Status of the Vegetation Case Study:
Red Bank, Stann Creek District, Belize.
Special reference: Scarlet Macaw.
By: Jan C. Meerman, March 1999.

Supporting documentation:
- Pictures: 4 foodplant pictures.
- Pictures: 4 habitat pictures.
- Compilation of vegetation types of the area reported by Wright et al. (1959)
- Compilation of vegetation types of the area reported by Iremonger and Brokaw (1996)
- Site visit reports: 19 & 20 January 1999 (4 sites).
- 1996 satellite image (source: LIC)
- Status of the vegetation map.
- Map of the Red Bank area indicating Scarlet Macaw protection habitats.
- DOS map 1:50,000 # 35, 1980 (not included)
- Video footage (available through ESTAP):
  Tape 1 (13 November, 1998): 12'15" to 15'00"
  Tape 2 (14 January, 1999)
Principal informants: Jeronimo Sho, Edilberto Romero, Erjenio Ah, Sharon Matola, Phillip Balderamos, Katherine Renton (1998 report to the Forest Department).

Introduction:
In February 1997 the village of Red Bank received nationwide attention as the result of the reported killing of a large number of Scarlet Macaw Parrots Ara macao cyanoptera (see attached Audubon press release). This attention resulted in the establishment of the "Red Bank Scarlet Macaw Group". Aim of this group is to protect the Scarlet Macaws, their habitat and to attract tourists to the area.

The current survey was carried out to gather baseline on status and health of the vegetation in the general area. Scarlet Macaws are not known to breed in the Red Bank area, but instead they intensively utilize the area as a forage site during the winter months. Although reliable data are lacking, it appears that a majority of the Belizean Scarlet Macaws (if not all) visit this area to forage. Consequently, the area appears of vital importance for the survival of this highly endangered subspecies.

Since the Scarlet Macaws do not appear to breed in the general area, the availability of nesting trees is does not appear to be of major importance. Of great importance is the floral composition and the supply of wild fruits eaten by these birds. The status and health of the vegetation in the area are thus of great importance and were the main focus of the current survey.
Findings:
A rapid vegetation assessment was carried out on January 19 and 20, 1999 (see the four Site Visit Reports). A comparison of these data with information available in the literature (Wright et al., 1959 and Iremonger and Brokaw, 1996) revealed that both studies provided insufficient and even erroneous information (see both Vegetation Type Compilations).

Several vegetation types exist in the general area. Just south of the Red Bank Village "Pine Ridge" can be found ("Fire Induced Shublands of the Plains" in the terminology of Iremonger and Brokaw, 1996). Along the Swasey Branch and other streams a broadleaf vegetation type is found. Much of this broadleaf forest has already been converted to Milpa induced Guamil (secondary scrub) or even permanent agriculture (Banana's and Citrus)(see Status of the Vegetation Map). Sizeable tracts of the original broadleaf forest are still left along the west bank of the Swasey branch in the Swasey - Crique Arenalosa - Sapote Creek basin north east of Red Bank. This area was not visited and the appropriate vegetation classification has not been assigned. Forementioned basin is separated from the Cockscomb basin in the north by a steep ridge, which is densely forested. Of particular interest is the row of hills directly north of San Pablo and Red Bank. It is these hills that seem of particular interest to the Scarlet Macaws.

It was found that the parent material of these hills consists of a metamorphosed red sandstone. Much of these hills are under broadleaf cover probably best described as "Broadleaf hill forests over non-calcareous rocks. Negrito-nargusta variant". The southernmost flanks and crests of these hills appear to have been subject to repeated fire influence (either natural or human induced) and as a result the more fire sensitive species have been replaced by more fire resistant species. The southern flanks of these hills are best described as transitional between the above mentioned vegetation type and "Mixed needle and broadleaf forests over poor soils". Fire influence seems to be most frequent and/or severe just west of Red Bank Village. The vegetation of these hillsides is now virtually replaced by "Needle-leaf hill forests over poor soils".

Although the vegetation indicates that has been a factor for at least a few decades, the amount of recently burned stumps of broadleaf trees appear to indicate that the influence of fire is increasing. Since recent fire damage always abuts recent milpa activity it is safe to assume that runaway milpa fires are the main cause of damage to the forest.

It is these impacted hills that the Scarlet Macaws seem to prefer as a forage site. It may be expected that similar areas in the vicinity are equally attractive but definite data are lacking. Scarlet Macaws are also seen near Maya Mopan (Erjenio Ah, pers. com.) but exact locations and duration of the observations are uncertain at this stage. Favoried Scarlet Macaw foodplants as they were pointed out to me include "Wild Anatto" Sloanea tuerckheimii (Elaeocarpaceae), "White Trumpet" Schefflera morototoni (Araliaceae), "Polewood" Xylopia frutescens (Annonaceae) and an unknown tree species (Euphorbiaceae?). During my visit in January, the birds were seen feeding on Polewood. Katherine Renton also reports "Mountain Trumpet" Pourouma bicolor (Moraceae) as an important foodplant at Red Bank. It may be important to verify the identity of both the "White Trumpet" and the "Mountain Trumpet". These two species are superficially similar and could be confused.
Interestingly, all of the above mentioned foodtrees (with possible exception of the unidentified species?) are widespread and often common throughout southern Belize. This raises the question as to what other factor is involved that makes the Red Bank area is so special to the Scarlet Macaw.

It is of equal interest to note that the Scarlet Macaw feeding habitat near Red Bank is not pristine forest. The question that arises is; do the Scarlet Macaws visit the area in spite of the noted disturbances, or because of it? Also in the Chiquibul area, the favored feeding habitat appears to be the (naturally) disturbed habitats along the Macal River.

**Threats:**
The survival of the Scarlet Macaws in Belize is potentially threatened by a number of factors:
1- Hunting: which may affect adults anywhere they get near human habitation.
2- Pet trade: baby parrots being collected for sale into the pet trade. This affects the reproductive success of the birds.
3- Destruction of breeding habitat: These large parrots are dependent on large, hollow trees in which to nest. Also they are dependent on sufficient food supply during the breeding season. Both requirements are fulfilled in the floodplains of the upper Macal in the Cayo District, which appears to be the main breeding ground for the species. These breeding grounds are now potentially threatened by the construction of a second hydro-dam in the Macal River.
4- Destruction of feeding habitat for non-breeding parrots: When not breeding, the Scarlet Macaws undoubtedly fly large distances to find preferred food trees. During the months December through March, Belizean Scarlet Macaws are now known to gather into large flocks (sometimes up to 70 – P. Balderamos pers. com.) and forage in the hills just above Red Bank Village. Whether similar feeding congregations occur elsewhere in Belize, during other months of the year is currently not known. The Red Bank feeding habitat is currently threatened by:
   a) The potential use of these hills as a quarry for base material for the renovation of the Southern Highway.
   b) Clearance of forest for milpa farming practices.
   c) Forest fires resulting from escaped milpa fires.

**Recommendations**
1- To protect the Scarlet Macaw feeding habitat(s) in the Red Bank area.
2- To prevent any activity that might lead to deterioration of the habitat (mining, giving out land unsuitable for agriculture).
3- To study Scarlet Macaw movements and feeding behavior in the greater Red Bank area.
4- To conduct a thorough vegetation mapping of the entire area.
5- To study the impact of fire on the creation/maintenance/destruction of Scarlet Macaw feeding habitat.
6- To create a protected area which incorporates the findings of the above studies. A tentative map is included in this document. Ideally, this protected area should:
   a) include all hills not suitable for permanent agriculture and specifically those on which the preferred food trees grow
   b) be made contiguous (as to create a bufferzone) with both the Maya Mountain Forest Reserve and the Cockcomb Basin Wildlife Sanctuary.
   c) be multiple use but exclude farming and the use of agricultural fires.
   d) be co-managed by the local population.
Reported Scarlet Macaw Foodplants occurring in the Red Bank area.

Left row – top: Fruiting branch of an unidentified tree species. Possibly an Euphorbiaceae. Reported to be an important fruit tree for the Scarlet Macaws (Jeronimo Sho, pers. com.)

Left row – center: Fruiting branch of Polewood *Xylopia frutescens*.

Left row – bottom: Fruiting branch of Wild-Anatto *Sloanea tuerkheimi*.

Bottom, right: Characteristic silhouette of White Trumpet *Schefflera morototoni*,
Red Bank Area
Aerial Photographs

Right: San Pablo Village
T. Boomsma.
Date: 13 November 1998 (#3:13)
On the westbank of the Swasey Branch.
Notice guamii across the river and fire damage adjacent to that.
Severe fire damage is visible on the crest of the hill. Notice small patch of Pine in the hill on the background.

Below: San Pablo Village
J. Meerman.
Date: 14 January 1999 (#8:15)
On the westbank of the Swasey Branch.
Notice severe fire damage to the hills immediately adjacent to milpa fields.
Red Bank Village: T. Boomsma. Date: 13 November 1998 (#3:15). Notice new water supply vat at the foot of the hill. Also notice guamil in the left top corner and severe infestation of "Tigerbush" Dicranopteris fern in the top right corner.

Red Bank Village: T. Boomsma. Date: 13 November 1998 (#3:14). High hill between Red Bank Village and the Swasey Branch. Notice severe fire damage to crest and south flanks of the hill. This hill is reported to be the prime feeding habitat for the Scarlet Macaws.
BELIZE'S ALREADY LOW SCARLET MACAW PARROT POPULATION SUFFERING FROM MASSIVE RECENT KILLING


Reports reaching the office of the Belize Audubon Society on Wednesday evening (Feb 19) and this morning (Thursday, Feb 20) indicate that unknown persons from the village of Red Bank in the Stann Creek District are involved in the massive shooting of scores of Scarlet Macaw Parrots (Ara macao). These parrots, classified as endangered as they can be throughout their natural range (Eastern Mexico to Brazil) due to relentless sport hunting and capture for the pet trade, were just recently highlighted in the Belize Audubon Society's Newsletter (October to December issue) as making a comeback in the Cockscomb Basin Wildlife Sanctuary area. This recent wanton killing will no doubt bite a big chunk out of these birds already scanty, Belizean population.

Personnel from the Ministry of Natural Resources have been informed of the situation and are organizing a trip to Red Bank Village today (Thursday Feb.20) to thoroughly investigate this matter.

February 20, 1997 - The Belize Audubon Society (BAS) issued a press release on the 20th February stating that scores of Scarlet Macaws had been slaughtered in the Red Bank Village area in the Toledo District. Reports had been made that up to 60 of these birds had been killed.

The Ministry of Natural Resources and the Forestry Department has started an official investigation into the incident and have visited the Red Bank Area. According to Mr. Richard Belisle, Chief Forest Officer (Ag), they estimated that 20 Scarlet Macaws were killed. "Due to the number of feathers and debris we found on the site that is how we estimated the number of birds we believed were killed." He added that on the 22nd and 23rd of February, forestry officers and two police officers from Independence Village visited Red Bank and questioned the village leaders and villagers. "The officers inquired about the shootings and one name has been coming up. They are investigating this person and the person is a main suspect in the incident. The males in the communities have said that they eat the birds because they are big and easy to catch and they also claim to use their feathers for arts and crafts. It has also come up that the suspects in the case are all from one area; a new settlement that is near Red Bank which is called San Pablo. The Ministry along with the Non Governmental Organizations (NGOs) and the private sector will work on educational programs to insure that other incidents like this one do not happen again. The NGO's are more equipped to carry out educational programs and the Ministry therefore works with them."

The Belize Audubon Society, in their recent newsletter, published an article on the comeback of these birds at Cockscomb Basin Wildlife Sanctuary. They were appalled at team of this incident. According to Michael Sommerville of Belize Audubon Society, "It is a big chunk out of the struggling and endangered Scarlet Macaw's population."

Mr. Belisle said that the investigation is by no means closed and that it will not be closed until they have discovered the reason behind the shooting of the birds and those responsible have been punished for the crime.
2d = Deciduous seasonal forest 70-100 ft high on limstone. Chiquebul-Cherry forest with abundant Ramon, Bullhoof, Sapote, Copal, Cedar and Fiddlewood.

5 = Broadleaf forests moderately rich in lime loving species. Cohune-Quamwood forest with abundant Bribri, Fig, Santa Maria, Mamey, Cotton, Mahogany, Polak and Pokenoboy.

9 = Semi-evergreen seasonal forest: Negrito-Banak forest with abundant Cohune Palm, mahogany, Swivel-stick, Warrie-cohune, Cramantte and Ironwood Fig, Mamey apple, Prickly yellow and purple timbersweet also occur in the upper canopy with Castiola rubber and chaklakin in the lower canopy. The upper canopy is deep and dense, and comparatively little ground flora exists. This forest occurs on rolling, hilly and steep land on which the soils are derived from granite.

9a = Semi-evergreen seasonal forest: Cohune-Santa Maria forest with abundant fig, negrito, star-apple, quamwood, warrie-cohune, cojeton and Heliconia spp. The upper canopy is dense but the shrub layer is usually occupied by the shade loving warrie-cohune. On gently rolling to flat relief.

9b = Semi-evergreen seasonal forest: Negrito – Santa Maria forest with Santa maria, banak, Vismia, nargusta, cramante, mahogany, quamwood, can't help it, and Alsophila ferns. This is a type of forest found in association with shallow, stony soils on steep shale hills.

9d = Semi-evergreen seasonal forest: Santa maria forest on moderately steep hills with cypress, negrito, mahogany and warrie cohune locally abundant. Euterpe palms and Alsophila ferns come into the assemblage at about 700 ft.

9e = Broadleaf forests with few or no lime-loving species: Nargusta-Santa Maria forest with Yemeri, melostomes, can't help it, cypress and polewood

11c = Medium high, semi evergreen seasonal forest poor in Lime loving species: Nargusta-Banak-Yemeri forest with Cohune palms frequent but of small stature. Black and White Maya. Bay Cedar and some large Cotton trees occur. This assemblage occurs on many flat high terrace soils in the 90-150 in. rainfall belt of the east coast.

14 = Can't help it – Polewood forest with abundant black maya and cutting grass. This assemblage occurs on leached terrace soils.

19 = Grass with scattered pines and pine clumps. Crabboe, yaha and oak are occasional trees in the landscape

19b = Savanna: Palmetto palm clumps with grass and sedges in between. This landscape has no pines, and oaks and craboo occur only as small isolated clumps marking the better drained patches.
RED BANK
Compilation of Iremonger and Brokaw vegetation types

Purple Horizontal = Agriculture

Dense green horizontal = 2. Lowland broadleaf wet forests over moderately lime-rich alluvium. Tall, species-rich, lowland forests. Characteristic species include Acosmium panamense, Brosumum sp., Calophyllum brasiliense, Carapa guianensis, Castilla elastica, Ceiba pentandra, Ficus sp., Gris casilflora, Guarea glabra, Inga edulis, Licania platypus, Nectandra sp., Ochroma lagopus, Orbignya cohune (locally dominant), Peteniodendron belizensis, Poulsenia armata, Pouteria mamosa, Protium schipp, Pseudoleuca sp., Pterocarpus hayesi, Quisqualis sp., Sabal morisiana, Schizolobium parahybum, Symphonia globulifera, Vismia ferruginea, and Vochysia hondurensis. Palms are a significant feature of the understory (3-4 m), particularly Astrocarum mexicanum, Battis sp., Calypogone ghistrobrachiana, and the rattan, Desmoncus sp. Soils are deep, fertile and well-drained, the fertility being maintained by seasonal silt deposition. Where the rivers break their banks the forests may periodically be destroyed, and patches of bamboo and Dieffenbachia seguine occur. (Wright 5, 5a, 6, 6a)

Green vertical = 4. Lowland broadleaf wet forest over poor or sandy soils. Characterized locally by Acosmium panamense, Aspidosperma cruentum, Calophyllum brasiliense, Dialium guianense, Guarea sp., Erblichia odorata, Ficus sp., Licania platypus, Orbignya cohune, Pouteria mamosa, Pouteria sp., Pterocarpus hayesi, Sinarumis glauca, Spondias monlin, Swietenia macrophylla, Symphonia globulifera, Terminalia amazonia, Vochysia hondurensis, Vismia koschmy, Vismia ferruginea, and Xylopia frutescens. Corresponding to where they occur in lowland areas, soils may be dull reddish-brown, brown or grey clays, often mottled and/or stony. (Wright 8, 8a, 8b, 8c)

Blue Crosses = 12. Lowland broadleaf moist forests over poor soils. These forests are characterized by Calophyllum brasiliense, low Orbignya cohune, Terminalia amazonia, Vismia brachycarpa, V. koschmy, Xylopia frutescens, and Miconia spp. Wright's 8 and 9 (including subtypes) are similar, but in higher places are better described as Moist broadleaf hill forests over non-calcareous rocks (type I.2.3.3). (Wright 11, 11a, 11e, 11d, 11e, 11g)

Dense green hatched = 15. Lowland needle-leaf moist open forests over poor soils. As described in type I.2.2.6 but much sparser, the pines forming a broken canopy to about 20 m high over broadleaf scrub with abundant Melastomataceae or a graminoid herbaceous layer (“orchard savanna”). When cleared and burned these forests undergo a progression through Fire-Induced shrubland of the plains back to pine land.

Red Horizontal = 21. Broadleaf hill forests over non-calcareous rocks. Negrillo-narguista variant. Characteristic tree species in these forests are Castilla elastica, Chrysoxyllum caimito, Dendrophax arboresus, Dialium guianense, Euterpe macrospada, Ficus sp., Guarea spp., Licania platypus, Nectandra sp., Orbignya cohune, Podocarpus guatemalenus, Protium schipp, Pterocarpus hayesi, Quararibea sp., Poruchsia aspera, Rhedius sp., Schizolobium parahybum, Sinarumis glauca, Stemmadenia donnell-smithii, Swietenia macrophylla, Terminalia amazonia, Vismia brachycarpa, V. koschmy, Vismia ferruginea, Vochysia hondurensis, Xylopia frutescens, and Zanthoxylum sp., with Astrocarum mexicanum and Melastomes in the understory. In the higher areas Cyathoe tree ferns occur and some ground ferns. The soils are reddish brown or grey sandy clays with stones, overlain quartzite or shale hills. They extend over large areas of the Maya Mountain massif. (Stevenson 1942, Brokaw 1991, Wright 9, 9a, 9b, 9c, 9d, 9e)

Gray Crosses = 42. Fire-Induced shrubland of the plains. This community is strongly related to the savanna grasslands described in III.2.1. The aspect of the communities grade from being an open pine forest (type I.2.2.7) through scrub to grassland. The shrublands generally appear as islands of scrub in a grassland area, in some areas the islands are large and merging, in others they are quite separate. Frequent woody species are Acoclinea wrightii, Bysonima crassifolia, Crescentia cujete, Curatella americana, Leucodendron sp., and Quercus sp. Pinus caribaea may be present. Soils are sands, organic sands, or loamy sands resting on sandy clay or sandy gravelly clay. The land is usually very gently sloping. (Wright 19, 19a, 19b)
Site: Red Bank – Lowland near guesthouse

Elevation: 80 m

Date: 19 January 1999

Observer(s): Jan Meerman

Route: Start from BTL office in Red Bank village going towards the Guesthouse and then following a bushtrail along a stream for approx 500 m.

Start: Village Center at approx. 163,33656 / 18,38241

2nd reading:

3rd reading:

### Vegetation types:

<table>
<thead>
<tr>
<th>Reported Wright</th>
<th>Reported Iremonger &amp; Brokaw</th>
<th>Found</th>
</tr>
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<tbody>
<tr>
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<td>12 = Lowland broadleaf moist forests over poor soils. These forests are characterized by Calophyllum brasiliense, low Orbignya cohune, Terminalia amazonia, Virola brachycarpa, V. koschyi, Xylopia frutescens, and Micosa spp. Wright’s 8 and 9 (including subtypes) are similar, but in higher places are better described as “Moist broadleaf hill forests over non-calcareous rocks” (Wright 11, 11a, 11c, 11d, 11e, 11g)</td>
<td>Most resembling Iremonger &amp; Brokaw’s description.</td>
</tr>
</tbody>
</table>

### Plant species identified during current survey:

- Acalypha sp., Anthurium pentaphyllum var. bombacifolium (Schott) Madison

### Comments:

Vegetation along trail mostly old secondary growth.

### Literature:

Wright et al. 1959; Iremonger & Brokaw, 1996.
### Site:
Red Bank – Hill behind village

### Elevation:
100 – 200 m.

### Date:
19 January 1999

### Observer(s):
Jan Meerman, Jeronimo Sho

### Route:
From Guesthouse following the nature trail uphill, approx 1 km (see map).

### Start:
No readings

### 2nd reading:

### 3rd reading:

### Vegetation types:
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<td>21. Broadleaf hill forests over non-calcareous rocks. Negrito-nargusta variant. Caharacteristic tree species in these forests are Castilla elastica, Chrysophyllum cainito, Dendropanax carboneus, Dialium guianense, Euterpe macrospadix, Picus sp., Guarea spp., Licaria platypus, Necandra sp., Orinoco cohune, Podocarpus guatemalensis, Protopium schippii, Pterocarpus hayestii, Quararibea sp., Porouma aspera, Rheedia sp., Schizolobium paralybum, Simarouba glauca, Stemmadenia dornell-smithii, Swietenia macrophylla, Terminalia amazonia, Virola brachycarpa, V. koschnyi, Vismia ferruginea, Vochoya hondurensis, Xylopia frutescens, and Zanthoxylum sp., with Astrocarum mexicanum and Melastomes in the understorey. In the higher areas Cyathea tree ferns occur and some ground ferns. The soils are reddish brown or grey sandy clays with stones, overlying quartzite or shale hills. They extend over large areas of the Maya Mountain massif. (Stevenson 1942, Brokaw 1991, Wright 9, 9a, 9b, 9c, 9d, 9e)</td>
<td>Neither descriptions fit the vegetation type found. The vegetation along the trail is best described as transitional between Iremonger &amp; Brokaw's 21 and 22. Mixed needle and broadleaf forests over poor soils. As for type 22 but with a greater abundance of broadleaf trees in the canopy. These include Byrsonima crassifolia, Clusia spp., Canelliella americana, Tabebuia pentaphylla, and Thraux argentea. Terminalia amazonia and Podocarpus guatemalensis are occasional. (Wright 18, 18a)</td>
<td></td>
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**9c = Broadleaf forests with few or no lime-loving species: Nargusta-Santa Maria forest with Yemeri, melastomes, can't help it, cypress and polewood**

### Plant species identified during current survey:

### Comments:
Strong influence of fire noted. Fire influence appears to have a long history but may be increasing in impact. Some patches with vegetation types 22 and 23 seem well established with large Pines and old Oaks. Reported Scarlet Macaw foodplants abundant in the broadleaf sections. These include "Wild Anatto" Sloanea tuerckheimii, "White Trumpet" Schefflera morototoni, "Polewood" Xylopia frutescens, and an unknown tree species (Euphorbiaceae?)

### Literature:
- Wright et al. 1959; Iremonger & Brokaw, 1996.
Site: Red Bank – Hill behind village

Elevation: 100 – 200 m.

Date: 19 January 1999

Observer(s): Jan Meerman, Jeronimo Sho

Route: From Guesthouse following the nature trail uphill, approx 1 km (see map).

Start: No readings

2nd reading:

3rd reading:

Vegetation types:

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Towards the Southwest of the same hill, a binocular survey revealed a large patch of type 22. Needle-leaf hill forests over poor soils. These forests are characterized by a dominance of Pinus caribaea and a number of Quercus spp. Other broadleaf occur but not in abundance. The forest aspect may be open or with the trees clumped and grass in between. The herb species which occur in these forests are listed for community type II.2.1. Soils are pale reddish or pinkish brown over sandy clay. (Wright 18, 18a) |

Plant species identified during current survey:


Comments: Strong influence of fire noted. Fire influence appears to have a long history but may be increasing in impact. Some patches with vegetation types 22 and 23 seem well established with large Pines and old Oaks. Reported Scarlet Macaw foodplants abundant in the broadleaf sections. These include "Wild Anatto" Sloanea tuerckheimii, "White Trumpet" Schefflera morototoni, "Polewood" Xylopia frutescens, and an unknown tree species (Euphorbiaceae?)

<table>
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<tr>
<th>Site:</th>
<th>Red Bank: Danto Creek agricultural area</th>
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<tbody>
<tr>
<td>Elevation:</td>
<td>80 m.</td>
</tr>
<tr>
<td>Date:</td>
<td>19 January 1999</td>
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<tr>
<td>Observer(s):</td>
<td>Jan Meerman</td>
</tr>
<tr>
<td>Route:</td>
<td>From Guesthouse following agricultural road into the basin for approx. 4 km (see map).</td>
</tr>
<tr>
<td>Start:</td>
<td>Guesthouse (no reading)</td>
</tr>
<tr>
<td>2nd reading:</td>
<td>163,32537 / 18,40531</td>
</tr>
<tr>
<td>3rd reading:</td>
<td>163,32011 / 18,41421</td>
</tr>
</tbody>
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<td>9 - Semi-evergreen seasonal forest: Negrito Banak Forest with abundant Cohune Palm, mahogany, Swivel-stick, Warrie Cohune, Cramantree and Ironwood. Fig, Mamey apple, prickly yellow and purple timbersweet also occur in the upper canopy with Castilea rubber and chacalakin in the lower canopy. The upper canopy is deep and dense, and comparatively little ground flora exists. This forest occurs on rolling, hilly and steep land derived from granite.</td>
<td>Agriculture</td>
<td>Secondary growth with little indication of original vegetation type.</td>
<td></td>
</tr>
</tbody>
</table>

### Plant species identified during current survey:

### Comments:
- Mostly secondary and herbaceous species noted. Dense mosaic of guamal. |

### Literature:
- Wright et al. 1959; Iremonger & Brokaw, 1996.
Site: Red Bank saddle over hills
Elevation: 140 m.
Date: 19 January 1999
Observer(s): Jan Meerman
Route: From Guesthouse following agricultural road northward for approx 2 km (see map).
Start: 163,32537 / 18,40531

<table>
<thead>
<tr>
<th>Vegetation types:</th>
<th>Reported Wright</th>
<th>Reported Iremonger &amp; Brokaw</th>
<th>Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 = Semi-evergreen seasonal forest: Negrito Banak Forest with abundant Cocule Palm, mahogany, Swivel-stick, Warrie Cocule, Cramantree and Ironwood. Fig, Maney apple, prickly yellow and purple timbersweet also occur in the upper canopy with Castillon rubber and chaclak in the lower canopy. The upper canopy is deep and dense, and comparatively little ground flora exists. This forest occurs on rolling, hilly and steep land derived from granite.</td>
<td>Agriculture</td>
<td>Broadleaf hill forests over non-calcareous rocks. (Most likely: 20. Santa Maria variant. Characteristic trees include Acosnum panamense, Aspidosperma cruenta, Calophyllum brasiliense, Erbichia odorata, Guarea excelsa, Lacca!a platys, Orbignya cohune, Pouteria mammosa, Pouteria sp., Simarouba glauca, Terminalia amazonia, Virola koschyi, Visnia ferruginea, Vochysia hondurensis, and Xylopia frutescens. In places where drainage is impeded the soils are mottled and Ficus sp., Dialium guianense, Pierocarpus officinalis, Spondias mombin, and Symphonia globulifera occur. (Wright 8, 8a, 8b, 8c except where these occur in lowland areas, when they belong to type 1.2.2.4.)</td>
<td></td>
</tr>
</tbody>
</table>


Comments: Along the road vegetation impacted by milpa agriculture but some patches relatively intact. Little or no impact higher on the hillsides.

Principal villages are indicated by red dots
Protected area boundaries are indicated in black
Status of the vegetation:
Red Bank area
Scale 1 : 50,000 (1 square = 1 sq km)
Orange areas: hills impacted by fire.
Yellow areas: altered by agriculture
Orange line: Flightpath 13 Nov. 1998

Map by J. C. Meeran, 1999