


The Uniqueness of Mont Mbilan Plateau





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the Mont Mbilan Plateau

Preliminary results and observations

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the **Mont Mbilan Plateau**

Mbé National Park

The geographical position of the Mt Mbilan Plateau (yellow encircled), park limit (red) and Mt Mbilan summit (small red triangle).

The Mt Mbilan Plateau

The Mont Mbilan Plateau is situated at the edge of the Monts de Cristal just NE of Mont Mbilan (see above). The area is relatively flat compared to the rugged landscape it is nested in.

During the delimitation of this part of the park a so-called “elfin forest” was encountered at the plateau. This is a type of forest found only at high altitudes (1000m <), and characteristically it has a low-canopy and covered in mosses (see below).

It is unique to find such a forest type at an altitude of only 500m and according to C.Wilks (personal comment) it is the largest extent of this type of forest in the Monts de Cristal.

The uniqueness or endemic status of the plateau forest deserved a more detailed study, especially since there exists the threat of mining. The soil contains large quantities of iron which made compasses useless during the delimitation of this part of the park last year August.

▲
A potential new species from the plateau, a blue flowered species of the family of the Rubiaceae.

Vegetation ► covered in mosses

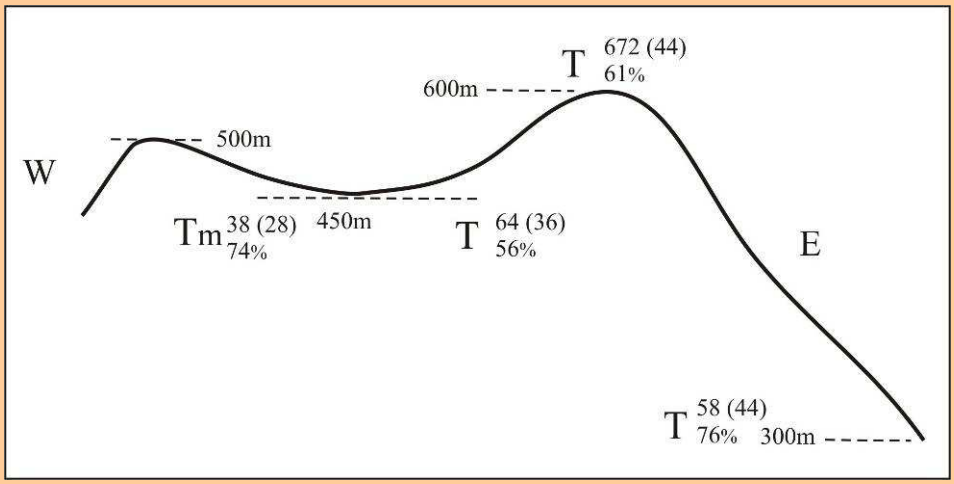
Uniqueness

The iron content of the plateau is a threat as it represents an economical value. Therefore, the main objective of this mission was to determine the scientific and biological value or uniqueness of the plateau to counterbalance exploitation in the future.

General characteristics of all transects in the Mt Mbilan Range

transect	1	2	3	7	4	6	5	13	12	14 (m)	15	
site	W	W	W	E	E	E	E	P	P	P	P(e)	
altitude	100m	500m	700m	100m	300m	500m	700m	600m	450m	450m	300m	**average**
species	60	68	48	68	75	63	63	71	63	38	58	61
endemics	22	33	29	40	45	34	42	40	26	28	37	34
% endemics	37	49	60	59	60	54	67	56	41	74	64	56

14(m): the transect in the marshy area
P(e): transect below the plateau at 300m



Profile of the Mt Mbilan Plateau showing the distribution of the transects (T) at bottom, summit and east of the plateau. The figures at each transect are the total number of species, between brackets the number of species restricted to that transect (endemic) and the percentage. Tm: marshy transect

Methods

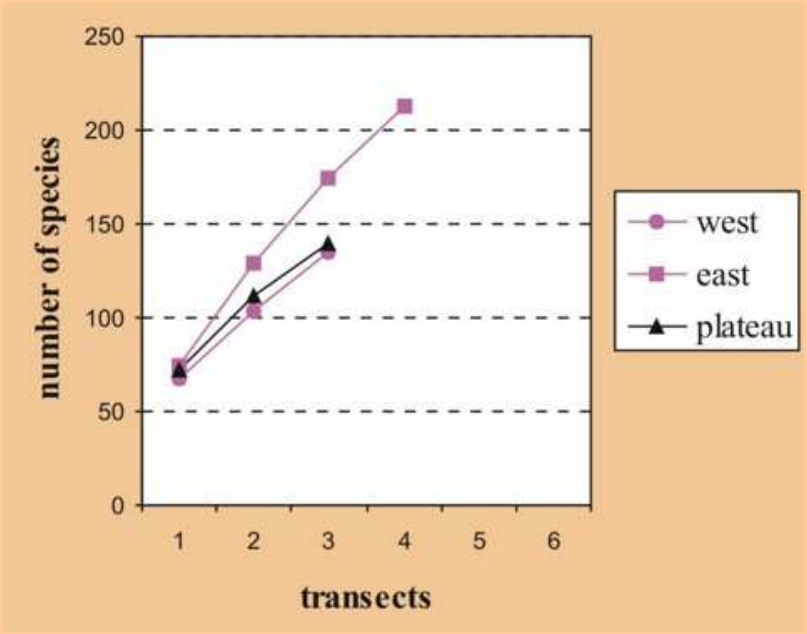
The transects used to record species composition were 200 m long and 5 m wide. Every individual with a diameter at breast height (dbh) of 5 cm and greater was recorded and identified. For each species which remained unidentified a voucher specimen was taken for further examination in the herbarium of Libreville or Wageningen. Often these 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.

Three transects were placed on the Mt Mbilan Plateau and one east of the plateau at 300m. Two transects were placed at the valley bottom at 450m and one further up at the rime of the plateau at 600m (see above). Transects were put in after the zone was prospected to estimate the heterogeneity of the environment, and habitat diversity. This procedure ensures to record maximum species diversity present within a certain altitudinal zone and avoids replication, i.e. transects with a similar species composition.

To be able to establish the uniqueness of the plateau species composition of the transects on and off the plateau were compared by calculating similarities indices (Sørensen) between all transects. This tells how dissimilar or unique the plateau transects are. (Sørensen index is $T_{12}/[0.5(T_1+T_2)]$ where T_{12} is the number of shared species between two transects; T_1 is the total number of species on transect 1 and similarly T_2.

General characteristics

In total species 184 (morpho-) species were recorded on the 4 transects. On average 58 species were recorded per transect. The lowest number was 38 species on the marshy transect at 450m and the highest number was 72 species on the rime at 600m. The majority of the species (184 species; 83%) were restricted to a single transect (4 transects). The number of restricted species is only slightly lower when all Mt Mbilan Range transects (11) are considered (464 species; 81%).



◄Species area curves of the three sites within the Mt Mbilan Range

Map of the Mt Mbilan Range showing the three sites►
W: west, E: east, P: plateau

Species richness

Botanical sites can be unique by a high level of species richness and/or a high level of endemism, i.e. species found to only that site. The species-area curve can be used to determine how unique a site is in terms of species richness compared to other sites.

The species-area curve shows how quickly species richness increased with sampled area, i.e. its steepness and also the maximum species richness of the site, i.e. when the curve bends towards a horizontal line (asymptote).

The figure above shows the species-area curves of the three sites in the Mont Mbilan Range (see map for location sites). The three species-areas curves do not yet level off to an asymptote, i.e. a maximum. This indicates that the three sites are still under-sampled and species richness will still rise.

The species-area curve for the plateau was drawn based on the three plateau transects. (The data from the 4th transect (P(e)) at 300m was not used as it was not located on the plateau.) The species-area curve from the plateau and the western site are not very different. The species area curve of the eastern side is clearly more "unique" in total number of species found, steepness or potential maximum species than the curve of the plateau.

Endemism

The other characteristic of uniqueness, i.e. endemism was determined by calculating Sørensen similarity indices (see table below). The restricted occurrence of species to a single transect in the Mt Mbilan Range is high, even when all transects are tabulated and compared (81%). Therefore, only species which occurred on more than one transect was used.

Similarity between sites at the same altitudes varied between 0.38 and 0.63 (Sørensen index). Similarity in species composition of the forest was highest (0.63) between the two transects on the eastern slope at 300m and similarity was lowest at the highest altitude between the transect at 700m on eastern slope and the transect on the plateau at 600m.

Sorensen index values

site	W	W	W	E	E	E	E	P	P	P	P (e)
altitude	100m	500m	700m	100m	300m	500m	700m	600m	450m	450m	300m
transect	**1**	**2**	**3**	**7**	**4**	**6**	**5**	**13**	**12**	**14 (m)**	**15**
2	0.68		0.56	0.22	0.31	0.41	0.36	0.33	0.31	0.22	0.29
3	0.39	0.56		0.21	0.24	0.38	0.50	0.28	0.29	0.21	0.20
7	0.42	0.22	0.21		0.69	0.39	0.29	0.24	0.37	0.11	0.49
4	0.41	0.31	0.24	0.69		0.54	0.39	0.36	0.42	0.15	0.63
6	0.39	0.41	0.38	0.39	0.54		0.48	0.27	0.39	0.21	0.36
5	0.27	0.36	0.50	0.29	0.39	0.48		0.38	0.45	0.26	0.29
13	0.26	0.33	0.28	0.24	0.36	0.27	0.38		0.74	0.49	0.42
12	0.27	0.31	0.29	0.37	0.42	0.39	0.45	0.74		0.43	0.57
14 (m)	0.13	0.22	0.21	0.11	0.15	0.21	0.26	0.49	0.43		0.10
15	0.41	0.29	0.20	0.49	0.63	0.36	0.29	0.42	0.57	0.10	

14(m): the transect in the marshy area
P(e): transect below the plateau at 300m

The transect most dissimilar from all other transects is the transect from the marshy area on the plateau (see **14(m)** in table above). In general characteristics this transect is not very unique. It does not have a high level of species richness nor a high level of endemism, i.e. species restricted to a single transect.

The total number of species present on this transect was only 38, whereas the average is 61 species. The low total number of species also explains the low number of endemic species, which is only 28 species compared to 34 species on average. But in relative terms it has the highest percentage of endemic species, 74% compared to 56% on average.

This transect was done in the marshy area of the plateau which is the most typical forest on the plateau. It was actually this low-canopy forest covered in mosses which drew attention to study the plateau in more detail. Last year when the plateau was visited the stunted vegetation was interpreted as elfin-forest. However, then the large marshy area was dry as this visit took place during the dry season July/August.

The new species *Calvoa maculata*

However, during that short stay a new species of Calvoa was discovered, *Calvoa maculata* and during this mission it could be established that its distribution is completely restricted the “bottom” of the plateau. As mentioned earlier again a potential new species was found on the plateau, a blue-flowered species of the family of the Rubiaceae.

Together with the ecological data, this botanical finds underline the uniqueness of the plateau.

Conclusions

Mt Mbilan Plateau was before this assessment identified as a unique site within the Monts de Cristal with a high conservation value. The assessment showed that biodiversity on the plateau is not very different from the rest of Mt Mbilan Range. But it remains to be said that the Mt Mbilan Range is presently the area with the highest biodiversity within the African rain forest. Data from the transects show that the seasonal marshy elfin-like forest on the plateau is unique within the Mt Mbilan Range. Furthermore, botanical finds support the uniqueness of the plateau. The existence of the narrow endemic species *Calvoa maculata* on the plateau suggests that the plateau is a refuge area within a refuge area, because the evolution of narrow endemics can only take place in long-term isolated but very stable forest refuge areas. Mining the plateau for iron would make this narrow endemic species become extinct.

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