



Forest Types of Suriname

Swamp Forest

Based upon the knowledge of Frits van Troon

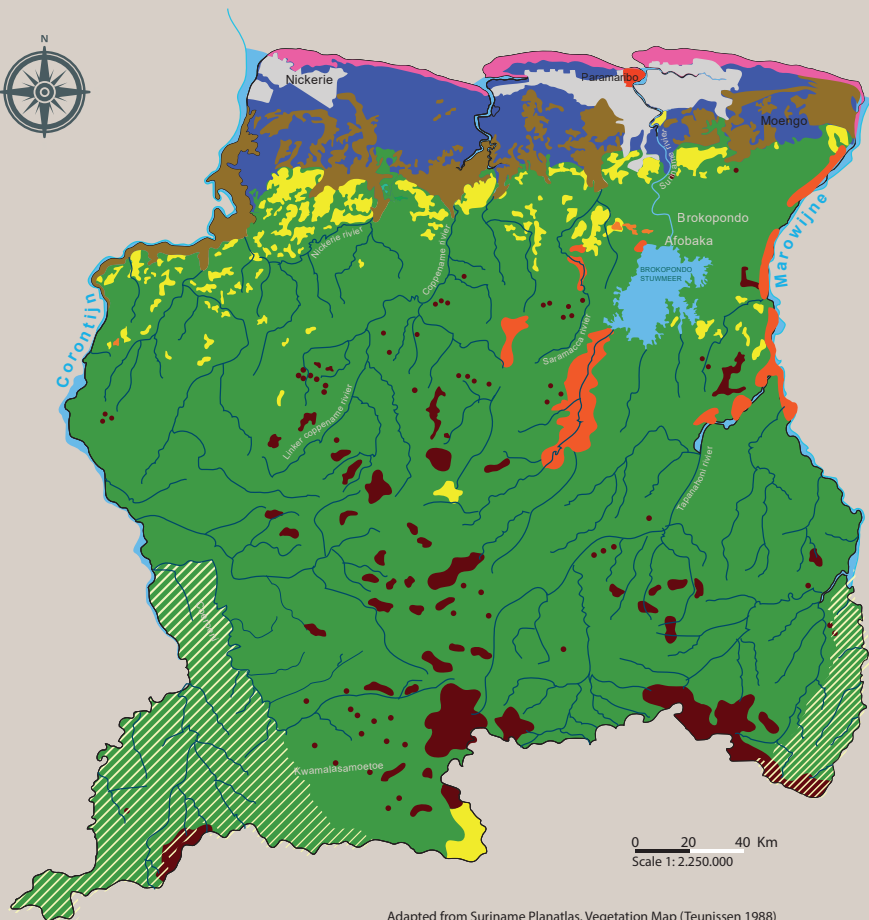
Manual
#2



Swamp Forest with mixed species



Learning about Swamp
Forest from Frits van Troon



Adapted from Suriname Planatlas, Vegetation Map (Teunissen 1988)

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.



Swamp Forest of the Young and Old Coastal Plain

Swamp forest is the major forest type zone occurring south of the mangrove forest zone presented in Manual 1 of this series (see forest types map). It covers approximately 10% of Suriname's land area, and dominates both the Young Coastal Plain (YCP, Holocene Epoch, < 10k years) and the Old Coastal Plain (OCP, Pleistocene Epoch, < 700k years). Swamp forest may occur south of the Coastal Plain – in the Zanderij Belt and Interior, but are less common and

not treated here. Vegetation sub-types present within the greater Swamp Forest zone include open (herbaceous) swamp, low swamp forest and high swamp forest.

Manual 3 in this series covers Marsh forest (e.g., seasonally flooded forest). In Suriname, the Swamp and Marsh forest zones of the Coastal Plain are not well-separated, but intergrade into one another in patchwork or mosaic pat-

terns (see the blue and brown colors in the forest types map). These patterns reveal environmental gradients (hydrology) and transitional stages between 'hydrophytic' (Swamp) and 'mesophytic' (Marsh) conditions (See De Dijn 2018, pp. 73-79). Marsh forest often occurs where swamp land transitions to dry land. See Table 1 for a general comparison of Swamp and Marsh forest trends.





Pina palm (*Euterpe oleracea*) swamp forest.

What are Swamp Forests?

Swamp Forest ecosystems exist under year-round fresh water flooding or at least water-logged soils. Soils within herbaceous and forested swamps commonly include clays, silty loam and, uniquely, peat (pegasse) from organic materials to more than 2.5 meters deep (See p. 10). Differences in soils, depth and duration of flooding, pre-existing plants and disturbances (e.g., fire, agriculture, land clearing) result in different kinds of swamp vegetation. Primary categories are herbaceous swamps, swamp scrub, low swamp forest (10-25 m), and tall swamp forest (15-35 m) - each category including sub-types of mixed or dominant species. Fresh-

water swamp forests are always composed of 'hydrophytic' tree species, but adjoining sandy ridges typically support marsh and upland forest species. In the absence of disturbance, a process of gradual ecological succession is expected - from open swamp to tall, closed-canopy swamp forest. However, disturbance is normal and most sites are a mosaic of different stages and species. Some dominant species of swamp forests are listed in Table 2.



Table 1. Swamp forest vs. Marsh forest - Defining characteristics

Swamp Forest (Manual 2) Young Coastal Plain (YCP) and Old Coastal Plain (OCP)	Marsh Forest (Manual 3) Mostly Old Coastal Plain (OCP), also Young Coastal Plain (YCP)
Soils	Soils
- Very poorly drained soil - clays, silty loams - Peat layer to 2.5 m deep (fallen leaves in stagnant, acidic water) - 'Kawfutu' or 'Hogwallow' structure absent (Page 3)	- Poorly drained soils – clays, silty loams - Peat layer absent (fallen leaves decomposing normally as 'leaf litter') - 'Kawfutu' or 'Hogwallow' structure present (Page 3)
Water	Water
- Flooded during rainy season - Soil water-logged during normal dry season	- Alternating flooded/non-flooded during rainy season - Soil moist, not water-logged during normal dry season
Biodiversity	Biodiversity
- Maripa palm absent; Pinapalm present - Species diversity greater than Mangrove Forest	- Maripa palm present; Pinapalm present - Species diversity greater than Swamp and Savanna Forest
Landscape Zones	Landscape Zones
- Common in both Young Coastal Plain and Old Coastal Plain	- Occurs primarily in Old Coastal Plain, extending into Young Coastal Plain, transition between swamp (hydrophytic) and dry land forests (mesophytic, xerophytic). South of the Coastal Plain, wetlands and creeks are considered part of "Riparian" ecosystems (Manuals 6-10).

Table 2. Ecosystem Diversity & Dominant Species

Swamp Forest (Manual 2)

Young Coastal Plain (YCP) and Old Coastal Plain (OCP)

1) Herbaceous Open Swamps

- Young Coastal Plain dominant species:
Langagrasi (*Typha domingensis*),
Prasorograsi (*Cyperus giganteus*),
Mokomoko (*Montrichardia arborescens*)
- Old Coastal Plain dominant species:
Large Sedges –prapragrasi (*Eleocharis spp.*),
twatwagrasi (*Lagenocarpus guianensis*, *Rhynchospora gigantea*)

2) Low Swamp Forest (incl. swamp scrub or wood)

- One Canopy Layer, 10-25 m, YCP, OCP
- Types:
 - a) Watrabebe (*Pterocarpus officinalis*) - Swampupanta (*Tabebuia insignis*)
 - b) Morisi dominant (*Mauritia flexuosa*);
 - c) Mira-udu dominant (*Triplaris weigeltiana*)
 - d) Zwamppruim (*Chrysobalanus icaco*) - Zwampzuurzak (*Annona glabra*)

3) High Swamp Forest

- Two Canopy Layers 25-35 m
- Types:
 - a) Shallow water swamp mix (mostly YCP)
(Babun – *Virola surinamensis*, Matak – *Symphonia globulifera*
Pinapalm – *Euterpe oleracea*)
 - b) Deep water swamp (mostly OCP) – low diversity
(Watrabiri – *Macrolobium bifolium*)
 - c) Low sand ridges (YCP/OCP)
(Ridge forest, Ritsbos, mixed species including marsh,
savanna, and dryland forest species)

Marsh Forest (Manual 3)

Mostly Old Coastal Plain (OCP), also Young Coastal Plain (YCP)

1) Marsh Forest

- Two Canopy Layers, 15-40 m
- Types:
 - a) Riverbanks, Creeksides (YCP and OCP)
 - b) Low clay flats (mostly OCP)
 - c) Low sand ridges (YCP and OCP)
(Ridge forest: mixed species from marsh forest, savanna forest,
and high, dryland forest.

2) Some Common Marsh Forest Tree and Palm Species

Trees

Barklak (*Eschweilera spp.*, *Lecythis spp.*)
Diya Ficus (*Ficus maxima*)
Groenhart (*Tabebuia spp.*)
Kankantri (*Ceiba pentandra*)
Krapa, redi (*Carapa guianensis*)
Krapa, weti (*Carapa procera*)
Mope (*Spondias mombin*)
Neku udu (*Alexa spp.*)
Possentri (*Hura crepitans*)
Sorosali (*Trichilia guianensis*)
Zwart Riemhout (*Micropholis guyanensis*)

Palms

Maripa (*Attalea maripa*)
Morisi (*Mauritia flexuosa*)
Pinapalm (*Euterpe oleracea*)



Ecology

Peat soil or “pegasse” forms when organic matter (fallen leaves, etc.) enters an oxygen-poor, acidic environment and doesn’t decompose completely. Freshwater, swampy sites with stagnant water provide these conditions and may produce thick layers of peat over long periods. Peat formation captures and stores high amounts of carbon from the plants.

Unlike laterite or sand, peat soils are vulnerable to burning in a dry season or drought event. Every year in Suriname, peat soil fires are set by local people when conditions allow. In shallow swamps, peat soils are thin, quickly drying and easily catch on fire. Such fires cause less long-term damage because they are superficial. In deeper swamps, peat layers are thicker, hold more water and do not catch fire easily. If fires do start under extreme drought conditions, however, they are more intense and can completely destroy swamp forest trees.

Larger peat soil fires are bad for two main reasons:

- 1 Great amounts of carbon are released, which contributes to global warming.
- 2 The barren landscape left behind allows invasive herbaceous species (e.g., langagrasi, *Typha domingensis*) an opportunity to dominate and inhibit the growth of shrubs and trees for years to come.

Some Key Species of Swamp Forests



Large Trees

- Laagland Babun - *Virola surinamensis*

- Kofmama - *Erythrina fusca*

- Mataki - *Symphonia globulifera*

- Mira-udu - *Triplaris weigeltiana*

- Watrabebe - *Pterocarpus officinalis*

- Zwamppanta - *Tabebuia insignis*

Palms

- Pinapalm - *Euterpe oleracea*

- Morisi - *Mauritia flexuosa* (See Manual 4 – Savanna Forest)

Smaller Trees, Shrubs, Lianas

- Borstel-lian - *Entada polystachya* - liana

- Watrabiri - *Macrolobium bifolium* - small tree

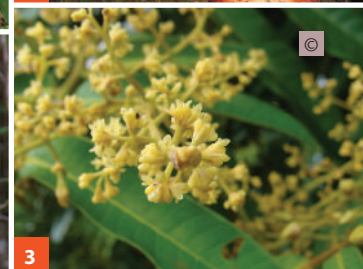
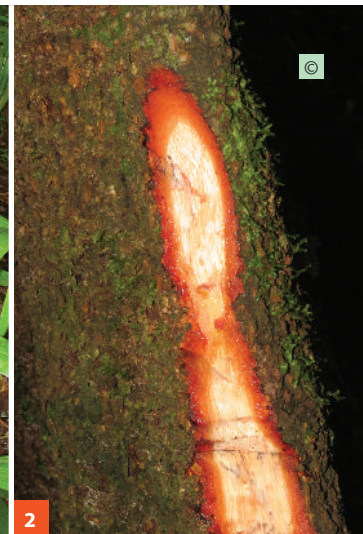
- Zwampprium - *Chrysobalanus icaco* - shrub/forming thickets

- Zwampzuurzak - *Annona glabra* - small tree

**Laagland
Babun
*Virola
surinamensis*
Myristicaceae**

Tree 20-40 m tall,
trunk 30-100 cm diam.
Branches horizontal,
pagoda-like. Often
growing with matakí
and pinapalm. Leaves in
2 rows, simple, alter-
nate, star-shaped hairs
present.

- 1 Buttresses high on trunk.
- 2 Slash fragrant, with red watery sap.
- 3 Flowers small, golden
- 4 Seed with red aril, nutmeg like..



Kofimama *Erythrina fusca* Fabaceae

Fire Resistant Species

Spiny tree 15-25 m tall with wide crown, support-roots (buttresses) spreading; in mixed swamp forest or dominant.

- 1 Flowering, leafless tree branches.
- 2 Bark soft and fissured, slash without colored sap, thick spines present.
- 3 Leaves alternate, tri-foliolate (3 leaflets).
- 4 spines on branchlets.
- 5 Flowers orange to red.



Mataki *Symphonia globulifera* Clusiaceae

Tree to 20 m tall;
present in swamp, marsh
and high, dryland forest.
Leaves opposite, simple,
dark green, thick.

- 1 Stilt roots present in
swamp forest, absent
in dryland forest.
- 2 Leaves dark green.
Flowers pale to dark
red.
- 3 Slash and all cut parts
with bright yellow,
sticky sap



Mira-udu or Drei-ten *Triplaris weigeltiana* Polygonaceae

Slender trees to 25 m tall, individuals either male or female (dioecious). Abundant in swamp and marsh forest. Bark thin, greyish-green, smooth, peeling. Hollow branches and twigs inhabited by stinging ants (*Pseudomyrmex* species).

- 1 Leaves alternate, simple, long.
 - a) Youngest leaf rolled up and pointed - "like a cigarette" (FvT).
 - b) Ring scars on branches.
- 2 3-winged propeller fruits.
 - a) white, immature;
 - b) brown, mature.

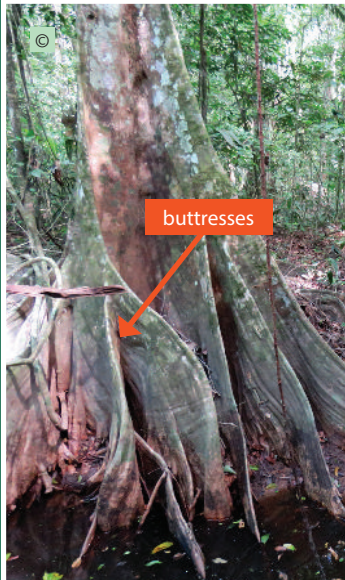
The dry season in Suriname is marked by the falling and twirling of the dry fruits, hence the name drei-ten (dry time).



Watrabebe *Pterocarpus officinalis* Fabaceae

Tree, to 20 m tall; trunk to 30 cm diam., often with long, thin, buttresses.

- 1 Bark grey, wood yellow or whitish, with abundant red sap
- 2 Leaves alternate, pinnate-compound, leaflets 5-9.
- 3 Flowers orange-yellow.
- 4 Fruit corky, flattened, winged, seed to 3 cm diam.
Genus name means "winged seed".



Zwamppanta *Tabebuia insignis* Bignoniaceae

Tree to 40 m tall in swamp or marsh forest (var. *monophylla*), also treelet in savanna forest. Bark fissured, light-brown-yellow, slash without colored sap. Leaves opposite. Flowers bright white, tubular. Fruit a capsule, ca. 15 cm long x 1.5 cm wide, seeds flat, with papery wings.

Tabebuia insignis var. *monophylla*



Leaves – opposite and simple

Tabebuia insignis var. *insignis*



opposite and palmate-compound





Pinapalm
Euterpe
oleracea
Arecaceae

Mixed swamp forest
Pinapalm-Mataki-Baboen swamp forest
Pinapalm swamp forest; Creek forest in interior

Pinapalm
Euterpe oleracea
Arecaceae

Palm to 20 m tall,
many-stemmed,
each stem
10-18 cm
diameter,
rings
inconspicuous.

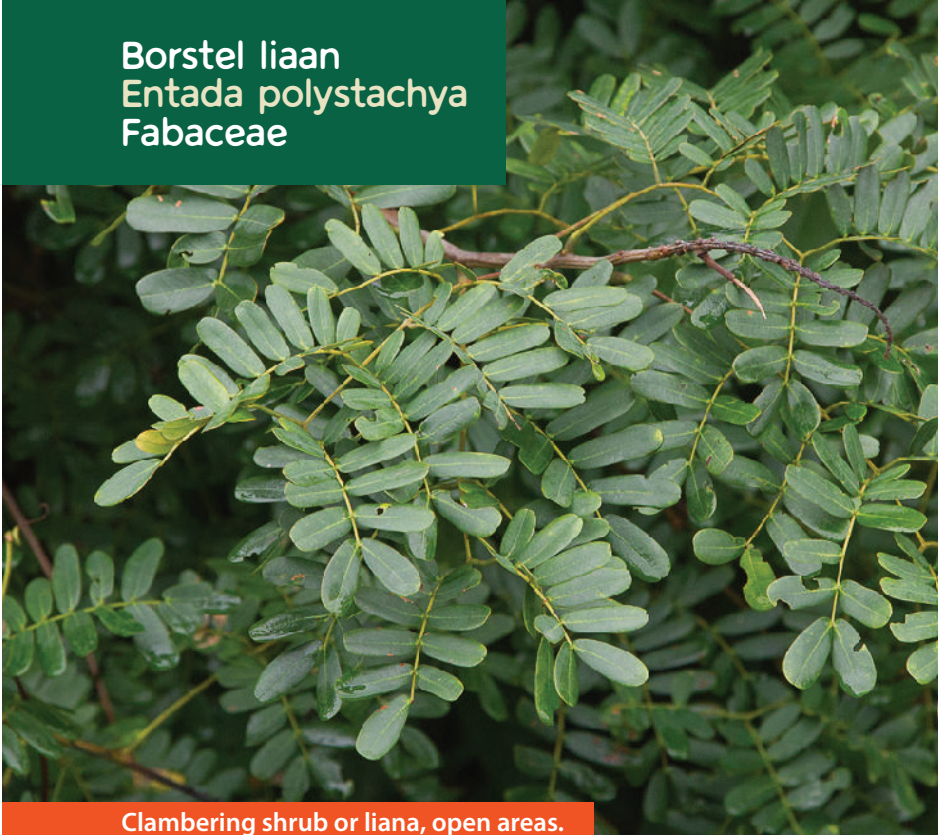
Flooded
in rainy
season

Edible fruits:
podosiri, açai

Breathing (aerial) roots

Swamp Forest understory or “Swamp-scrub” (low forest)

Borstel liaan
Entada polystachya
Fabaceae



Clambering shrub or liana, open areas.

Inflorescence (flowers)



Fruit Pods



Watrabiri
Macrolobium
bifolium
Fabaceae

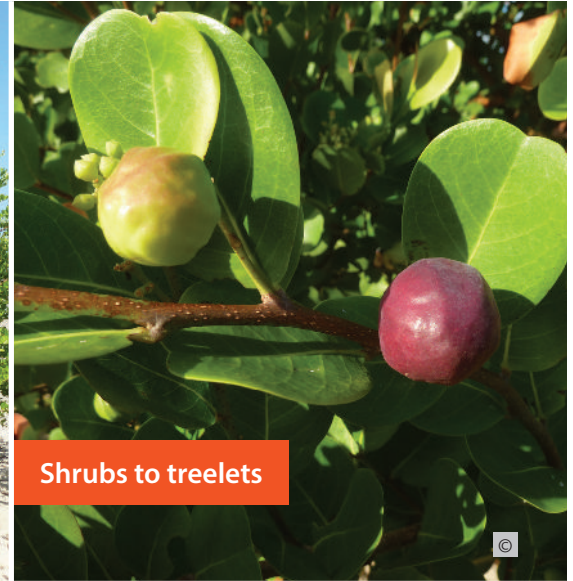
Tree to 25 m.
Bark dark grey, slash
without red sap. Leaves
alternate, bi-foliolate (2
leaflets per leaf)

- 1 Flowers white with
long, pink-red
stamens.
- 2 Fruit elliptic, flat-
tened, ca. 6 x 0.8 cm,
greenish-yellow,
turning brown at
maturity.



Zwamp-pruim
Chrysobalanus
icaco
Chrysobalanaceae

Shrub or treelets to 5 m tall.
Leaves alternate, simple,
leathery. Flowers small, green-
ish-white. Fruits (drupe) ovoid,
fleshy, white, pink, red or black,
2.5-6 cm diameter.



Shrubs to treelets



Zwamp-zuurzak
Annona glabra
Annonaceae

Shrubs or small trees, to 10 m tall. Bark strong, pulls off in strips, aromatic. Leaves alternate, simple, leathery. Flowers 3-parted, with whorls of male and female parts clustered together in center. Fruit 5-12 cm diameter, maturing orange-yellow, edible.





Threats to Swamp Forests

- **Deforestation**, Land conversion of swamp forest for cattle ranching, agriculture, water management, or housing is common. With agriculture and animal husbandry there is the additional issue of toxic chemicals entering into the system.
- **Fires**, Swamp forests are often seriously degraded or deforested by the burning of peat (peat soils, p. 10) during the dry season or droughts
- **Extractive activities** such as commercial 'black earth' removal (organic soils), over-fishing and over-hunting.
- **Degradation or deforestation of swamp forest** disrupts the capacity to provide many 'ecosystem services' that are often taken for granted - such as flood control, water purification, wildlife habitat, subsistence resources and economic opportunities.
- **Climate change** threatens swamp forests through extreme weather events, rising sea level and increased vulnerability to human disturbances.

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

High swamp forest burned





European Union

dwb ecology

CARING
FOR NATURE. FOR LIFE
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 **AMAZONIA**
2.0 Connected
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the Amazon Conservation Team
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