The Biodiversity of Bai Djobo

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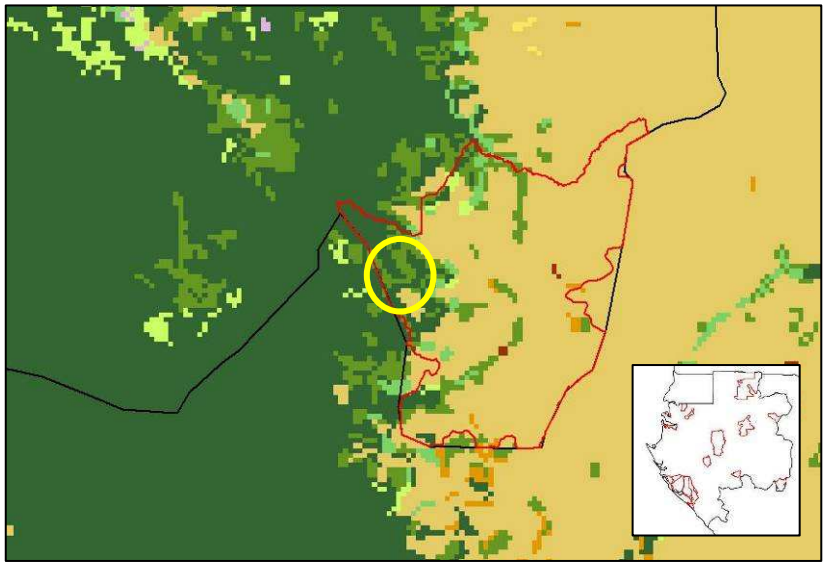
Prologue

In September 2006 Missouri Botanical Garden was invited to assess the biodiversity of the Bai Djobo for PPG on the Bateké Plateaux. Very little is known of the forests on the Bataké Plateaux and this was the first biodiversity assessment. Hopefully, more will follow because this assessment already had some very surprising results.

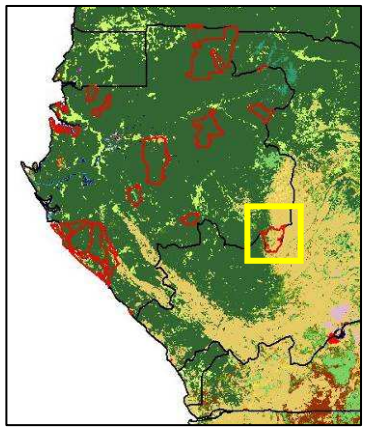
Miguel E. Leal

February 2007

The biodiversity of Bai Djobo



The vegetation of Bateké NP and study site (outlined in red) and the geographical position of the Bai Djobo (encircled in yellow).

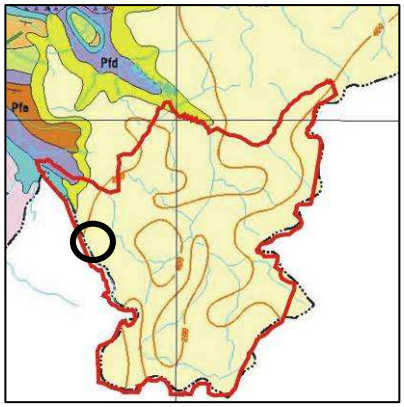


The forest cover in Gabon and Congo (dark green) and the flanking savannahs (light brown) source Mayaux et al. 2003

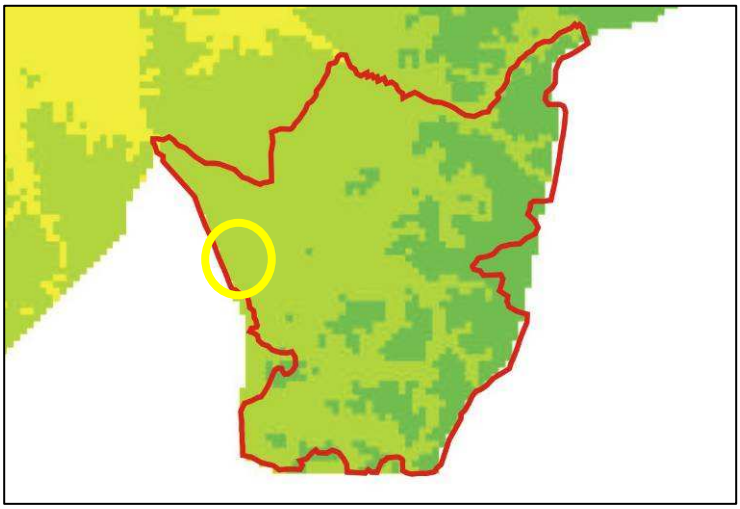
The Bateké Plateaux

Bateké Plateaux in the south-east with its undulating prairies is an exception to the rule in the heavily forested Gabon. The Bateké Plateaux is part of the larger forest-savannah mosaic which stretches all along the south flank of the Central African rain forest. Typical for these savannah which wedge into the forest is their superposition on sands from the Tertiary (40-23Myrs ago).

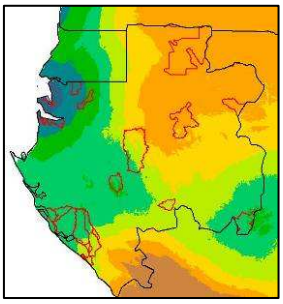
Bateké Plateaux was then one large dune landscape, like a large desert. But these sands do not necessarily have to be associated with desert conditions in the past. Similar dune landscapes exist within the Amazon. The sand which forms the beaches along the Ogooué and Gabonese coast may very well come from the Bateké Plateaux transported and deposited over millions of years. Although it has not been geologically proven, similar situation exist for other regions outside central Africa.



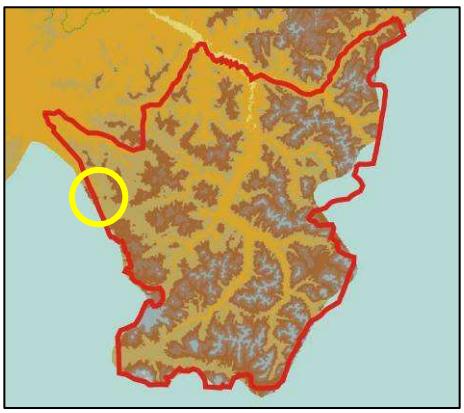
Geological formations in the Bateké NP showing the sands (light color) which extent further east.



Bateké NP (red line) showing a rainfall gradient over the Plateaux from wet in the east to drier to the west.



▲
Mean rainfall over Gabon, (gradient from blue-green-orange= wet to dry) showing that the SE is among the wetter parts of the country.

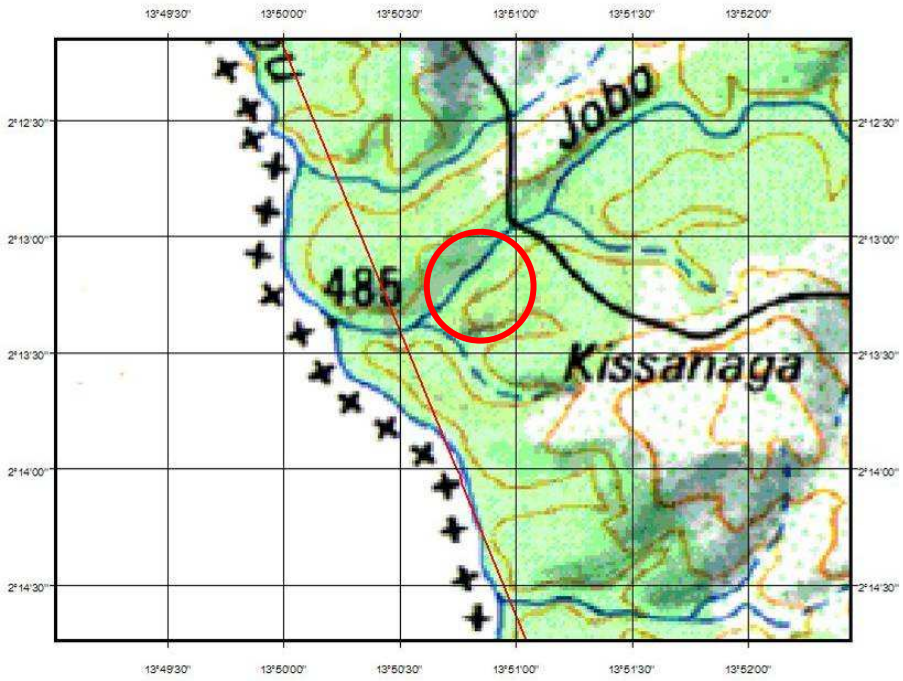


The topography of Bateké NP and study site (outlined in red) and the geographical position of the Bai Djobo (encircled in yellow).

The savannahs on the Plateaux and the forest restricted along rivers and streams show that this is an arid ecosystem, but which is not explained by the lack of rainfall (mean annual). Rainfall over Gabon shows that the Bateké Plateaux receives more rainfall than most of northern interior of Gabon (see above) but which is covered by rainforest whereas the Bateké Plateaux is not.

The dominance of the savannahs is explained by the Bateké sands which have a low retention capacity and a large dept. Therefore, the ground water table is beyond the reach of most trees, accept along rivers and streams. The only plant life-forms adapted to these dry conditions are grasses and some shrubs.

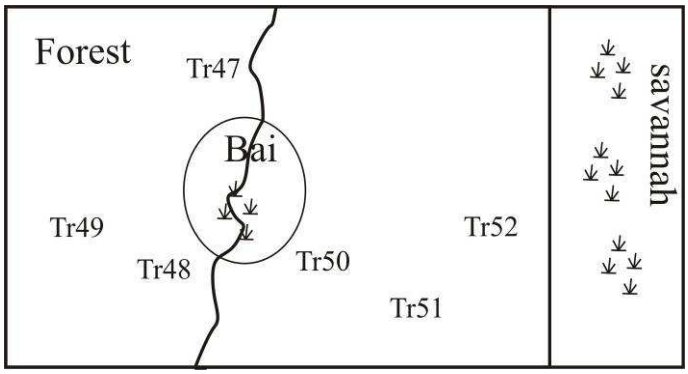
One of the reasons why the savannahs dominate is also because of burning which impedes forest colonization. The large Massif du Chaillu forest is situated west of the Plateaux and it looks like it is slowly encroaching, comparing the national maps from the 60's and 70's and recent maps (Mayaux et al. 2003). Forest colonization typically occurs first along rivers and streams and slowly as patches of savannahs become enclosed by gallery forest it may expand patch wise. In Lopé for instance these patches are colonized by Okoumé (Aucoumea klaineana). Okoumé also occurs in on the Plateaux, but its role is not known.



View on Djobo Bai on the national map (see left circled in red)

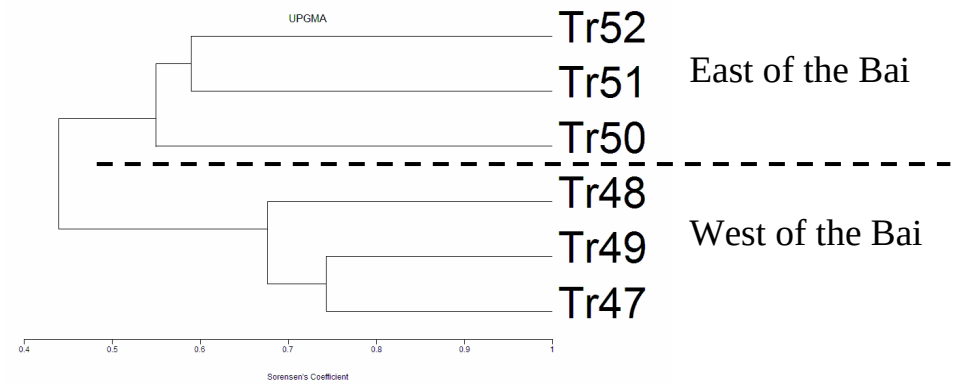
Bai Djobo

Bai Djobo is situated inside the eastern section of the Massif du Chaillu forest block close with the western edge of Bateké savannah. Through the bai there flows a stream to the south west. A first preliminary observation is that the herbs and grasses present in Bai Djobo are also found in Langoué Bai in Ivindo NP a few 100 km away.



Schematic representation of the study site showing the location of the bai and the transects

The forest around the bai is full grown undisturbed forest. The effect of topography determining the species composition of the forest is small as the area around the bai is basically flat. In hilly or mountainous areas transects are places at different altitudes along the slope and summit. With this setting general forest ecology assumes a gradient in species composition from the drier edge of the forest in the west to the wetter interior in the forest to the east. A second gradient is from the edge of the bai away from the bai. By placing transects around the bai (Tr48, Tr50), close to the savannah (Tr51,Tr52) and away from the savannah (Tr47, Tr49) it can be determined which environmental factors are strongest and if the general assumptions are right altogether.



Cladogram showing the relationship (similarity) between the transects, close e.g. Tr49 and Tr47 or distant e.g. Tr50 and Tr48.

Methods

The transects used to record species composition were 200 m long and 5 m wide. Every individual with a diameter at breast height (dbh) of 5 cm and greater was recorded and identified or vouchered for identification in the herbarium of Libreville. Often voucher specimens were without flowers or fruits in which case species were identified only on sterile e.g. leaf characteristics. Such identifications are less confident and revered to as morpho-species. Similarity between the transects was calculated by using the Sørensen index.
Sørensen index is $S_{12}/[0.5(S_1+S_2)]$ where S_{12} is the number of shared species between two transects and S_1 is the total number of species in transect 1 and similarly S_2.

	Tr47	Tr48	Tr49	Tr50	Tr51	Tr52	average
spp	49	56	51	46	53	52	51.2
n	121	129	129	113	115	110	119.5
alpha-diversity	30.6	37.6	31.1	28.9	38.1	38.5	34.2
endemism	13	23	17	10	20	24	17.8
%	26.5	41.1	33.3	21.7	37.7	46.2	34.4

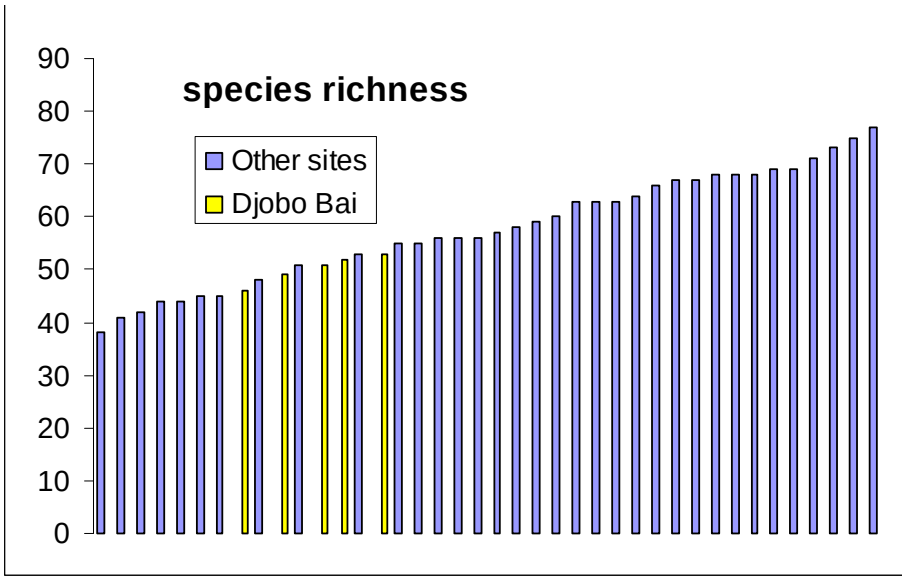
Results

General characteristics

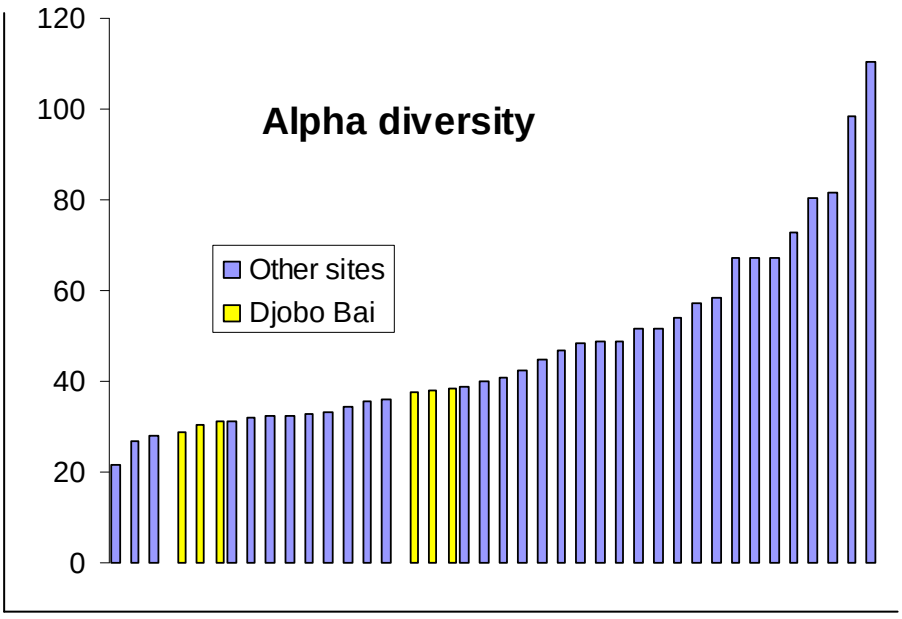
The total recorded species was 171 species. On average 52 species were present on a transect and differences between transects were low. The highest score was 56 species on Tr48 and the lowest 46 species on Tr47. Species restricted to a single transect (endemic) varied between 10 (21.7%) and 24 (46.2%). The number of trees on a transect was in general lower east of the bai close to the savannah than west of the bai towards the interior, 113 and 126 on average, respectively. Alpha-diversity varied between 28.9 and 38.5 with higher values for the transects closer to the savannah.

Similarity

The cladogram (see above) shows a split in species composition between the transects east and west of the bai. The transects east of the bai are more similar, and so the transects on the west side. The two transects most dissimilar are close to the bai, i.e. Tr48 and Tr50. On the west side the transects furthest away from the bai (Tr49, Tr47) show a higher similarity with each other than with the transect close to the bai on the same side (Tr48). This is also observed east side of the bai. Tr51 and Tr52 have a more similar species composition than Tr50.



Graph showing species richness in Djobo Bai (yellow bars) and other sites in Gabon (blue bars).



Graph showing Alpha diversity in Djobo Bai (yellow bars) and other sites in Gabon (blue bars).

Discussion

The cladogram clearly shows that species composition on either side of the Jobo stream is very different with the largest difference on opposite banks. This was not at all expected from applying general forest ecology. In the Lopé forest savannah mosaic, for instance, the riverside or riverine forest has a fairly constant species composition and only changes away from the stream. The difference in species composition on both sides is clearly illustrated by the distribution of Okoumé (Aucoumea klaineana) which was near absent the right side of the stream close to the savannah and clearly present on the right side towards the interior.

The distribution of Okoumé gives insight in to the history of the forest around the bai. Okoumé does not germinate under a closed canopy and in Lopé it is a typical savannah colonizer. The forest close the savannah has been colonized some hundred years ago, judging from the large size of the Okoumé trees. On the national map there is an enclosed patch of savannah to the north. This patch extended much further south in the past judging from the presence of old Okoumé trees in the forest close to the bai.

In terms of species richness and (alpha-) diversity the transects around Djobo Bai are neither exceptionally rich nor poor. For the site it is interesting to observe that this site being at the very edge of the Gabonese rain forest is still richer than other sites situated within the forest block. Some of the poorer sites were situated in so-called Pleistocene forest refugia, these were climatically stable forests during the last ice age. The relative high number of Caesalpinioideae, like *Bikinia pellegrinii* (hight lighted in yellow in the appendix) is a strong indication that some parts of this forest are old, because these species disperse very slowly. This means that forest so-called micro refugia persisted on the Bateké Plateaux.

General collecting

In between doing the transects plants flowing and fruiting were collected also to obtain more information on plant biodiversity in general. Botanically the Plateaux is still fairly unknown, as was confirmed recently with finds of a few rare grass species and 2 new records collected by Gretchen Walters. The MBG field team identified the collected specimens (see Appendix) among the specimens collected is probably a new species of *Calvoa* and there is the pygmy version of *Rinorea batesii*. For the former flowers need to be collected to describe it properly.

The pygmy Rinorea batesii

The new Calvoa

Acknowledgements
Nous remercions le conservateur du Parc National d'Plateaux Bateké pour son soutien. A monsieur Paul Telfer directeur technique du Parc National d'Plateaux Bateké de W.C.S pour la disponibilité et l'accueil fraternel qu'il nous a accorde tout au long de notre séjour. Nous remercions madame Liz Pearson Directrice P.P.G et Mousieur Paul Aczel, Coordinateur des activités anti braconnage de Plateaux Bateké, et l'ensemble de son équipe pour toute la disponibilité et l'accueil qu'ils nous ont apporté à notre égard Nous remercions également à Ms Félix Asumu et madame Mireille pour l'appui important qui ils nous ont apporté (from the fieldteam). This project was funded by Rufford Foundation, USAID's Central African Regional Program for the Environment in collaboration with the Wildlife Conservation Society, the Herbier National du Gabon, IPHAMETRA, and CENAREST.

Appendix ***Identifications of the plateaux Bateké specimens***
D.Nguema et al.

number	*species*	*Family*	
729	*Memecylon myrianthum Gilg*	*Melastomataceae*	*Shrub*
730	*Memecylon sp*	*Melastomataceae*	*Shrub*
731	*indet*	*Rubiaceae*	*Undestory tree*
732	*indet*	*indet*	*Shrub*
733	*Garcinia sp*	*Guttiferaceae*	*Undestory tree*
734	*Hymenocardia cf acida Tul.*	*Euphorbiaceae*	*Undestory tree*
735	*Oxyanthus speciosus DC.*	*Rubiaceae*	*Shrub*
736	*Canthium sp*	*Rubiaceae*	*Shrub*
737	*Garcinia sp*	*Guttiferaceae*	*Undestory tree*
738	*Campylospermum cf reticulatum (P.Beauv.) Farron*	*Ochnaceae*	*Shrub*
739	*Heterotis sp*	*Melastomataceae*	*Herb*
740	*cf Aneilema sp*	*Commelinaceae*	*Herb*
741	*indet*	*indet*	*Liane*
742	*Coffea sp*	*Rubiaceae*	*Shrub*
743	*Thomandersia cf butayei De Wild.*	*Acanthaceae*	*Shrub*
744	*Hunteria cf oxyantha Omino*	*Apocynaceae*	*Shrub*
745	*Baphia sp*	*Leguminosae-Pap.*	*Undestory tree*
746	*Spathandra sp*	*Melastomataceae*	*Shrub*
747	*Garcinia sp*	*Guttiferaceae*	*Undestory tree*
748	*Psilanthus sp*	*Rubiaceae*	*Shrub*
749	*Tarenna sp*	*Rubiaceae*	*Shrub*
750	*Tricalysia sp*	*Rubiaceae*	*Shrub*
751	*Monanthotaxis sp*	*Annonaceae*	*Liane*
752	*Tricalysia sp*	*Rubiaceae*	*Shrub*
753	*Hymenocoleus cf hirsutus (Benth.) Robbr.*	*Rubiaceae*	*Herb*
754	*Justicia cf laxa T.Anders.*	*Acanthaceae*	*Herb*
755	*Sorindeia sp*	*Anacardiaceae*	*Shrub*
756	*Rinorea sp*	*Violaceae*	*Shrub*
757	*Calvoa sp (novo)*	*Melastomataceae*	*Herb*
758	*Angylocalyx sp*	*Leguminosae-Pap.*	*Undestory tree*
759	*Napoleonaea vogelii Hook. & Planch.*	*Lecythidaceae*	*Undestory tree*
760	*Campylospermum cf reticulatum (P.Beauv.) Farron*	*Ochnaceae*	*Shrub*
761	*Dicellandra cf barteri Hook.f.*	*Melastomataceae*	*Herb*

762	***Rinorea cf batesii Chipp***	***Violaceae***	***Shrub***
763	***Tricalysia sp***	***Rubiaceae***	***Undestory tree***
764	***indet***	***Rubiaceae***	***Shrub***
765	***Tricalysia cf pedunculosa (N.Hallé) Robbr.***	***Rubiaceae***	***Shrub***
766	***Memecylon sp***	***Melastomataceae***	***Shrub***
767	***Chassalia cf kolly (Schum.) Hepper***	***Rubiaceae***	***Shrub***
768	***Rinorea leiophylla M.Brandt***	***Violaceae***	***Shrub***
769	***Coffea sp***	***Rubiaceae***	***Shrub***
770	***indet***	***Rhizophoraceae***	***Shrub***
771	***indet***	***indet***	***Liane***
772	***Synsepalium sp***	***Sapotaceae***	***Shrub***
773	***Octolobus sp***	***Sterculiaceae***	***Shrub***
774	***Tricalysia sp***	***Rubiaceae***	***Undestory tree***
775	***Rinorea angustifolia (Thouars) Grey-Wilson***	***Violaceae***	***Shrub***
776	***Dracaena acutissima Hua***	***Dracaenaceae***	***Shrub***
777	***Oxyanthus formosus Hook.f. ex Planch.***	***Rubiaceae***	***Shrub***
778	***Agelae sp***	***Conaraceae***	***Liane***
779	***Leptaspis cochleata Thwaites***	***Gramineae***	***Herb***
780	***Paraphyadanthe flagelliflora Mildbr.***	***Flacourtiaceae***	***Undestory tree***
781	***Palisota cf thollonii Hua***	***Commelinaceae***	***Herb***
782	***Salacia sp***	***Celastraceae***	***Liane***
783	***Cynometra letestui (Pellegr.) J.Léonard***	***Leguminosae-Caes.***	***Undestory tree***
784	***indet***	***indet***	***Liane***
785	***indet***	***Annonaceae***	***Liane***
786	***Senandrium cf gabonicum (R.Benoist) Vollesen***	***Acanthaceae***	***Shrub***
787	***Mareya micrantha (Benth.) Müll.Arg.***	***Euphorbiaceae***	***Shrub***
788	***Synsepalium sp***	***Sapotaceae***	***Shrub***
789	***Bikinia grisea Wieringa***	***Leguminosae-Caes.***	***Sub canopy tree***
790	***Lasiodiscus fasciculiflorus Engl.***	***Rhamnaceae***	***Shrub***
791	***Schefflerodendron sp***	***Leguminosae-Pap.***	***Undestory tree***
792	***Monodora sp***	***Annonaceae***	***Shrub***
793	***Warneckea reygaerti (De Wild.) Jacq.-Fél.***	***Melastomataceae***	***Shrub***
794	***Culcasia sp***	***Araceae***	***Herb***
795	***Palisota cf hirsuta (Thunb.) K.Schum.***	***Commelinaceae***	***Herb***
796	***Chytranthus sp***	***Sapindaceae***	***Undestory tree***

797	*Sorindeia sp*	*Anacardiaceae*	*Shrub*
798	*indet*	*Rubiaceae*	*Shrub*
799	*Ochna sp*	*Ochnaceae*	*Shrub*
800	*Campylospermum cf reticulatum (P.Beauv.) Farron*	*Ochnaceae*	*Shrub*
801	*Pancovia sp*	*Sapindacaeae*	*Shrub*
802	*Campylospermum laeve (De Wild. & T.Durand) Farron*	*Ochnaceae*	*Shrub*
803	*Warneckea wildeana Jacq.-Fél.*	*Melastomataceae*	*Shrub*
804	*Grewia sp*	*Tiliaceae*	*Shrub*
805	*Venonia sp*	*Compositae*	*Herb*
806	*Rourea cf coccinea (Thonn. ex Schum.) Benth.*	*Connaraceae*	*Liane*
807	*Sapium cornutum Pax*	*Euphorbiaceae*	*Shrub*
808	*Guarea cf glomerulata Harms*	*Meliaceae*	*Shrub*
809	*indet*	*Guttiferaceae*	*Shrub*
810	*indet*	*indet*	*Herb*
811	*indet*	*Gramineae*	*Herb*
812	*Dialium sp*	*leguminosae-Caes.*	*Undestory tree*
813	*Syziguim sp*	*Myrtaceae*	*Undestory tree*
814	*indet*	*indet*	*Liane*
815	*Cnestis sp*	*Conaraceae*	*Liane*
816	*Allophylus cf africanus P.Beauv.*	*Sapindaceae*	*Shrub*
817	*Laccodiscus cf ferrugineus (Baker) Radlk.*	*Sapindacaeae*	*Shrub*
818	*Maprounea sp*	*Euphorbiaceae*	*Undestory tree*
819	*Phyllanthus sp*	*Euphorbiaceae*	*Shrub*
820	*Oncoba welwitschii Oliv.*	*Flacourtiaceae*	*Undestory tree*
821	*indet*	*Leguminosae-Pap.*	*Herb*
822	*Xyris cf congensis Büttner*	*Xyridaceae*	*Herb*
823	*Cyperus sp*	*Cyperaceae*	*Herb*
824	*Hypolytrum cf purpurascens Cherm.*	*Cyperaceae*	*Herb*
825	*Fimbristylis cf hispidula (Vahl) Kunth*	*Cyperaceae*	*Herb*
826	*Trichopteryx marungensis Chiov.*	*Gramineae*	*Herb*
827	*indet*	*Gramineae*	*Herb*
828	*Tristemma cf littorale Benth.*	*Melastomataceae*	*Herb*
829	*Dissotis sp*	*Melastomataceae*	*Herb*
830	*Dichaetanthera cf strigosa (Cogn.) Jacq.-Fél.*	*Melastomataceae*	*Herb*
831	*Eriocoelum cf petiolare Radlk.*	*Sapindacaeae*	*Shrub*

832	*Dacryodes le-testui (Pellegr.) Lam*	*Burceraceae*	*Understory tree*
833	*Impatiens cf irvingii Hook.f. ex Oliv.*	*Balsaminaceae*	*Herb*
834	*Baphia laurifolia Baill.*	*Leguminosae-Pap.*	*Liane*
835	*Cogniauxia cf podolaena Baill.*	*Cucurbitaceae*	*Liane*
836	*Ruthalicia sp*	*Cucurbitaceae*	*Liane*
837	*Antidesma sp*	*Euphorbiaceae*	*Undestory tree*
838	*Spathandra cf blakeoides (G.Don) Jacq.-Fél.*	*Melastomataceae*	*Undestory tree*
839	*impatiens sp*	*Balsaminaceae*	*Herb*
840	*Rhabdophyllum cf affine (Hook.f.) Tiegh.*	*Ochnaceae*	*Undestory tree*
841	*Vismia rubescens Oliv.*	*Guttiferaceae*	*Liane*
842	*indet*	*Sapindacaeae*	*Undestory tree*
843	*Dalbergia sp*	*Leguminosae-Pap.*	*Liane*
844	*indet*	*Leguminosae-Pap.*	*Liane*
845	*Berlinia sp*	*leguminosae-Caes.*	*Sub canopy tree*
846	*Plagiostyles africana (Müll.Arg.) Prain*	*Euphorbiaceae*	*Sub canopy tree*
847	*Klainedoxa gabonensis Pierre ex Engl.*	*Irvingiaceae*	*Canopy tree*
848	*Milletia sp*	*Leguminosae-Pap.*	*Liane*
849	*Dacryodes igaganga Aubrév. & Pellegr.*	*Burseraceae*	*Undestory tree*
850	*Milletia sp*	*Leguminosae-Pap.*	*Sub canopy tree*
851	*Duvigneaudia sp*	*Euphorbiaceae*	*Undestory tree*
852	*Ochna multiflora DC.*	*Ochnaceae*	*Undestory tree*
853	*Baphia laurifolia Baill.*	*Leguminosae-Pap.*	*Liane*
854	*Milletia sp*	*Leguminosae-Pap.*	*Liane*
855	*Dalbergia cf saxatilis Hook.f.*	*Leguminosae-Pap.*	*Liane*
856	*Sorindeia sp*	*Anacardiaceae*	*Shrub*
857	*Pentadesma grandifolia Baker f.*	*Guttiferaceae*	*Canopy tree*
858	*Sorindeia sp*	*Anacardiaceae*	*Shrub*

Appendix 1 common species

species	Tr47 n	Tr48 n	Tr49 n	Tr50 n	Tr51 n	Tr52 n
Greenwayodendron suaveolens (Engl. & Diels) Verdc	3	3	5	1	4	3
Dacryodes macrophylla (Oliv.) Laur.	2	4	7	6	1	1
Rhabdophyllum 47d	5	1	2	3	1	
Diospyros iturensis (Gürke) Letouzey & F.White	4	4	1	3	1	
Aucoumea klaineana Pierre	7	4	3	2		
Garcinia mannii Oliv.	3	4	4	2		
Syzygium cf congolense Verm. & Amshoff	3	4	3	2		
Dialium cf corbisieri Staner	3	3	1	2		
Santiria trimera (Oliv.) Aubrév.	5	6	7		2	1
Pentaclethra eetveldeana De Wild. & T.Durand	5	4	2		3	1
Dialium pachyphyllum Harms	5	2	2	1	2	
Erismadelphus exsul Mildbr. cf var. platyphyllus Keay & Stafleu	5	2		2		
Baphia leptostemma Baill.	5	1		4	3	5
Microdesmis sp Hook.f. ex Hook	5		2		6	
Oncoba cf mannii Oliv.	4		5			
Pausinystalia macroceras 47b (K.Schum.) Pierre ex Beille	3	1	2		2	
Berlinia auriculata Benth.	3	1				
Allanblackia sp Oliv. ex Benth.	3		5	1		
Greenwayodendron s. var gab. (Pellegr. ex Le Thomas) Verdc.	2	8	9		2	
Dialium guineense Willd.	2	5	9	4	6	
Chytranthus sp Hook.f.	2	2	2			1
Xylopia le-testui Pellegr. var. longepilosa Le Thomas	2	1		1	1	1
Thomandersia cf hensii De Wild. & T.Durand	2		3			
Anonidium mannii (Oliv.) Engl. & Diels	2					1
Dracaena cf laxissima Engl.	1	3	4	1		1
Placodiscus cf glandulosus Radlk.	1	3	1			
Trilepisium madagascariense Thouars ex DC.	1	1	5			2
Aphanocalyx microphyllus (Harms) Wieringa	1	1				
Diospyros sp L.	1		4			1
Maesobotrya floribunda Benth.	1		2			
Dichostemma glaucescens Pierre	1		1	2	10	1
Drypetes sp Vahl	1		1			
Garcinia sp	1			3		

Appendix 1 (continued) common species

species	Tr47 n	Tr48 n	Tr49 n	Tr50 n	Tr51 n	Tr52 n
Coelocaryon preussii Warb	1				1	
Cola sp Schott & Endl.		5	2			
Sapindaceae 48a		4	1			
Plagiostyles africana (Müll.Arg.) Prain		3	3		1	
Harungana madagascariensis Lam. ex Poir.		2		2		
Diospyros conocarpa Gürke & K.Schum.		1	1	1		
Funtumia sp Stapf		1	1			
Beilschmiedia cf klainei Robyns & R.Wilczek		1		1		
Didelotia africana Baill.			1			2
Isolona hexaloba (Pierre) Engl. & Diels			1	1	1	1
Oncoba 47d		1		1	4	
Strombosia pustulata Oliv.		1			3	
Tricalysia sp		1		1		
Chytranthus edulis Pierre			2	2	2	4
Oddoniodendron micranthum (Harms) Baker f.				11		3
Diospyros cf bipindensis Gürke				8	1	
Plagiosiphon emarginatus (Hutch. & Dalziel) J. Léonard				6	2	5
Rutaceae 49c				5		1
Sapindaceae 49b				4	6	4
Synsepalum cf longecuneatum De Wild.				4	4	2
Staudtia stipitata Warb.				3	2	7
Tessmannia sp Harms				2		
Strombosiopsis tetrandra Engl.				1	2	1
Carapa cf parviflora				1	2	
Cola digitata Mast.				1		2
Bikinia pellegrinii (A.Chev.) Wieringa				1		1
Gilbertiodendron cf stipulaceum (Benth.) J.Léonard					1	6
Tessmannia lescrauwaetii (De Wild.) Harms					1	2
Trichoscypha 51c					1	1
Beilschmiedia sp Nees					2	1

Appendix 2

species	Tr47 n	Tr48 n
Dialium cf angolense Welw. ex Oliv.	5	
Spp 47b	5	
Dacryodes klaineana (Pierre) H.J.Lam	2	
Garcinia smeathmannii (Planch. & Triana) Oliv.	2	
Uapaca sp Baill.	2	
Baphia cf leptobotrys Harms	1	
Cola acuminata (P.Beauv.) Schott & Endl.	1	
Cola altissima Engl.	1	
Dacryodes 47b2	1	
Dacryodes cf igaganga Aubrév. & Pellegr.	1	
Grewia cf coriacea Mast.	1	
Nauclea pobeguinii (Hua ex Pell.) Merr. ex Petit	1	
Pauridiantha cf dewevrei (De Wild. & T.Durand) Bremek.	1	
Aneulophus africanus Benth.		7
Diospyros 48a		5
Hallea cf ledermannii (K.Krause) Verdc.		5
Diospyros cf zenkeri (Gürke) F.White		3
Berlinia cf auriculata Benth.		2
Oxyanthus cf speciosus DC.		2
Anisophyllea cf polyneura J.Floret		1
Araliopsis sp Engl.		1
Baphia sp Afzel. ex Lodd.		1
Carapa sp		1
Dacryodes yangambensis		1
Dialium tessmannii Harms		1
Drypetes 48d		1
Maranthes cf glabra (Oliv.) Prance		1
Microdesmis 48b		1
Newtonia leucocarpa (Harms) Gilbert & Boutique		1
Parkia bicolor A.Chev.		1
Pavetta cf corymbosa (DC.) F.M.Williams		1
Sorindeia cf winkleri Engl		1
Swartzia fistuloides Harms		1
Tessmannia lescrauwaetii (De Wild.) Harms		1
Uvariastrum pynaertii De Wild.		1
Xylopia 48c		1

species	Tr49 n	Tr50 n
Dialium cf polyanthum Harms	3	
Dialium sp L.	3	
Duvigneaudia inopinata (Prain) J.Léonard	3	
Rutaceae 48c	3	
Calpocalyx dinklagei (Taub.) Harms	1	
Carapa cf angustifolia Harms.	1	
Ceaesalpiniaceae sp	1	
Discoglypremna caloneura (Pax) Prain	1	
Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill.	1	
Mareya sp Baill.	1	
Millettia laurentii De Wild.	1	
Pentaclethra macrophylla Benth.	1	
Rubiaceae 49b	1	
Tessmannia africana Harms	1	
Trichilia gilgiana Harms	1	
Warneckea cauliflora Jacq.-Fél.	1	
Xylopia 49a	1	
Sapindaceae 49a		7
Tessmannia sp Harms		2
Berlinia 49a		1
Hallea 49a		1
Napoleonaea cf vogelii Hook. & Planch.		1
Ongokea gore (Hua) Pierre		1
Pleiocarpa cf bicarpellata Stapf		1
Polyceratocarpus parviflorus (Baker f.) Chesq.		1
Rhabdophyllum 45d		1

Appendix 2 (continued)

	Tr51	Tr52
species	**n**	**n**
Hymenostegia pellegrinii (A.Chev.) J.Léonard	7	
Oddoniodendron 50b	4	
Gambeya cf subnuda (Baker) Pierre	2	
Lecomtedoxa sp	2	
Piptostigma cf mortehani De Wild.	2	
Rhabdophyllum cf arnoldianum (De Wild. & T.Durand) Tiegh.	2	
Angylocalyx pynaertii De Wild.	1	
Baphia obanensis Baker f.	1	
Barteria fistulosa Mast	1	
Chytranthus cf mortehani (De Wild.) De Vold. ex Hauman	1	
Heisteria parvifolia Sm.	1	
Hymenostegia pellegrinii (A.Chev.) J.Léonard	1	
Memecylon cf collinum Jacq.-Fél.	1	
Rabdophyllum 47d	1	
Sizyguim 51c	1	
Strephonema cf sericeum Hook.f	1	
Symphonia globulifera L.f.	1	
Thomandersia 51a	1	
Vangueriopsis rubiginosa Robyns	1	
Warneckea cf sapinii (De Wild.) Jacq.-Fél.	1	
Cynometra cf sanagaensis Aubrév.		10
Craibia cf atlantica Dunn		8
Ceaesalpiniaceae 52a2		3
Hymenostegia pellegrinii (A.Chev.) J.Léonard		3
Synsepalum cf le-testui Aubrév. & Pellegr		3
Hymenostegia pellegrinii (A.Chev.) J.Léonard		2
Prioria oxyphylla (Harms) Breteler		2
Baphia cf laurifolia Baill.		1
CF Pavetta sp		1
Cleistopholis glauca Pierre ex Engl. & Diels		1
Diospyros barteri Hiern.		1
Diospyros cf boala De Wild.		1
Diospyros hoyleana F.White		1
Drypetes 52c		1
Drypetes gilgiana (Pax) Pax & K.Hoffm.		1
Erythrophleum ivorense A.Chev.		1
Maprounea africana Müll.Arg.		1
Plagiosiphon 52b		1
Polyceratocarpus cf parviflorus (Baker f.) Chesq		1
Rhabdophyllum 51a		1
Rinorea angustifolia (Thouars) Baill. subsp. ardisiiflora (Welw. ex Oliv.) Grey-Wilson		1
Spp 52b		1
Tricalysia soyauxii K.Schum.		1
Xylopia 52d		1