>Sobralia decora</i> Bateman	Orquídea monja
ORCHIDACEAE	<i>Catasetum</i> sp.	Torito
ORCHIDACEAE	<i>Catasetum integerrimum</i> Hook.	
ORCHIDACEAE	<i>Epidendrum melistagum</i> Hágsater	

FAMILY	SPECIES	COMMON NAME
ORCHIDACEAE	<i>Gongora atropurpurea</i> Hook.	
ORCHIDACEAE	<i>Myrmecophila christinae</i> Carnevali & Gómez-Juárez	Orquídea de hormigas naranja
ORCHIDACEAE	<i>Polystachya foliosa</i> (Hook.) Rchb.f.	
ORCHIDACEAE	<i>Sobralia</i> sp.	
ORCHIDACEAE	<i>Trigonidium egertonianum</i> Bateman.	
ORCHIDACEAE	<i>Epidendrum flexuosum</i> G. Mey.	
ORCHIDACEAE	<i>Mormolyca hedwigiae</i> Hamer. Y Dodson.	

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

FERNS

Lomariopsis recurvata, Cerro San Gil, Municipality of Livingston
Photograph by: Nicholas Hellmuth, FLAAR Mesoamerica.

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FERNS

FAMILY	SPECIES	COMMON NAME
CYATHEACEAE	<i>Cyathea</i> sp.	Chipe
DENNSTAEDTIACEAE	<i>Pteridium</i> sp.	Chispa
DRYOPTERIDACEAE	<i>Elaphoglossum herminieri</i> (Bory ex Fée) T. Moore	Lanzas
GLEICHENIACEAE	***	Helecho eléctrico (electric fern)
LOMARIOPSIDACEAE	<i>Lomariopsis recurvata</i> Fée	Helecho trepador (climbing fern)
NEPHROLEPIDACEAE	<i>Nephrolepis</i> sp.	Cascada
NEPHROLEPIDACEAE	<i>Nephrolepis biserrata</i> (Sw.) Schott	Cascada
PTERIDACEAE	<i>Acrostichum danaeifolium</i> Langsd. & Fisch	Helecho de manglar (mangrove fern)
PTERIDACEAE	<i>Acrostichum aureum</i> L.	Helecho de manglar (mangrove fern)
PTERIDACEAE	<i>Vittaria lineata</i> L. (Smith.)	Llorona
SELAGINELLACEAE	<i>Selaginella</i> sp.	Selaginela

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

HERBACEOUS

Aphelandra aurantiaca, Río Dulce, Municipality of Livingston
Photograph by: David Arrivillaga, FLAAR Mesoamerica.

LIVINGSTON

Plantas



HERBACEOUS

FAMILY	SPECIES	COMMON NAME
ACANTHACEAE	<i>Aphelandra aurantiaca</i> (Scheidw.) Lindl.	Afelandra
APOCYNACEAE	<i>Asclepias curassavica</i> L.	
ARACEAE	<i>Spathiphyllum blandum</i> (Schott.)	Gushnay
ARACEAE	<i>Xanthosoma robustum</i> Schott.	Malanga venenosa
ARACEAE	<i>Colocasia esculenta</i> (L.) Schott	Taro
ARALIACEAE	<i>Hydrocotyle</i> sp.	
BEGONIACEAE	<i>Begonia</i> sp.	Begonia
CAMPANULACEAE	<i>Hippobroma longiflora</i> (L.) G.Don	San Juan
FABACEAE	<i>Canavalia rosea</i> (Sw.) DC.	
FABACEAE	<i>Vigna luteola</i> (Jacq.) Benth.	
GESNERIACEAE	<i>Besleria laxiflora</i> Benth.	Botón naranja
HAEMODORACEAE	<i>Xiphidium caeruleum</i> Aubl.	Cola de paloma
MALVACEAE	<i>Sida acuta</i> Burm.f.	
MARANTACEAE	<i>Maranta</i> sp.	Lavender
MELASTOMATACEAE	<i>Clidemia hirta</i> (L.) D. Don	
MORACEAE	<i>Dorstenia choconiana</i> S. Watson	Flor verde
URTICACEAE	***	Flor de carne

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

MACROPHYTES

Potamogeton illinoensis, Río Dulce, Municipality of Livingston
Photograph by: Víctor Mendoza, FLAAR Mesoamerica.

LIVINGSTON

Plantas



MACROPHYTES

FAMILY	SPECIES	COMMON NAME
ALISMATACEAE	<i>Sagittaria lancifolia</i> L.	Flecha de agua (Water potatoes)
AMARYLLIDACEAE	<i>Crinum</i> sp.	Spider lily
AMARYLLIDACEAE	<i>Hymenocallis littoralis</i> (Jacq.) Salisb.	Spider lily
ARALIACEAE	<i>Hydrocotyle umbellata</i> L.	Ombbligo de Venus
CABOMBACEAE	<i>Cabomba</i> sp.	Cola de zorro
CYPERACEAE	<i>Cyperus esculentus</i> L.	Cebollín (earth almond)
CYPERACEAE	<i>Cladium mariscus</i> (L.) Pohl	Navajuela
CYPERACEAE	<i>Eleocharis geniculata</i> (L.) Roem. & Schult.	Pajiza (caribbean spike-rush)
CYPERACEAE	<i>Rhynchospora cephalotes</i> (L.) Vahl	Pasto de playa
CYPERACEAE	<i>Cyperus brevifolius</i> (Rottb.) Hassk.	Cebollín amarillo
CYPERACEAE	<i>Cyperus luzulae</i> (L.) Retz.	Cebollín blanco
CYPERACEAE	<i>Eleocharis caribaea</i>	
CYPERACEAE	<i>Eleocharis</i> sp.	
CYPERACEAE	<i>Oxycaryum cubense</i> (Poepp. & Kunth) Palla	
CYPERACEAE	<i>Schoenoplectus acutus</i> (Muhl.)	
HYDROCHARITACEAE	<i>Vallisneria americana</i> Michx.	Pasto acuático
MAYACACEAE	<i>Mayaca fluviatilis</i> Aubl.	Mayaca
MENYANTHACEAE	<i>Nymphoides indica</i> (L.) Kuntze	Lirio pequeño (Water Snowflake)
NYMPHAEACEAE	<i>Nymphaea ampla</i> (Salisb.) DC.	Lirio blanco (dotleaf waterlily)
ONAGRACEAE	<i>Ludwigia leptocarpa</i> (Nutt.) H.Hara	Clavito
ONAGRACEAE	<i>Ludwigia</i> sp.	Calavera
POACEAE	<i>Phragmites australis</i> (Cav.) Trin.	Carrizo, Tañil
PONTEDERIACEAE	<i>Pontederia cordata</i> L.	Espiga de agua (pickerelweed)
POTAMOGETONACEAE	<i>Potamogeton illinoensis</i> Morong	Hierba de agua
SALVINIACEAE	<i>Salvinia</i> sp.	Lenteja de agua
TYPHACEAE	<i>Typha domingensis</i> Pers.	Junco, Tifa, Tul (Cattail)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)



PALMS

Chamaedorea castillo-montti, Plan Grande Tatín, Municipality of Livingston
Photograph by: Víctor Mendoza, FLAAR Mesoamerica.

LIVINGSTON

Plantas



PALMS

FAMILY	SPECIES	COMMON NAME
ARECACEAE	<i>Acoelorrhaphe wrightii</i> H. Wendl	Tasiste o pimientillo (Palmetto palm)
ARACEAE	<i>Astrocaryum mexicanum</i> Liebm. Ex Mart.	Lancetillo
ARECACEAE	<i>Attalea cohune</i> Mart.	Corozo (Cohune Nut)
ARECACEAE	<i>Bactris major</i> Jacq.	
ARECACEAE	<i>Bactris mexicana</i> Mart.	Huiscoyol
ARECACEAE	<i>Calyptrogyne ghiesbreghtiana</i> (Linden & H.Wendl.) H.Wendl.	Capuque, capuca
ARECACEAE	<i>Chamaedorea castillo-montii</i> Hodel	Pacaya endemica
ARECACEAE	<i>Chamaedorea</i> sp.	Xate jade
ARECACEAE	<i>Chamaedorea elegans</i> Mart.	Pacaya
ARECACEAE	<i>Chamaedorea ernesti-augusti</i> H.Wendl.	
ARECACEAE	<i>Chamaedorea tepejilote</i> Liebm.	Tepejilote
ARECACEAE	<i>Cryosophila stauracantha</i> (Heynh.) R.J.Evans	Escobo o escoba (rootspine palm)
ARECACEAE	<i>Gaussia maya</i> (O.F.Cook) H.J.Quero & Read	
ARECACEAE	<i>Geonoma interrupta</i> (Ruiz & Pav.) Mart.	Capuca grande
ARECACEAE	<i>Manicaria saccifera</i> Gaertn.	Confra
ARECACEAE	<i>Reinhardtia elegans</i> Liebm.	Capuque de montana
ARECACEAE	<i>Reinhardtia latisecta</i> (H.Wendl.) Burret	Pamak
ARECACEAE	<i>Roystonea regia</i> (Kunth) O.F.Cook.	Palma real (royal palm)
ARECACEAE	<i>Sabal mauritiiformis</i> (H.Karst.) Griseb. & H.Wendl.	Guano

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

FUNGUS

Cookeina speciosa, Mirador del Cañón Río Dulce, Municipality of Livingston
Photograph by: Brandon Hidalgo, FLAAR Mesoamérica.

LIVINGSTON

Diversidad



FUNGUS

FAMILY	SPECIES	COMMON NAME
AGARICACEAE	<i>Leucocoprinus</i> sp.	
ARTHONIACEAE	<i>Herpothallon rubrocinctum</i>	Liquen de navidad (christmas lichen)
AURICULARIACEAE	<i>Auricularia</i> sp.	Hongo oreja (ear fungus)
CERATIOMYXIDAE	<i>Ceratiomyxa</i> sp.	
COENOGONIACEAE	<i>Coenogonium</i> sp.	Hongo verde (Green fungus)
COLLEMATACEAE	<i>Leptogium</i> sp.	Liquen negro (Black lichen)
GANODERMATACEAE	<i>Ganoderma</i> sp.	
GOMPHACEAE	<i>Ramaria</i> sp.	Hongo coral (Fungus coral)
GOMPHACEAE	<i>Phaeoclavulina</i> sp.	
MARASMIACEAE	<i>Marasmius</i> sp.	
MARASMIACEAE	<i>Collybiopsis</i> sp.	
OMPHALOTACEAE	<i>Gymnopus</i> sp.	
PARMELIACEAE	<i>Flavoparmelia</i> sp.	
PEZIZALES	***	
PHALLACEAE	<i>Phallus indusiatus</i> Vent.	Velo de novia
PLEUROTACEAE	<i>Pleurotus</i> sp.	
POLYPORACEAE	<i>Tramaste</i> sp.	Cola de pavo
POLYPORACEAE	<i>Pycnoporus sanguineus</i> (L.) Murrill	Repisa naranja
POLYPORACEAE	<i>Lentinus</i> sp.	
POLYPORACEAE	<i>Ganoderma</i> sp.	
PSATHYRELLACEAE	<i>Agaricus disseminatus</i> Pers.	Colonia de hongos
PSATHYRELLACEAE	<i>Psathyrellaceae</i> sp.	

FAMILY	SPECIES	COMMON NAME
SARCOSCYPHACEAE	<i>Cookeina speciosa</i> Kutze.	Copa de vino
SARCOSCYPHACEAE	<i>Sarcoscypha</i> sp. Fr. Boud.	Copa de vino
SARCOSCYPHACEAE	<i>Cookeina tricholoma</i> (Mont.) Kuntze	Copa de vino
TREMELLACEAE	<i>Tremella fuciformis</i> Berk.	Hongo nieve (snow fungus)
XYLARIACEAE	<i>Xylaria</i> sp.	

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

BIRDS

Pteroglossus torquatus, Río Chocón Machacas, Municipality of Livingston
Photograph by: David Arrivillaga, FLAAR Mesoamerica.

LIVINGSTON

Aves



BIRDS

FAMILY	SPECIES	COMMON NAME
ACCIPITRIDAE	<i>Leptodon cayanensis</i> Latham.	Grey falco
ACCIPITRIDAE	<i>Rostrhamus sociabilis</i> Vieillot.	Halcón caracolero (snail falcon)
ACCIPITRIDAE	<i>Buteo magnirostris</i> Gmelin	Gavilán pollero (hawk)
ACCIPITRIDAE	<i>Buteogallus</i> sp.	Halcón pardo (Brown falcon)
ARDEIDAE	<i>Nycticorax nycticorax</i> Linnaeus.	Nictocorax
ARDEIDAE	<i>Nycticorax violacea</i> Linnaeus.	Nictocorax corona negra (Nitrocorax black crown)
ARDEIDAE	<i>Ardea alba</i> Linnaeus.	Garza blanca (White heron)
ARDEIDAE	<i>Butorides virescens</i> Linnaeus.	Garza verde (Green heron)
ARDEIDAE	<i>Bubulcus ibis</i> Linnaeus.	Garcilla bueyera
ARDEIDAE	<i>Cochlearius cochlearius</i> Linnaeus	Garza pico de cucharón (dipper-billed heron)
ARDEIDAE	<i>Egretta caerulea</i> Linnaeus	Garza azul (Blue heron)
ARDEIDAE	<i>Ardea herodias</i> Linnaeus	Garza gris (Gray heron)
ARDEIDAE	<i>Tigrisoma mexicanum</i> Swainson.	Garza parda (Brown heron)
CATHARTIDAE	<i>Coragyps atratus</i> Bechstein.	Zopilote (buzzard)
CATHARTIDAE	<i>Cathartes aura</i> Linnaeus.	Zopilote cabeza roja (Red-head buzzard)
CERYLIDAE	<i>Ceryle torquata</i> Linnaeus.	Martin pescador
CERYLIDAE	<i>Megaceryle torquata</i> Linnaeus.	Martín pescador
CORVIDAE	<i>Psilorhinus morio</i> Wagler.	Brown jay
FREGATIDAE	<i>Fregata magnificens</i> Matews.	Tijereta macho
FURNARIIDAE		Trepadores
HIRUNDINIDAE	<i>Tachycineta albilinea</i>	Golondrina (swallow)
LARIDAE	<i>Sterna maxima</i>	Gaviota real (royal seagull)
PANDIONIDAE	<i>Pandion haliaetus</i> Linnaeus.	Águila pescadora (fishing Eagle)
PARULIDAE	<i>Parkesia motacilla</i>	Chipe de mar
PELECANIDAE	<i>Pelecanus occidentalis</i> Linnaeus.	Pelicano café (brown pelican)
PHALACROCORACIDAE	<i>Phalacrocorax brasilianus</i> Gmelin.	Cormorán

FAMILY	SPECIES	COMMON NAME
PIPRIDAE	<i>Pipra mentalis</i>	Red capped manakin
PSITTACIDAE	<i>Amazona farinosa</i> Boddaert.	Loro (parrot)
RALLIDAE	<i>Porphyrio martinica</i> Linnaeus.	Polla de agua
RALLIDAE	<i>Aramides cajanea</i> Statius Muller.	Gray necked wood
RAMPHASTIDAE	<i>Pteroglossus torquatus</i> Gmelin.	Tucán collares
RAMPHASTIDAE	<i>Ramphastos sulfuratus</i> Lesson.	Tucán
SCOLOPACIDAE	<i>Numenius phaeopus</i>	Whimbrel
SCOLOPACIDAE	<i>Actitis macularius</i>	Playero
SCOLOPOCIDAE	<i>Calidris</i> sp.	Playero
STERNIDAE	<i>Thalasseus elegans</i> Gambel	Gaviota elegante (graceful seagull)
THRAUPIDAE	<i>Tangara larvata</i> Du Bus De Gisignies.	Tangara
TINAMIDAE	<i>Tinamus major</i> Gmelin	Huevos de mancolola
TITYRIDAE	<i>Tityra inquisitor</i> Lichtenstein.	Titira
TROCHILIDAE	<i>Amazilia</i> sp.	Colibrí garganta azul (blue throated humming- bird)
TROCHILIDAE	<i>Phaethornis striigularis</i> Gould.	Colibrí ermitaño (hermit hummingbird)
TROGONIDAE	<i>Trogon melanocephalus</i> Gould.	Trogon azulado
TROGONIDAE	<i>Trogon caligatus</i> Gould.	Trogon
TROGONIDAE	<i>Trogon messena</i> Gould.	Trogon verde
TURDIDAE	<i>Catharus minimus</i> Lafresnaye	Zorzalino
TURDIDAE	<i>Turdus grayi</i> Bonaparte.	Mirlo pardo
TYRANNIDAE	<i>Myiozetetes similis</i>	Mosquero
TYRANNIDAE	<i>Tyrannus melancholicus</i> Vieillot	Tirano

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

REPTILES

Bothrops asper, Biotopo Chocón Machacas, Municipality of Livingston
Photograph by: Alejandra Gutiérrez, FLAAR Mesoamerica.



REPTILES

FAMILY	SPECIES	COMMON NAME
BOIDAE	<i>Boa constrictor</i> Linnaeus.	Masacuata
COLUBRIDAE	<i>Oxybelis fulgidus</i>	Bejuquilla verde
CORYTOPHANIDAE	<i>Corytophanes cristatus</i> Merrem.	Camaleón (chameleon)
CORYTOPHANIDAE	<i>Basiliscus vittatus</i> Wiegmann.	Basilisco (basilisk)
CROCODYLIDAE	<i>Crocodylus moreletii</i> Dumerli and Bibron.	Cocodrilo (crocodile)
DACTYLOIDAE	<i>Norops</i> sp.	Lagartija (lizard)
EMYDIDAE	<i>Trachemys</i> sp.	Tortuga pintada (painted turtle)
IGUANIDAE	<i>Iguana iguana</i> Linnaeus.	Iguana verde, garrobo
KINOSTERNIDAE	<i>Staurotypus triporcatus</i> Wiegmann	Tortuga guao (tortoise)
TEIIDAE	<i>Holcosus</i> sp.	Lizarda gris
VIPERIDAE	<i>Porthidium nasutum</i> Bocourt.	Tamaga
VIPERIDAE	<i>Bothrops asper</i> Garman.	Barba amarilla (yellow bearded snake)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

INSECTS

MANTODEA, Tapón Creek, Municipality of Livingston
Photograph by: Brandon Hidalgo, FLAAR Mesoamérica.

LIVINGSTON

Insectos y Arácnidos



INSECTS

ORDER	FAMILY	SPECIES	COMMON NAME
BLATTODEA	TERMITIDAE	<i>Nasutitermes</i> sp.	Comején, termitas (termites)
BLATTODEA	BLABERIDAE	<i>Archimandrita tessellata</i> Stoll.	Cucaracha gigante (giant cockroach)
COLEOPTERA	CHRYSOMELIDAE	<i>Neolema</i> sp.	Escarabajo rojo (red beetle)
HEMIPTERA	PENTATOMIDAE	<i>Brachystethus rubromaculatus</i> Dallas.	Chinche puntos rojos (red dotted bug)
HEMIPTERA	PENTATOMIDAE	<i>Brachystethus rubromaculatus</i>	Red spotted
HEMIPTERA	COCCOIDEA		Chinche nevada (snow bug)
HEMIPTERA	PENTATOMIDAE	<i>Brachystethus rubromaculatus</i>	Chinche de lunares rojos (red polka dot bug)
HEMIPTERA	APHIDIDAE		Pulgón (aphid)
HYMENOPTERA	POMPILLIDAE		Blue wasp
HYMENOPTERA	FORMICIDAE	<i>Atta cephalotes</i> Linnaeus.	Zomposos
HYMENOPTERA	APIIDAE		Meliponas
HYMENOPTERA	VESPIDAE		Avispas (wasps)
LEPIDOPTERA	NYMPHALIDAE	<i>Dione juno</i> Hubner.	Orange Juno
LEPIDOPTERA	NYMPHALIDAE	<i>Heliconius charithonia</i> Linnaeus.	Mariposa cebra (zebra butterfly)
LEPIDOPTERA	NYMPHALIDAE	<i>Heliconius erato</i> Linnaeus	Heliconius
LEPIDOPTERA	PIERIDAE	<i>Phoebis</i> sp. Hubner.	Foebis
LEPIDOPTERA	***	***	Larvas de mariposas (caterpillar)
LEPIDOPTERA	NYMPHALIDAE	<i>Heliconius ismenius</i> Latreille	Mariposa tigre (tiger butterfly)
LEPIDOPTERA	NYMPHALIDAE	<i>Morpho</i> sp.	Morfo
LEPIDOPTERA	NYMPHALIDAE	<i>Dryas iulia</i> Fabricius.	Julia
LEPIDOPTERA	NYMPHALIDAE	<i>Anartia fatima</i> Fabricius.	Cocinera
LEPIDOPTERA	LYCAENIDAE	<i>Eumaeus toxea</i>	Mariposa negra con naranja (black and orange butterfly)
LEPIDOPTERA	NYMPHALIDAE	<i>Caligo</i> sp.	Mariposa búho

ORDER	FAMILY	SPECIES	COMMON NAME
LEPIDOPTERA	SATURNIIDAE		Mariposa nocturna (night butterfly)
LEPIDOPTERA	PAPILIONIDAE	<i>Papilio</i> sp.	Papilio
ODONATA	LIBELLULIDAE	<i>Libellula herculea</i> Karsch.	Mantis parda (Brown mantis)
ODONATA	COENAGRIONIDAE	<i>Argia</i> sp.	Caballito del diablo azul (blue damselfly)
ODONATA	COENAGRIONIDAE		Caballito del diablo azul
ODONATA	LIBELLULIDAE		Libélula (dragonfly)
ORTHOPTERA	TETTIFONIDAE		Grillos (cricket)
ORTHOPTERA	PYRGOMORPHIDAE		Saltamontes cono (cone grasshopper)
ORTHOPTERA	ROMELEIDAE	<i>Taeniopoda</i> sp.	Chapulín, langosta (locust)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

ARACHNIDS

THOMISIDAE, Cerro San Gil, Municipality of Livingston
Photograph by: Haniel López, FLAAR Mesoamerica.



LIVINGSTON

Insectos y Arácnidos



ARACHNIDS

FAMILY	SPECIES	COMMON NAME
ARANEIDAE	<i>Micrathena</i> sp.	Araña cornuda (horned spider)
ARANEIDAE	<i>Trichonephila clavipes</i>	Araña tejedora (weaver spider)
CTENIDAE	<i>Cupiennius salei</i> Keyserling.	Araña errante (wander spider)
SALTICIDAE	<i>Colonus sylvanus</i> Hentz.	Araña saltarina (jumping spider)
SCLEROSOMATIDAE	<i>Leiobunum</i> sp.	Opilión
THERAPHOSIDAE		Tarántula
THOMISIDAE	<i>Epicadus</i> sp.	Araña cangrejo (Crab spider)
TROMBIDIIDAE		Acaro rojo (red mite)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

AMPHIBIANS

Incilius sp., Tapón Creek, Municipality of Livingston
Photograph by: Alejandra Gutiérrez , FLAAR Mesoamérica.



AMPHIBIANS

FAMILY	SPECIES	COMMON NAME
BUFONIDAE	<i>Incilius</i> sp.	Sapo rojizo (Red toad)
BUFONIDAE	<i>Incilius</i> sp.	Sapo gris (Gray toad)
BUFONIDAE	<i>Incilius</i> sp.	Sapito manchado (Spotted toad)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

FISHES

***Astyanax* sp.**, Río Bonito, El Golfete, Municipality of Livingston
Photograph by: Víctor Mendoza, FLAAR Mesoamerica.

LIVINGSTON

Peces y Crustaceos



FISHES

FAMILY	SPECIES	COMMON NAME
CHARACIDAE	<i>Astyanax</i> sp.	Pepesca
CICHLIDAE	***	Mojarrita de río
LUTJANIDAE	***	Cubera

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

MOLLUSKS

GASTROPODA, Río Dulce, Municipality of Livingston
Photograph by: Alejandra Gutiérrez, FLAAR Mesoamerica.



LIVINGSTON

Peces y Crustaceos



MOLLUSKS

FAMILY	SPECIES	COMMON NAME
PACHYCHILIDAE	<i>Pachychilus</i> sp.	Jutes
PACHYCHILIDAE	<i>Pachychilus</i> sp.	Caracol de agua dulce (Fresh water snail)
STROMBIDAE	<i>Strombus</i> sp.	Caracol burrito (Burrito snail)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

CRUSTACEANS

Cardisoma guanhumi, Playa Blanca, Municipality of Livingston
Photograph by: Nicholas Hellmuth, FLAAR Mesoamerica.

LIVINGSTON

Peces y Crustaceos



CRUSTACEANS

FAMILY	SPECIES	COMMON NAME
DECAPODA	***	Cangrejo naranja café (Brown orange crab)
GECARCINIDAE	<i>Cardisoma guanhumi</i> Latreille.	Cangrejo azul (Blue crab)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

MAMMALS

Artibeus lituratus, Tapón Creek, Municipality of Livingston
Photograph by: Alejandra Gutiérrez, FLAAR Mesoamérica.



LIVINGSTON

Diversidad

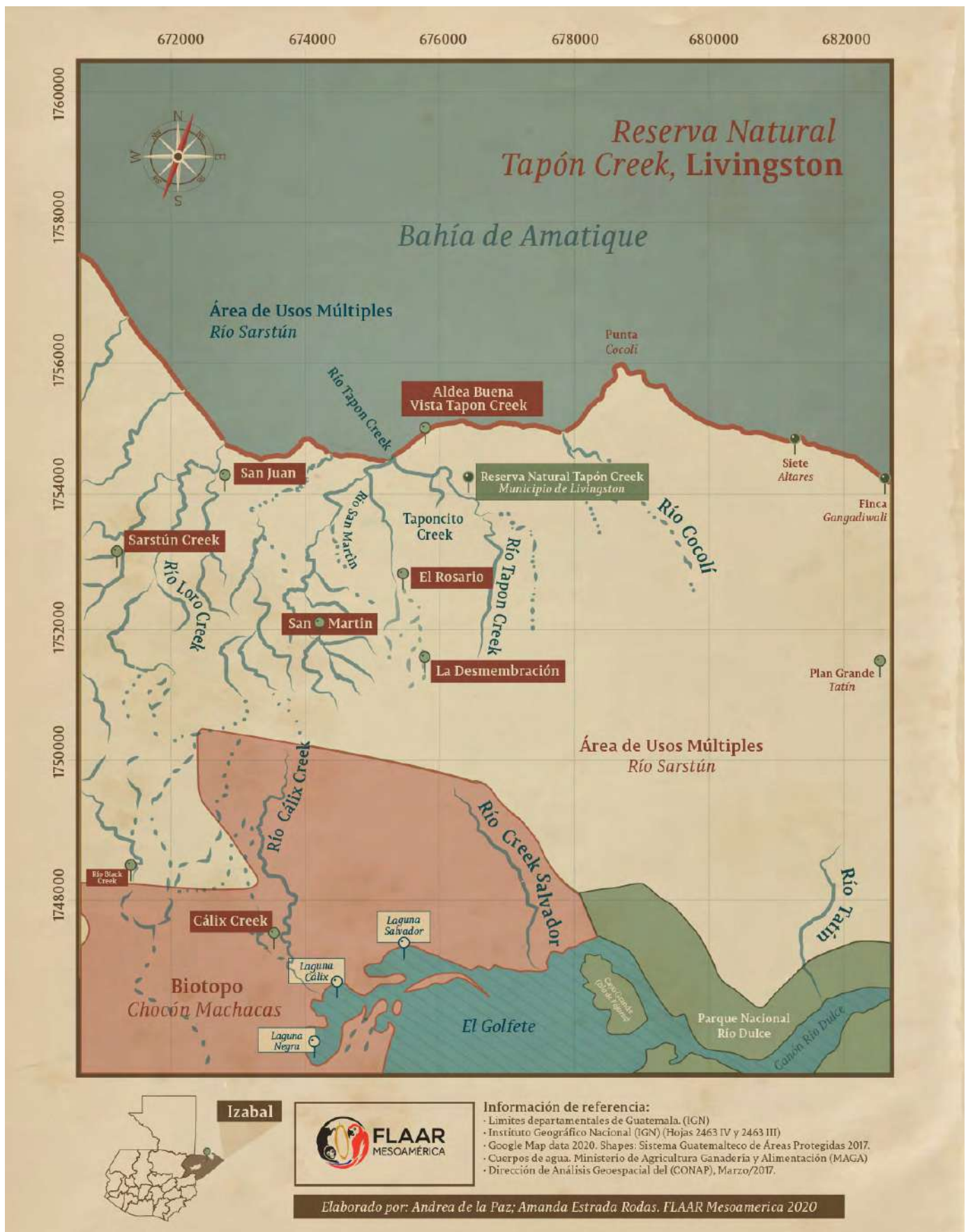


MAMMALS

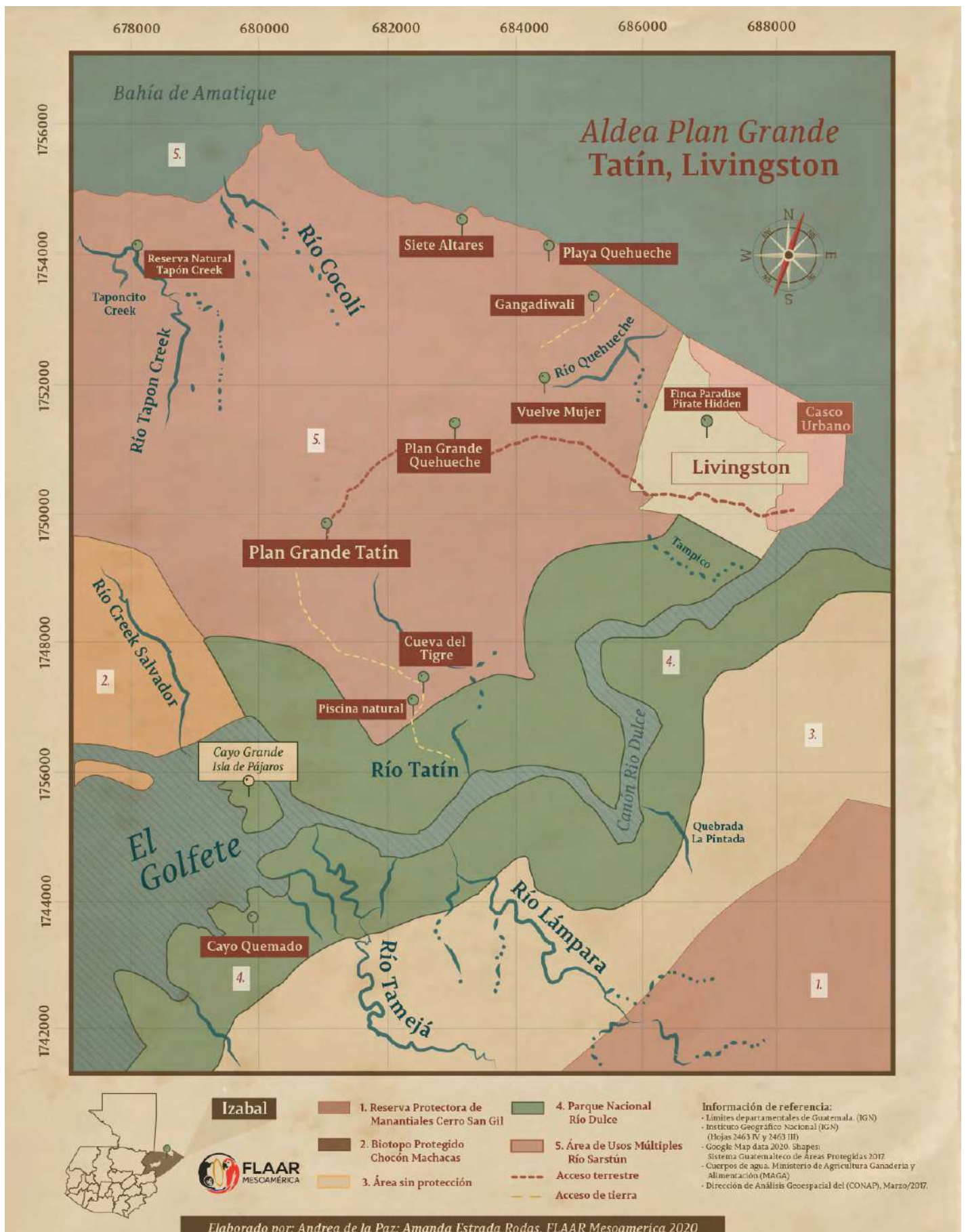
FAMILY	SPECIES	COMMON NAME
EMBALLONURIDAE	<i>Rhynchonycteris naso</i>	Murciélago rayado (Striped bat)
PHYLLOSTOMIDAE	<i>Artibeus lituratus</i>	Murciélago (bat)
ATELIDAE	<i>Alouatta palliata</i>	Mono aullador de manto dorado (Golden-mantled howler monkey)
SCIURIDAE	<i>Sciurus</i> sp.	Ardilla pecho rojo (red breasted squirrel)
DELPHINIDAE	<i>Tursiops truncatus</i>	Delfín nariz de botella (Bottle nose Dolphin)

Source: (Mendoza, V. & Hurtado, V., FLAAR Mesoamérica, 2022)

For more information on the lists of documented species and/or photographs of species, contact the email:
botany-zoology@flaar.org



Map 2. Study areas for the biodiversity documentation project in Tapón Creek, Área de Usos Múltiples Río Sarstún, municipio de Livingston.



Map 3. Study areas for the biodiversity documentation project in the area of Área de Usos Múltiples Río Sarstún, La Buga Livingston, Plan Grande Tatín y El Golfete del Parque Nacional Río Dulce, municipio de Livingston.



Map 4. Study areas for the biodiversity documentation project in Parque Nacional Río Dulce, El Golfete, Lago de Izabal, Castillo de San Felipe, municipality of Livingston.

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

Flor de María Setina is the office administrator, she oversees several projects around the world (since FLAAR-REPORTS has been researching large format printers around the world for more than 20 years. We also use these types of printers to produce educational material to donate to schools. In a poster we can show an entire ecosystem instead of a book)

Vivian Díaz is the coordinator of flora and fauna projects (field work, publications, results and reports for botanists, zoologists, ecologists, and university students). We also use our publishing expertise to produce children's books on ecological rescue for educational projects in schools in remote areas of Guatemala.

Victor Mendoza identifies plants, fungi, lichens, insects and arachnids. When his college schedule allows, he also likes to participate in wildlife research field trips.

Vivian Hurtado prepares the bibliography for each topic and downloads relevant research material for our electronic flora and fauna library. We all use these two downloads plus our internal library of Mesoamerican flora and fauna (from Mexico to Guatemala and Costa Rica).

Andrea de la Paz is a graphic designer who helps propose art for the overall template and for aspects of our posts.

Senaida Ba photography assistant for many years. She knows Canon, Nikon and is learning about the new Canon R5 mirrorless and our four new Sony mirrorless cameras. She prepares, packs, sets up and assists the photographers before, during and after each day's outing.

Jaqueline González is a designer who diagrams text and photos to create the actual reports.

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

María Alejandra Gutiérrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens to photograph small insects, flowers, and fungi. Her work during and after a field trip also includes sorting, naming, and photo processing. And then supplement the reports in PDF format.

David Arrivillaga is an experienced photographer and can handle both Nikon and the latest Sony digital cameras. His work during and after a field trip also includes sorting, naming and processing.

Juan Carlos Hernández receives the material we write and puts it into Internet software to produce our web pages.

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

Valeria Áviles is an illustrator for MayanToons, a division in charge of educational material for schools, especially the Mayan Q'eqchi' schools in Alta Verapaz, Q'eqchi' and Peten Itza Maya in Peten, and the Mayan and Garífuna Q'eqchi' schools in the Municipality of Livingston, Izabal.

Josefina Sequén is an illustrator for MayanToons and also helps prepare illustrations for social media posts and animated videos.

Rosa Sequén is an illustrator for MayanToons and also helps prepare illustrations for social media posts and animated videos

Laura Morales prepares animated videos in the style of MayanToons, as animated videos are the best way to help schoolchildren protect fragile ecosystems and endangered species.

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

Maria José Rabanales She has been part of the Flora y Fauna photographic reportage and educational material editing team since September 2020. She works together with others in the team to prepare the finished pdf editions of the Yaxhá Nakum Naranjo Project material.

Alejandra Valenzuela Biology student has been part of the editing team of photographic reports and educational material of Flora and Fauna since September 2020.

Alexander Gudiel designer who join the editorial design team in December 2020. He will combine the text, images, and maps in the editorial criteria of FLAAR Mesoamerica.

Cristina Ríos design student who joins the editorial design team in December 2020. Will combine text, images, and maps in the editorial criteria of FLAAR Mesoamerica.

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

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

Diana Sandoval: Agricultural engineer, plant lover and botanical enthusiast. As part of the flora and fauna research team, her work is based on the collection of scientific information that shapes the reports that are posted on our pages.



FLAAR Mesoamerica team in the field. From left to right Haniel López, Víctor Mendoza, Vivian Hurtado, Víctor Castillo, Valeria Aviles, Roxana Leal, Nicholas Hellmuth, Senaida Ba, David Arrivillaga, Lucas Cuz. Place: Plug Creek Reserve



FLAAR Mesoamerica team in the field. From left to right: David Arrivillaga, Haniel López, Lucas Cuz, Víctor Mendoza, Roxana Leal, Vivian Hurtado, Nicholas Hellmuth, Víctor Castillo, and Senaida Ba. Place: Cerro Sartún.



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