



European Union

dwb ecology



# Forest Types of Suriname

**Savanna Forests and Savannas**

Based upon the knowledge of Frits van Troon

**Manual**

**#4**





Low Savanna Forest or Tikitiki Busi – Thicket to wood, few herbs, mostly shrubs and trees 5-15 meters tall (sabanamangro, blakaberi, swa-udu)



Frits van Troon

Savanna (Coesewijne type) – grassland with scattered treelets (lontukasi, sananakasju, sabanaboskers, sabanabortri)

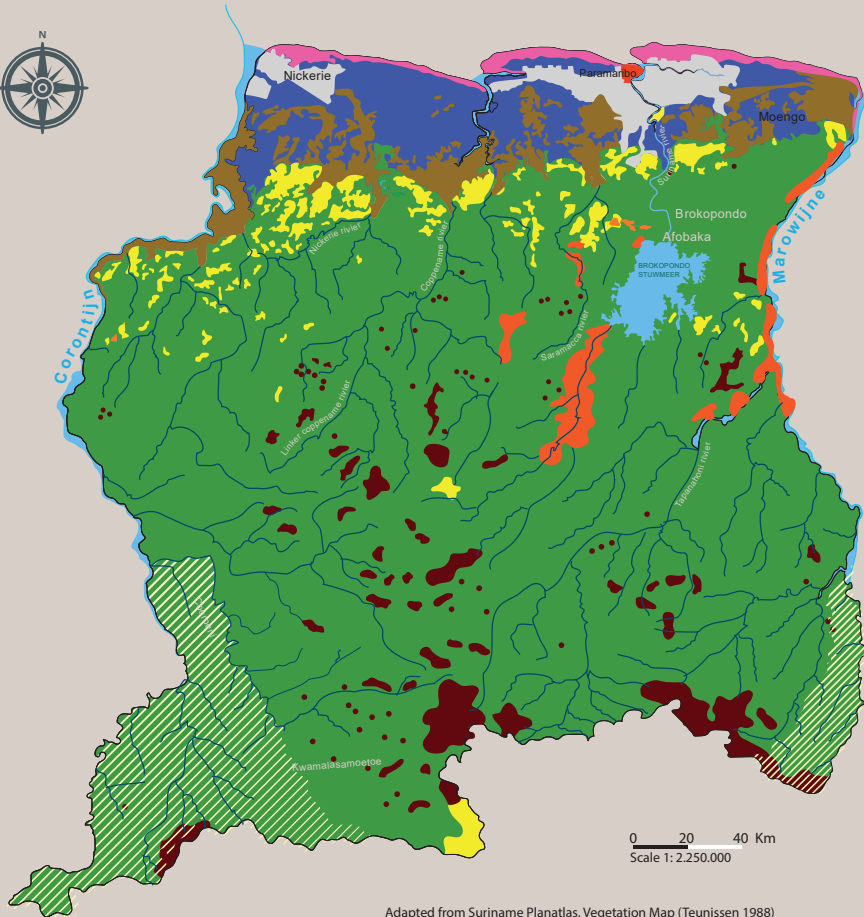




Savanna Marsh Forest (Morisi + Blakaberi)  
and wet 'Zanderij'-type savanna



High Savanna Forest, few herbs, mostly trees,  
canopy 25-30 (35) meters tall. Trees include both  
high dryland and savanna forest species



## Forest Types of Suriname

- Coastal Plain Mangrove Forest w/ brackish lagoons and herbaceous brackish swamps
- Coastal Plain Swamp Forest w/ herbaceous freshwater swamps
- Coastal Plain Marsh Forest w/ high dryland forest
- Savanna-areas Savanna Forest & Savanna
- Guiana Shield Secondary Forest
- Guiana Shield High Dryland Forest
- Guiana Shield Mountain Forest (> 500 m)
- Sipaliwini-savanne Sipaliwini Savanna (at border with Brazil)
- Urban area, agricultural land and abandoned plantations
- Disputed area

This training manual and map is one of a series in the Forest Types of Suriname project conducted with Mr. Frits van Troon. Please refer to the Introductory Manual of the series for more information.





## The Zanderij Belt

South of Suriname's 'Coastal Plain' mangroves, freshwater swamp and marsh forests (Manuals 1-3), lies the Zanderij Belt or Savanna Belt formation (See Suriname map, p.4). The "Belt" is made up of deep deposits of white and brown sand (Pleistocene Epoch, 2-5 Mya) and covers approximately 5% of Suriname's land area. It is 10-50 km wide - with higher hills to the southwest (50-100 meters) and gentler slopes on the central-northeastern side (10-50 meters). Traveling south of the Zanderij Belt, one encounters tall rainforest with laterite soils. This is where the geological formation known as the Pre-Cambrian Guiana Shield begins - commonly referred to in Suriname as "The Interior" or the "Hill Country" (Manuals 5-9). Savannas in southern Suriname may look similar to more northerly savannas, but are developed on Guiana Shield basement soils.

The typical Zanderij Belt landscape (visible near Suriname's J.A. Pengel International Airport) is easily recognized - with bleached white sands, black water 'Cola' creeks, scrubby tree thickets, open savanna, and Morisi palm marshes. However, only seven percent of the Belt is covered by these conspicuous 'open' savanna areas. The remaining lands include various forms of xerophytic (dry) savanna forest and wood (explained below), marsh forests, and high dryland forest on brown sands or even loamy soils. We focus here only upon the savanna and savanna forest ecosystems.



High Savanna Forest

## What are Savannas and Savanna Forests?

Ecosystems with 'xerophytic' woody plants - adapted to the rapid drainage and low nutrients of sandy soils.

A **savanna** is a mixed woodland-grassland ecosystem characterised by the trees being sufficiently widely spaced so that the canopy does not close. The open canopy allows sufficient light to reach the ground to support an unbroken herbaceous layer consisting primarily of grasses. Savannas are typical in the Sahel or Eastern Africa, some savannas occur in the Brazilian cerrado.

In Suriname, real savannas (mixed trees/grasslands) are scarce, and mostly confined to the South (Sipaliwini savannas). Most of the ecosystems in the Zanderij Belt are xerophytic woodlands known in Suriname as 'savanna forests', with some 'real' savannas (called orchard savanna in Suriname) and open grasslands. Because deep, sandy soils drain water away from the reach of roots, the plants of these ecosystems must be able to survive long periods

of water stress. By contrast, 'wet' marsh savanna forests occur where an impermeable "hardpan" layer exists in the soil and causes water to pool. Plants in these ecosystems must survive alternating conditions of too much water or too little water.

In this manual we cover the following vegetation types: savanna (the orchard type with shrubs or treelets), low savanna forest, high savanna forest and marsh savanna forest (often adjoining wet savanna).



Marsh and Savanna Marsh Forest



## What are Savannas and Savanna Forests?

Ecosystems with 'xerophytic' woody plants - adapted to the rapid drainage and low nutrients of sandy soils.

High (or tall) savanna forests are often composed of mixed-species with two canopy levels. The upper canopy includes species that also occur in adjoining tall dryland forest (mesophytic) – (e.g., basralokus, kopie, wana, tingimoni, kwari) – while the lower canopy is composed of xerophytic species that dominate in low savanna forest and woodland. In some cases, high savanna forests are dominated by one or two species. Examples include: dakama forest (*Dimorphandra conjugata*), wallaba forest (*Eperua falcata*), and dakama / sabana-ijzerhout forest. (*D. conjugata* + *Swartzia bannia*).

Low savanna forests or 'tiki-tiki busi' are usually mixed species, but with much lower diversity than high savanna forests. Examples of tree species include sabana-mangro, sabana-fungu, and sabana-katun. The 'Orchard-type' savannas are typically dominated by grasses, sedges, and herbs and dotted with gnarled trees or shrubs such as lontukasi and sabana-kadju. In wetter areas, marsh savanna forest is common - with a canopy of morisi palms and blak-bereri, and a dense understory of hydrophytic shrubs and herbs,.



Dakama forest

## Ecology

**Fire:** Although the role of fire is often only noticed when forests are burning, its current and historical influence upon ecosystems is profound. In the Zanderij belt landscape, some ecologists predict that if fire were suppressed, most of the open savanna areas would slowly transition into intermediate 'orchard' savanna, and then into closed-canopy savanna forest.

Tall savanna forest today includes species from savanna, marsh forest and high dryland forest.

Such successional processes are rarely completed, however, due to fire and both natural and human-caused disturbances. The presence of large stands of Dakama trees (*Dimorphandra conjugata*) or Morisi palms (*Mauritia flexuosa*) is often an indicator of frequent burning as these are fire-resistant species that outsurvive others. Trees close to creeks may survive burning events and form 'gallery forests'

that run along creeks within otherwise open savanna grasslands. If fires are very rare, this can result in the building up of flammable leaf litter and a bigger fire and more severe impact (dying trees) when fires do occur. One traditional method of fire control is to make small controlled burns in the wet season to avoid large, uncontrollable fires in the dry season.

**Convergent Evolution.** It is common around the world that plants in extreme habitats have evolved with a similar 'look' because they have found similar ways to survive and to conserve water and nutrients. Plants unable to adjust to such harsh conditions would quickly die out locally. This explains why so many woody plants in the Zanderij Belt appear to be shorter, more twisted and with thicker leaves than their relatives in swamp, marsh or high dryland forests.





## Some Key Species of Savanna Forests and Savannas



'Orchard-type' savanna



## Medium to Large Trees in High Savanna Forest

- Blakaberi - *Humiria balsamifera* (shrubs to medium trees)

- Busi Amandra - *Terminalia amazonia* (medium to large trees)

- Dakama - *Dimorphandra conjugata* (shrubs to large trees)

- Rode Fungu - *Parinari campestris* (medium to large trees)

- Wallaba - *Eperua falcata* (medium to large trees)

## Large Shrubs/Treelets in Savanna & Low Savanna Forest

- Lontukasi - *Byrsonima crassifolia* (shrubs to small trees)

- Sabana-boskers - *Eugenia patrisii* (shrubs to small trees)

- Sabana-fungu - *Licania incana* (shrubs to small trees)

- Sabana-kasju - *Curatella americana* (shrubs to small trees)

- Sabana-katun - *Pachira flaviflora* (shrubs to medium trees)

- Sabana-mangro - *Clusia nemorosa* (shrubs to small trees)

- Swa-udu - *Ternstroemia spp* (shrubs to small trees)



## Palms

- Morisi

- *Mauritia flexuosa* (wet savanna forest)

## Small Shrubs / Herbs

- *Amasonia campestris* (herb, dry savanna)

- Anansiwaiwai

- *Rapatea paludosa* (herb; wet savanna forest)

- Bandjapasi

- *Tibouchina aspera* (shrub, dry savanna)

- Bladderwort

- *Utricularia* spp. (herb, wet savanna)



# Blakaberi

## *Humiria balsamifera*

### Humiriaceae

Dense and low shrubs or 10-30 m tall trees. Occurring in diverse habitats - savanna forest, savanna, wet sites and well-drained sandy sites.

- 1 Bark fissured, sap colorless, with sweet scent.
- 2 Leaves alternate, simple, without leaf-stalk, immature leaf rolled up and pointed (like a cigarette - FvT).
- 3 Flowers small, tubular, yellowish-white
- 4 Fruits ovoid, green to black, to 1.6 cm long, with sweet, edible pulp.





## Busi-amandra *Terminalia amazonia* Combretaceae

Tree 20-35 (70) m tall, 30-150 cm diameter, trunk straight, round, with broad plank buttresses. Bark greyish-brown, fissured, does not peel easily. Inner bark yellow, with sweet scent. Leaves alternate, often in tight clusters, simple.

- 1 Lateral branches forming distinct horizontal layers - pagoda-like.
- 2 Each branchlet curving upwards with a leaf cluster at tip.
- 3 Flowers, small, petals absent.
4. Fruiting branches, each fruit papery, 2-winged.





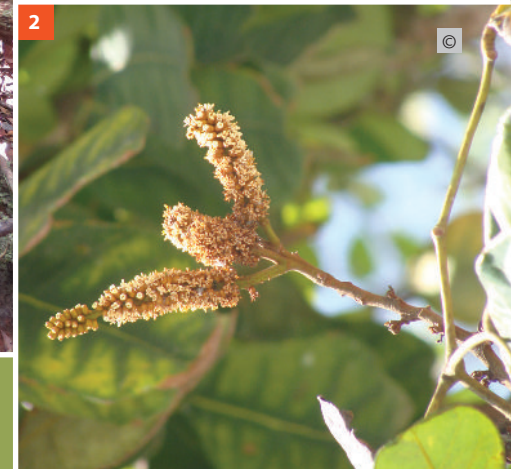
# Dakama

## *Dimorphandra conjugata*

Fabaceae

Shrubs and treelets in low savanna forest or savanna; also medium-sized trees to 30 m tall in "Dakama Forest" with thick fallen leaf layer. Bark grey-brown, fissured, slash without colored sap.

- 1 Leaves alternate, 2x-pinnate compound, leaflets thick, oval, looking like cashew tree leaves.
- 2 Flowers in spikes, whitish-yellow. Fruit - a leathery pod, to 20 x 4 cm, flat and sickle-shaped (similar to wallaba).





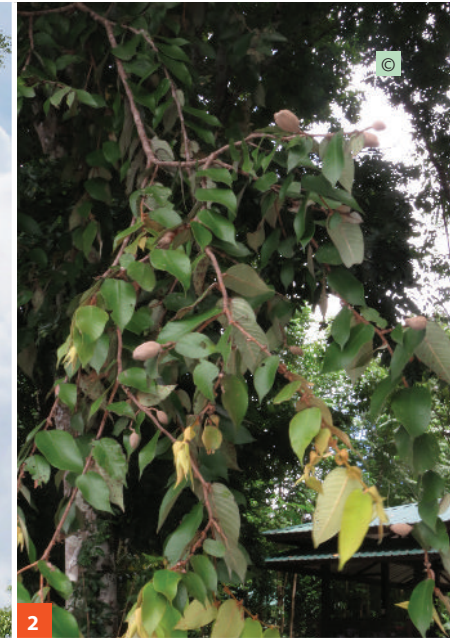
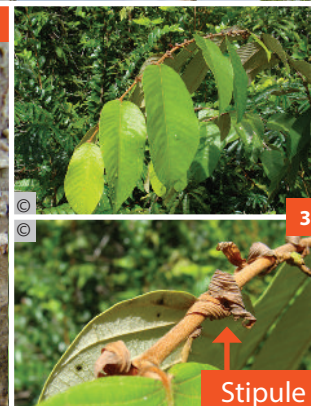
# Rode fungu

## *Parinari campestris*

### Chrysobalanaceae

Common tree in dry and wet forest types; 20-40 m tall x 40-70 cm diam., buttresses present.

- 1 Light-colored bark, hard, with conspicuous lenticels (bumps)
- 2 Branches drooping downwards, Older leaves curled, yellowish-brown, looking dried-out
- 3 Leaves alternate, simple, with large curled stipules (see photo) and red hairs.

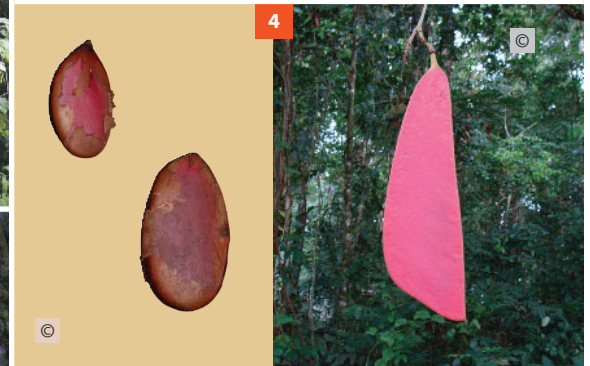




## Wallaba, Biri-Udu *Eperua falcata* Fabaceae

Common tree in dry and wet forest types; 15-40 m tall x 20-100 cm diam.

- 1 Bark brown to brown-grey, thick, rough, sap clear and sticky.
- 2 Leaves alternate, pinnate-compound, with 4-8 leaflets.
- 3 Inflorescence (flowers) hanging on cord from branches, 0.5-2.5 meters.
- 4 Fruit pods hanging on cords, sickle-shaped (bi-udu), red turning woody, to 36 x 10 cm, releases seeds explosively.





# Lontukasi

## *Byrsonima crassifolia*

Malpigiaceae

Shrubby savanna tree to 10 m tall.

- 1 Leaves opposite, simple, leathery.
- 2 Flowers yellow, petals with narrow stalks, pairs of "oil glands" visible below, hairs reddish-brown.
- 3 Fruits round, to 0.8 cm diam., bearing oil glands below, maturing yellow, pulp edible..





## Sabana-boskers *Eugenia patrisii* Myrtaceae

Trees and treelets to 15 m tall. Cut trees usually regrow from same stem. Leaves opposite, simple, with tiny clear dots visible in blade (hold to light), aromatic when crushed. Leaf side veins end before leaf edge (FvT calls these 'stop-nerves'). Fruit bright red, to 2.5 cm diameter, edible, with one seed.





# Sabana-fungu

## *Licania incana*

### Chrysobalanaceae

Shrub or (rarely) a tree to 10 m. Endemic to savanna forest and dry savannas. Bark grey, shattering upon cutting, non-peeling, slash dry, without colored sap. Leaves alternate, simple. Inflorescence spikes 4-12 cm long, flowers tiny. Fruits oval to round, to 3 x 3.5 cm, hairs reddish-brown.



© D. Plouvier



Young shoots and leaves white



Flowering and fruiting branch



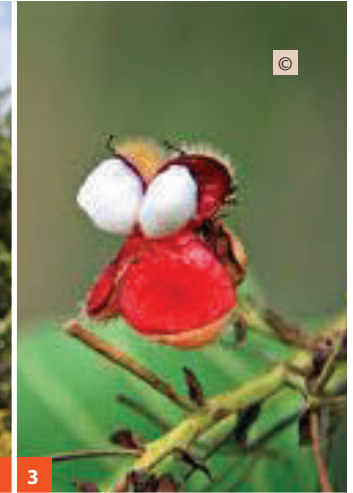
# Sabana-kasju

## *Curatella americana*

### Dilleniaceae

Shrub or tree to 6 m tall (brown sand savanna along Para River, also Coesewijne, Tibiki), Fire resistant.

- 1 Leaves alternate, simple, large, leathery, rough-surfaced, margins often toothed or spiny.
- 2 Flowers showy, with many white stamens.
- 3 Fruit capsule - red inner wall, white pulp (aril) around black seed.

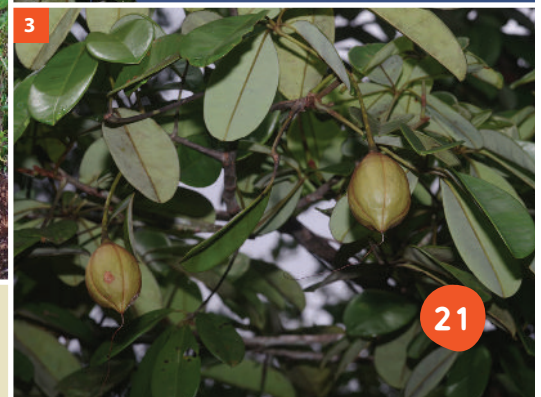




## Sabana-katun *Pachira flaviflora* Malvaceae

Shrub to treelet in white sand savanna, usually solitary (FvT says it plays 'bigi bos'). Large tree in savanna forest. Fire resistant.

- 1 Leaves alternate, palmate-compound (hand-shaped with 5-7 thick leaflets), often light-colored below.
- 2 Large flower with recurved petals and showy stamens.
- 3 Fruits yellowish-brown, w 5-vertical grooves, 6-10 cm long





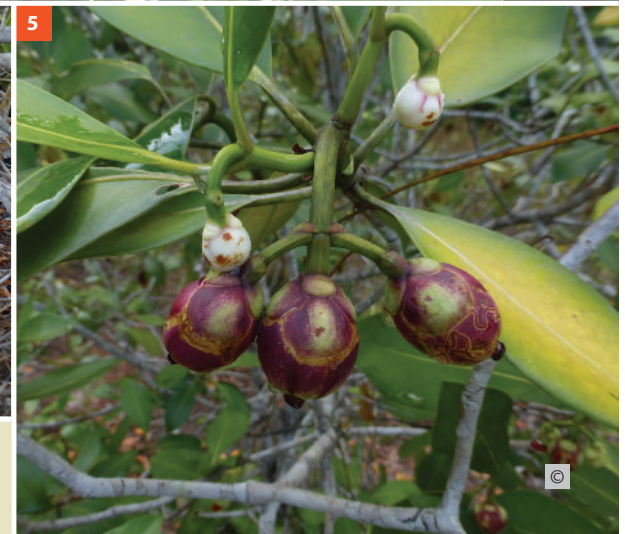
# Sabana-mangro

## *Clusia nemorosa*

### Clusiaceae

Trees to 15 m, shrubs forming thickets or climbers (hemi-epiphyte).

- 1 Leaves opposite, simple, fleshy
- 2 stilt roots present.
- 3 All cut parts with yellow sticky sap.
- 4 Female flower. One of only families with resin-producing flowers
- 5 Fruits green to purplish, ovoid, to 3 x 3.5 cm, splitting to reveal many reddish-orange, sticky seeds.





**Swa-udu**  
***Ternstroemia* spp.**  
**Pentaphylaceae**

- 1 *Ternstroemia dentata* (upper left). Tree to 15 m tall. Leaves alternate, simple, fleshy, pointed.
- 2 *Ternstroemia punctata*, shrub or tree to 6 m tall. Leaves alternate, simple, spoon-shaped, fleshy, w/ brown dots on blade below.
- 3 Flowers and fruits of *T. punctata*.





**Morisi palm**  
*Mauritia flexuosa*  
Arecaceae

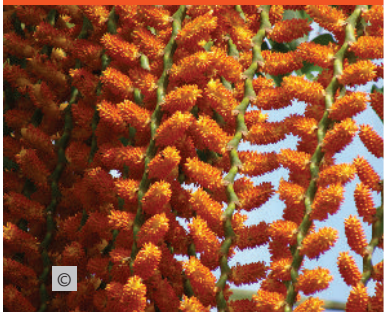
Spineless palm growing often in large stands in wet areas, trunk 15-35 m tall, smooth, ringed with old leaf scars. Fruit at maturity w/ brown-red scales, to 4.5 cm diameter, flesh orange.



Juvenile plants



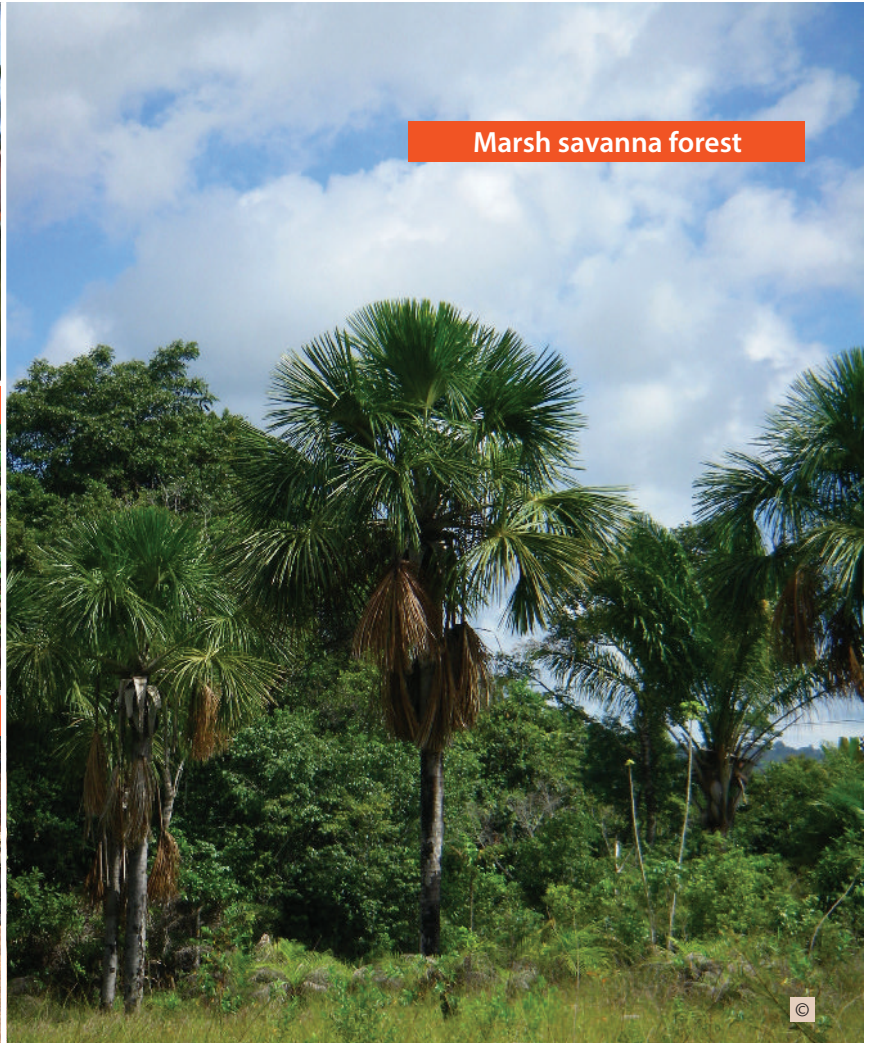
Male inflorescence



Fruits (edible)



Marsh savanna forest





## *Amasonia campestris* Lamiaceae

Common herb in open savanna and savanna forest edges. Leaves opposite, simple. Inflorescence with red bracts and yellow tubular flowers. Poisonous for cows.



All © Christian Feuillet





## Anansiwaiwai *Rapatea paludosa* Rapateaceae

Small monocot herb growing in marsh savanna forest and other wet forest types. Leaves strap-like, leaf-bases producing a clear slimy gel. Flowers 3-parted, yellow, delicate.





**Bandjapasi**  
***Tibouchina aspera***  
**Melastomataceae**

Sub-woody herb in open savanna. Leaves opposite, simple, 3-veined, leathery. Flowers large, pink, with white stamens.





**Bladderwort**  
*Utricularia* spp.  
Utriculariaceae

Small carnivorous herb,  
common in open wet  
savanna and bogs.  
Leaves at the base  
produce traps that  
capture tiny aquatic  
animals.







## Threats to Savanna Forests

- Savanna forests are one of the most threatened ecosystems in Suriname due to their relatively small area (5% of Suriname) and close proximity to urban development and resource extraction activities.
- **Deforestation and Forest Degradation.** The clearing of forest for logging, agriculture, settlements, roads and other infrastructure continues to significantly threaten the integrity of this forest type.
- **Sand-mining** has degraded and deforested **some** open areas in the Zanderij Belt.
- Wildfire is a major threat to Savanna forests. Although many tree species are fire resistant (e.g., Dakama forest), repeated burning can degrade or destroy savanna forest stands.
- Climate change is a threat through the direct impact of extreme weather events (drought, fire, flood) or, indirectly, by increasing vulnerability to human impacts.



“Kibri a savanna busi lek  
a savanna busi kibri yu”







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