

RED LISTS FOR MALAGASY PLANTS

I: *Melanophylla* (TORRICELLIACEAE)



Melanophylla alnifolia – photo George Schatz

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Introduction

Nowhere in the World can rival Madagascar in terms of the diversity and uniqueness of its flora. Estimates of the total number of plant species in the country continue to climb and now it is thought that at least 13,000 species of higher plant grow in the country (pers. comm. P. Phillipson). This remarkable diversity is especially important given that nearly all these species (around 90% - Schatz 1999) grow only in Madagascar. Sadly Madagascar's exceptional flora is highly threatened and an alarming number of plant species are now on the very brink of extinction. We must now choose whether to make strenuous efforts to conserve the Malagasy flora or accept, within the next few decades, the loss of a large number of plant species. Now is the last chance to make this choice.

An important part of effective conservation is prioritization: the relatively small amount of money available for conservation must be used where it will have most impact. To assist with the prioritization of conservation actions for the Malagasy flora a series of documents will be produced containing risk of extinction estimates for species in selected Malagasy plant families.

The research presented here was conducted as a collaborative project between Missouri Botanical Garden (MBG), Antananarivo University and Madagascar's National Association for the Management of Protected Areas (ANGAP).

Methods for estimating risk of extinction

The identification of the species with the highest priority for conservation action is based on estimates of their likelihood of becoming extinct in the next few decades. However before the risk of extinction of a species can be investigated it is necessary to ensure that it has been delimited using a taxonomic framework that closely reflects the real distribution of variation (that in turn reflects underlying evolutionary history) within the genus/family to which the species belongs. In an endeavor associated with our study the taxonomic framework of each of Madagascar's endemic families was examined by scientists from Missouri Botanical Garden and the National Museum of Natural History in Paris and those judged inadequate were revised. These revisions were published as a series of articles in the journal *Adansonia* and resulted in new species being delimited, previously recognized species being re-circumscribed, and others placed in synonymy.

Information on the risk of extinction of each species was obtained from the analysis of its distribution and from observations made in the field. Most of this work was conducted by Malagasy students as part of their DEA (= Masters) studies. Species distribution was estimated using geo-referenced locality data obtained from herbarium specimens in the five herbaria (K, MO, P, TAN, TEF) with large holdings of Malagasy plants. Most recent herbarium specimens include precise longitude and latitude coordinates of the collection location obtained using a GPS, but many older specimens do not, necessitating *post facto* allocation of coordinates by locating the collection site on maps with the aid of MBG's Madagascar gazetteer (available on line at (<http://www.mobot.org/MOBOT/Research/madagascar/gazetteer>)). The collection sites were mapped and analyzed using ArcView Geographic Information System (GIS) software. The resultant species distribution was quantified in terms of extent of occurrence, area of occupancy, and number of subpopulations. The analysis of each species' distribution in relation to various environmental base maps provided information on the habitat of the species in terms of geology, vegetation type, bioclimate and elevation.

Information on the habitat, abundance, pollination, seed dispersal, regeneration, threats, uses and vernacular name for each species was obtained by locating and studying at least one population in the wild. The best method of locating species proved to be with the assistance of local people living close to previous collection sites. Information on the vernacular name and uses of the species were also obtained from the labels of herbarium specimens.

Further information on the methods used in the study is provided in Table 1.

The information collected for each species is summarized in a Risk of Extinction Datasheet

Table 1. Methods for the collection of information presented in each of the data fields of the Species Conservation Priority Datasheet.

<p>Species name and author: name of species according to the most recent taxonomic revision and name of author(s) who defined the species</p>	<p>Risk of extinction: based on the application of criteria presented in IUCN (2001)</p>
<p>Vernacular names: from information collected in the field and captured from herbarium specimens.</p>	<p>Conservation recommendations: our recommendations for actions to reduce the risk of extinction of the species.</p>
<p>Description: based on information in the literature and our own observations of herbarium specimens and living plants in the field.</p>	
<p>Habitat:</p> <ul style="list-style-type: none"> • Vegetation type: defined by observations in the field and analysis of the distribution of the species related to the vegetation map of DuPuy & Moat (1996) • Bioclimate: defined by the analysis of the distribution of the species related to the bioclimate map of Cornet (1974) • Geology: defined by observations in the field and analysis of the distribution of the species related to the geology map of DuPuy & Moat (1996) • Altitude: based on field observations and information captured from the notes accompanying herbarium specimens 	
<p>Biology:</p> <ul style="list-style-type: none"> • Pollination: probable pollinator identified from characteristics of flower and observations in the field • Seed dispersal: probable method of seed dispersal identified from characteristics of fruit and observations in the field 	
<p>Uses: based on information collected by interviewing local people in the field and captured from the literature and notes on herbarium specimens.</p>	
<p>Distribution: distribution of the species represented by the locations of the collection sites of the herbarium specimens attributed to the species in the five herbaria with large collections from Madagascar. Map created using Arcview 3.2 software.</p>	<p>Observations of study population(s) Location: study site with geo-reference</p> <ul style="list-style-type: none"> • Regeneration observed: presence of regeneration assumed from the presence at the site of individuals representative of all size classes. • Tolerant to disturbance: presence of regenerating populations of the species in severely degraded vegetation (>50% of original biomass lost). • Density: average number of mature individuals of the species per ha of appropriate habitat based on counts in replicated plots or along transects. • Abundance: estimated number of mature individuals at the study site based on the density of the species at the site and an estimate of the area of suitable habitat available (abundance classes based on thresholds used in IUCN (2001)).
	<p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: estimate of decline of population based on observations of tolerance of species to habitat perturbation and estimates of rate of loss of primary vegetation from (FAO 1993, Green & Sussman 1990, Steininger et al. 2002). Classes of population decline (i.e. 0-30%, ≥30-50%, ≥50-80%, ≥80%) relate to thresholds used in the IUCN (2001). • Due to exploitation or poor regeneration: in addition to loss of habitat it is possible that populations may decline because of selective exploitation or poor regeneration resulting for example from the increasing rarity of pollinators or seed dispersers. Although we were unable to quantify these factors, their possible significance is noted.
	<p>Distribution attributes for total population: (These analyses made using ArcView 3.2)</p> <ul style="list-style-type: none"> • Extent of occurrence: estimated as the area contained within the shortest continuous imaginary boundary drawn to encompass all the collection locations for the species. • Area of occupancy: estimated as the area of suitable habitat (defined in terms of vegetation type, bioclimate, altitude and geology) for the species within the extent of occurrence. • Number of subpopulations: estimated as the number of collection locations but combining locations that are separated by less than 5 km.
	<p>Representation in protected areas: Protected areas are defined as National Parks (PN), Special Reserves (RS), Nature Reserves (RNI), Biosphere Reserves (RB).</p> <ul style="list-style-type: none"> • Number of subpopulations: number of data points within protected areas but combining locations separated by less than 5 km. • Protected areas: list of protected areas where the species has been recorded.
<p>Herbarium specimens examined: list of herbarium specimens examined for this study</p>	

Toricelliaceae Takht. ex Airy Shaw
(from Schatz 2001)

Formerly the genus *Melanophylla* was classified within the family Melanophyllaceae that was endemic to Madagascar. However, recent molecular sequence data suggest that this genus should be classified with two non-malagasy genera (*Aralidium* and *Toricellia*) within a new family Toricelliaceae (see the Phylogeny Group website at <http://www.mobot.org/MOBOT/Research/Apweb>).

Melanophylla Baker, J. Linn. Soc. Bot. 21: 352. 1886.

Endemic genus of 7 species.

Hermaphrodite shrubs to small trees, sparsely branched, entirely glabrous. Leaves alternate, simple, often clustered at the apex of branch, entire or more often irregularly to regularly crenate, dentate, or serrate, sometimes only along the apical half of the leaf margin, the petiole base slightly to markedly amplexicaul and sheathing the branch, the leaves often succulent and cabbage-like, usually turning black upon drying, exstipulate. Inflorescences terminal or pseudoterminal, bracteate racemes or panicles, the flowers small, regular, 5-merous; sepals fused to form a tubular calyx, with 5 short, teeth-like lobes; petals 5, free, reflexed at anthesis, usually white, pink, or rarely yellow; stamens 5, alternate the petals, filaments slender, anthers bilocular, dorsifixed, introrse longitudinally dehiscent; ovary inferior, 2-3-locular, styles 3, linear or thickened and recurved, the stigmatic surface along the inner portion of the style; ovule 1 in one of the locules, the other(s) sterile. Fruit a small to large, fleshy, indehiscent, single-seeded drupe, crowned by the persistent remnants of the style/stigma; seed with endosperm.

Melanophylla is distributed throughout the humid to subhumid evergreen forest from Andohahela RNI to the Marojejy RNI and Sambirano Region (Manongarivo RS), primarily at mid-elevation from 500-1,500 m, but descending to near sea level on the Masoala Peninsula and at Manombo RS.

Key to the species of *Melanophylla*

(from Schatz *et al.* 1998 and McPherson G. D. and J. Rabenantoandro. 2002)

1. Inflorescence main axis 36-60 cm long *M. modestei*
- 1'. Inflorescence main axis 3.5-29 cm long 2
2. Leaf blade thick coriaceous 3
- 2'. Leaf blade membranous, chartaceous, or sub-coriaceous 4
3. Leaf margins slightly revolute; flower buds 2.5 cm long, petals 3.5 mm *M. madagascariensis*
- 3'. Leaf margins strongly revolute; flower buds 4.5-5 mm long, petals 5.5 mm *M. perrieri*
4. Leaf blade membranous or chartaceous 5
- 4'. Leaf blade sub-coriaceous 6
5. Inflorescence bifid, each axis a raceme, rarely one or both axes once-branched near the base, petals yellow; fruit 14-16 mm long *M. crenata*
- 5'. Inflorescence a well-branched pyramidal panicle, petals white; fruit 6-11 mm long *M. aucubifolia*
6. Leaf blade 3.5-10 (-12) cm long; twigs slender, petiole base 1-3 mm broad; plants occurring from 900-1,800 m altitude *M. alnifolia*
- 6'. Leaf blade 20-30 cm long; twigs slender, petiole base 5-9 mm broad; plants known only from Manombo RS (c. 30 m altitude) *M. angustior*



Melanophylla aucubifolia, Betampona – photo Chris Birkinshaw



Melanophylla madagascarensis, Betampona – photo Chris Birkinshaw


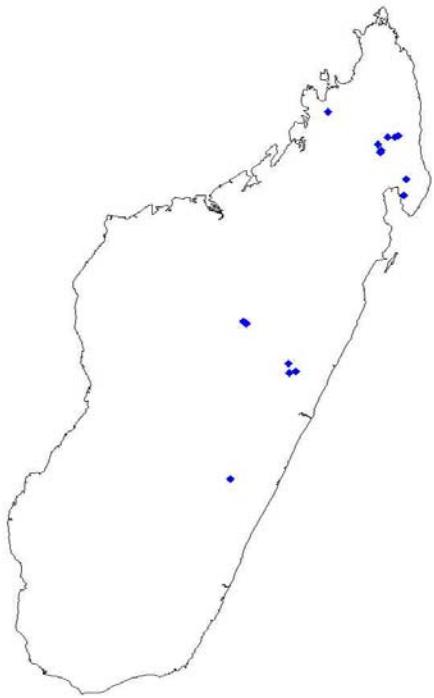


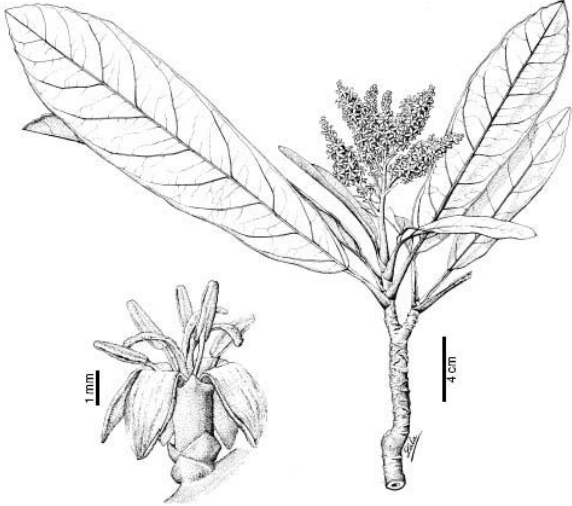

Melanophylla alnifolia, Ambohitantely – photo George Schatz


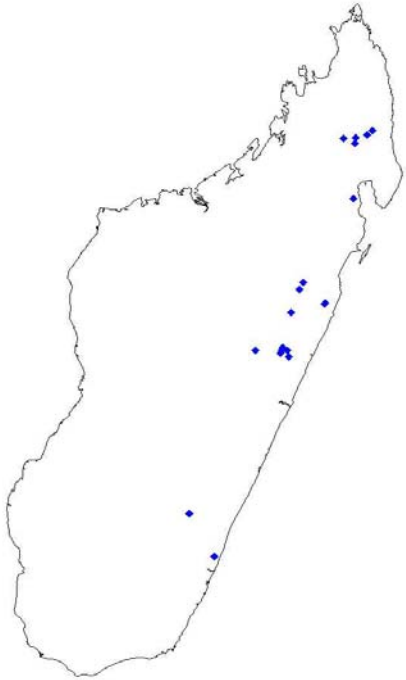




Melanophylla modestei, Ambanziana – photo George Schatz



RISK OF EXTINCTION DATASHEETS



<p><i>Melanophylla alnifolia</i> Baker</p>	<p>Risk of extinction: Least Concern</p>
<p>Vernacular names: Briaty, Hazomborondreo, Marefolena, Sirambengy</p>	<p>Conservation recommendations: good management of protected areas</p>
<p>Description: Small/medium tree. Twigs slender. Leaves medium, obovate/spoon-shaped with obtuse/rounded apex and cuneate base, margins rolled over and crenulate close to apex, leathery; petiole sheathing stem. Inflorescence a panicle with main axis to 12 cm long. Flower with white petals. Fruit yellow.</p>	
<p>Habitat</p> <ul style="list-style-type: none"> • Vegetation type: mid-elevation humid forest • Bioclimate: humid, subhumid • Geology: basement rock • Altitude: 900 - 1800 m 	
<p>Biology</p> <ul style="list-style-type: none"> • Pollination: probably insects • Seed dispersal : probably lemurs and/or birds 	
<p>Uses</p> <p>None known.</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <p>Location 1.: Ambohitantely RS (47°11'E, 18°11'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 23.5 individuals per ha. • Abundance: probably > 10,000 <p>Location 2 : Bekorakaka (48°2'E, 19°04'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 35 individuals per ha. • Abundance: probably > 10,000
	<p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 0-30% (reason for loss = shifting cultivation) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of large vertebrate dispersers.
	<p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 123.128 km² • Area of occupancy : 21.693 km² • Number of subpopulations: 16
	<p>Distribution attributes of population within protected areas</p> <ul style="list-style-type: none"> • Number of subpopulations: 12 • Protected areas: Anjanaharibe Sud RS, Ambohitantely RS, Manongarivo RS, Marojejy PN, Masoala PN, Ranomafana PN
<p>Herbarium specimens examined: Antananarivo: Ambohitantely RS, G.E. Schatz, S.G. Razafimandimbison, S.T. Malcomber & L. Rakotomalala 3552: Manankazo-Ankazobe, SF(Rakotoarisoa.F.) 7880: Manankazo-Ankazobe SF, SF(Rakotoarisoa.F.) 7995: Ambohitantely RS, SF(Capuron) 20164: Ambohitantely RS, F. Randriantafika et al. 89. Antsiranana: Marojejy RN, James S. Miller & A. Randrianasolo 4598: Marojejy RN, Armand Randrianasolo 90: Anjanaharibe-Sud RS, D. Ravelonarivo et al. 95: Anjanaharibe-Sud RS, SF(Capuron) 937: Manongarivo RS, SF(Capuron) 11453: Marojejy RN, J.-L. Guillaumet 4171: Anjanaharibe-Sud RS, H. Humbert, R. Capuron & G. Cours 24625: Marojejy RN, H. Humbert & P. Saboureau 31503: Marojejy RN, H. Humbert & P. Saboureau 31628: Anjanaharibe-Sud RS, COURS 3750: Ampokafo, R. Ranaivojoana et al. 202 Fianarantsoa: Ranomafana PN, Raphael Rakoto 340 Toamasina: Ambanizana, G.E. Schatz & G. Modeste 2895 Sandrangato, SF(Ranaivojoana.N.) 21924: Beanjada, SF(R. Capuron) 8806: Moramanga, G. Cours 879: Sandrangato, SF(Rahobisoa. B.) 21923: Bekorakaka, F. Randriantafika et al. 87</p>	



<p><i>Melanophylla angustior</i> McPherson & Rabenantoandro</p>	<p>Risk of extinction: Critically Endangered (D)</p>
<p>Vernacular names: none known</p>	<p>Conservation Recommendations: a) good management of Manombo RS, b) modification of boundary of Manombo RS to include the individuals outside the current limit, c) possibly reinforce the population at Manombo RS, d) ex-situ conservation, e) search for additional populations at Manombo RS</p>
<p>Description: Small tree to 8 m tall. Leaves somewhat clustered towards the end of branches, blades large, oblong, narrowly elliptic/narrowly oblanceolate with cuneate base and obtuse/shortly acuminate apex, margin untoothed or toothed above, papery or sub-coriaceous; petiole short (to 4.7 cm) with sheathing base. Inflorescence a many branched panicle with main axis to 14 cm long. Flowers almost sessile with pale cream petals. Fruit unknown.</p>	
<p>Habitat</p> <ul style="list-style-type: none"> • Vegetation type: low elevation evergreen humid forest • Bioclimate: humid • Geology: basement rocks • Altitude: 30 m 	
<p>Biology:</p> <ul style="list-style-type: none"> • Pollination: probably insects. • Seed dispersal: probably lemurs and/or birds 	
<p>Uses</p> <p>None reported</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <ul style="list-style-type: none"> • Location: Manombo RS (23° 01'S, 47° 44'E) • Regeneration observed: yes (but poor) • Tolerant to disturbance: No • Density: 0.05 mature individuals per ha. • Abundance: probably < 50 <p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 30-50% (part of population is outside protected area) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of large vertebrate seed dispersers. <p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 1 km² • Area of occupancy: 1 km² • Number of subpopulations: 1 <p>Distribution attributes for population within protected areas</p> <ul style="list-style-type: none"> • Number of subpopulations: 1 • Protected areas: Manombo RS
<p>Herbarium specimens examined: Fianarantsoa: Manombo RS, Johny Rabenantoandro, G. McPherson & Gervais 774.</p>	

<p><i>Melanophylla aucubifolia</i> Baker</p>	<p>Risk of extinction: Least Concern (although this species has a high predicted population decline it has several large and apparently secure sub-populations within protected areas).</p>			
<p>Vernacular names: Hazomalany, Singaramatingoro, Tsiboratjala</p>	<p>Conservation Recommendations: good management of protected areas</p>			
<p>Description: Small (medium) tree. Twigs stout. Leaf blade medium (large on young plants), obovate/elliptical with acute apex and rounded teeth, cabbage-like in consistency when fresh; petiole long with wide base that sheaths the stem. Inflorescence a many-branched panicle with many bracts, main axis to 30 cm long. Flowers with whitish petals. Fruit yellow.</p>				
<p>Habitat:</p> <ul style="list-style-type: none"> • Vegetation type: low and mid-elevation evergreen humid forest • Bioclimate: humid, subhumid • Geology: basement rock • Altitude: 0 - 1,500 m 				
<p>Biology:</p> <ul style="list-style-type: none"> • Pollination: probably insect (bees seen visiting flowers at Betampona RN) • Seed dispersal: probably lemurs (fruits eaten by <i>Varecia variegata</i> and <i>Eulemur fulvus</i> at Betampona RN (pers. comm. Iambana Bernard)). 				
<p>Uses: None reported</p>				
<p>Distribution:</p> 	<p>Observations of study population(s):</p> <table border="1" data-bbox="778 1048 1485 1332"> <tr> <td data-bbox="778 1048 1129 1332"> <p>Location 1: Betampona RN (49°12'E, 17°56'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 2.6 mature individuals per ha. • Abundance: probably between 2,500-10,000 mature individuals </td> <td data-bbox="1129 1048 1485 1332"> <p>Location 2: Mantadia PN (48°53'E, 18°17'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 18 mature individuals per ha. • Abundance: probably > 10,000 mature individuals </td> </tr> </table> <p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 30-50% (cause of habitat loss = shifting cultivation) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of vertebrate seed dispersers. <p>Distribution attributes for total population:</p> <ul style="list-style-type: none"> • Extent of occurrence: 93,912 km² • Area of occupancy: 35,433 km² • Number of subpopulations: 19 <p>Distribution attributes of population within protected areas:</p> <ul style="list-style-type: none"> • Number of subpopulations: 12 • Protected areas: Andringitra PN, Analamazaotra RS, Anjanaharibe RS, Betampona RN, Manombo RS, Mantadia PN, Masoala PN, Marojejy PN, Zahamena PN 		<p>Location 1: Betampona RN (49°12'E, 17°56'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 2.6 mature individuals per ha. • Abundance: probably between 2,500-10,000 mature individuals 	<p>Location 2: Mantadia PN (48°53'E, 18°17'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 18 mature individuals per ha. • Abundance: probably > 10,000 mature individuals
<p>Location 1: Betampona RN (49°12'E, 17°56'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 2.6 mature individuals per ha. • Abundance: probably between 2,500-10,000 mature individuals 	<p>Location 2: Mantadia PN (48°53'E, 18°17'S)</p> <ul style="list-style-type: none"> • Regeneration observed: yes • Tolerant to disturbance: no • Density: 18 mature individuals per ha. • Abundance: probably > 10,000 mature individuals 			
<p>Herbarium specimens examined: Antananarivo: Mandraka SF, Ch. d'Alleizette 773; Antsiranana: Marojejy RN, James S. Miller 4242; Marojejy RNI, P.J. Rakotomalaza, N. Messmer & D. Ravelonarivo 732; Anjanaharibe RS, Herbier de la Station Agricole de l'Alaotra 3659; Anjanaharibe-Sud RS, G. Cours 3659 Anjanaharibe-Sud RS, H. Humbert, R. Capuron & G. Cours 24531; Anjanaharibe-Sud RS, Desiré Ravelonarivo & M. Rabarisoamanana 896; Anjanaharibe-Sud RS, Desiré Ravelonarivo & et al. 920; Anjanaharibe-Sud RS, G.E. Schatz & D. Ravelonarivo 3745; Fianarantsoa: Andringitra RN, Beverley Lewis et al. 895; Fianarantsoa: Iabomary, J. Rabenantoandro et al. 444; Toamasina: Mantadia PN, Porter P. Lowry II & G. Schatz 4282; Saharanga, SF(Capuron) 24029; Analamazaotra-Périnet RS, SF(Bégué) 1602; Analamazaotra-Périnet RS, SF(Capuron) 11538; Betampona RNI, M. Andrianarisata et al. 253; Marozevo, SF(R. Capuron) 24380; Betampona RN, RN(Rakotoniaina) 4533; Didy, G. Cours 4781; Didy, G. Cours 4802; Ambatovola, H. Perrier de la Bâthie 18358; Amboditavolo, SF(R. Capuron) 8984; Antsianaka, H. Humblot 517; Didy, G. Cours 4912; Mantadia PN, SF(Rabevohitra) 33845; Betampona RNI, J. Rabenantoandro et al. 52; Betampona RNI, R. Randrianaivo 271; Zahamena PN, Fidy Ratovoson, L.M. Randrianjanaka & J. Rakotoralahy 142; Zahamena PN, Johny Rabenantoandro et al. 153; Zahamena PN, Sennen Randrianasolo et al. 137</p>				

<p><i>Melanophylla crenata</i> Baker</p>	<p>Risk of extinction: Least Concern (although this species has a high predicted population decline it has several large and apparently secure sub-populations within protected areas).</p>
<p>Vernacular names: Hazoporetaka, Kivoso, Kibotongotra, Marefilena, Sirambengy, Tafatra, Vavaporetaka</p>	<p>Conservation Recommendations: good management of protected areas</p>
<p>Description: Small trees. Leaves medium, oblong/obovate/elliptical, borne on slender twigs (compared with <i>M. aucubifolia</i>). Inflorescence two-branched, consisting of one relatively long and one relatively short raceme; terminal. Flowers with yellow petals.</p>	
<p>Habitat:</p> <ul style="list-style-type: none"> • Vegetation type: low and mid-elevation evergreen humid forest • Bioclimate: humid, subhumid • Geology: basement rock • Altitude: 300 - 1,400 m 	
<p>Biology:</p> <ul style="list-style-type: none"> • Pollination: probably insects • Seed dispersal: probably lemurs and/or birds 	
<p>Uses: Timber.</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <ul style="list-style-type: none"> • Location: Talatakely (47°18', 21°02') • Regeneration observed: no • Tolerant to disturbance: no • Density: 5 mature individuals per ha. • Abundance: <50 mature individuals <p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 50-80% (cause of habitat loss = shifting cultivation) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of are large vertebrate seed dispersers and exploitation for timber. <p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 47,356 km² • Area of occupancy : 16,724 km² • Number of subpopulations: 21 <p>Distribution attributes for population within protected areas</p> <ul style="list-style-type: none"> • Number of subpopulations: 9 • Protected areas: Zahamena RNI, Analamazoatra RS, Mantadia PN, Andohahela PN, Ranomafana PN, Pic d'Ivohibe RS
<p>Herbarium specimens examined: Fianarantsoa: Ranomafana PN, Raphael Rakoto 284: Ranomafana PN, S. Malcomber et al. 1633: Ranomafana PN, Marion Nicoll 127: Ranomafana PN, A. Kotozafy & D. Randriamanantena 352: Andringitra RN, Beverley Lewis et al. 847: Andringitra RN, Beverley Lewis et al. 860: Ranomafana PN, Dan Turk & J. Randrianasolo 256: Ranomafana PN, Dan Turk & J. Randrianasolo 571: Ranomafana PN, R. Rakoto & D. Randriamanantena 433: Ampamaherana SF, SF(Rouxeville) 1258: Pic d'Ivohibe RS, SF(Rakoto,JD) 1494: Andrambovato SF, SF(Ramarolahy) 6508: Andrambovato SF, SF(Ramarolahy) 5852: Ampamaherana SF, SF 2042: Ranomafana PN, A. Kotozafy & P. Rasabo 458: Ranomafana PN, A. Kotozafy & P. Rasabo 586: Ranomafana PN, A. Kotozafy & P. Rasabo 587: Andrambovato SF, R. Randrianaivo et al. 283: Ivohibe RS, P.J. Rakotomalaza, C. Rakotovoao & N. Messmer 1407: Ranomafana PN, F. Randriantafika et al. 131: Toamasina: Beforona, SF(Comtet, S.) 34312: Mantady PN, R.D. Noyes, D.K. Harder, E.A. Rakotobe, T.G. Razafindrabeaza, M.I.L. Rakotozafy & J.P. Abraham 988: Antanandava, SF(R. Capuron) 28401: Andriandavibe, SF(R. Capuron) 24163: Sandrangato, SF(R. Capuron) 6699bis: Didy, G. Cours 4717: Ambinaniango, H. Perrier de la Bâthie 18057: Ambatovola, H. Perrier de la Bâthie 18357: Didy, G. Cours 4664: Zahamena RN, RN(Botoalina) 6100: Amboditafoana, G. Cours 2819: Andrebevava, G. Cours 4342: Didy, G. Cours 4715: Ambodigavo, SF(Abraham) 25504: Ambodigavo, SF(Rabendalana Justin) 25410: Andrebevava, Herbier, Institut Scientifique, Madagascar 4342: Amboditafoana, Herbier, Institut Scientifique, Madagascar 2819: Zahamena PN, N.M. Andrianjafy et al. 155: Zahamena PN, N.M. Andrianjafy et al. 285: Zahamena PN, F. Ratooson et al. 570: Toliara: Marosohihy, H. Humbert 6621: Andohahela RN, SF(R. Capuron) 22356 [If you ARE going to list specimens, then the lists will have to be edited carefully. This one contains some errors, as do the other most likely]</p>	

<p><i>Melanophylla madagascariensis</i> Keraudren</p>	<p>Risk of extinction: Vulnerable (D2)</p>
<p>Vernacular names: Bararaty, Nofonakoho</p>	<p>Conservation Recommendations: a) good management of Betampona RN, b) search for additional populations, c) ex-situ conservation at Parc Ivoloina.</p>
<p>Description: Sparsely branched shrub to 7 m high with stem diameter to 13 cm. Leaf large/very large, obovate/oblanceolate with cuneate base and obtuse/rounded apex, toothed above, coriaceous; petiole to 19 cm long, robust and markedly sheathing. Inflorescence and erect, many branched panicle with main axis to 15 cm long. Flowers with very short pedicel and pale cream petals. Fruit widely ellipsoid, pale yellow when ripe.</p>	
<p>Habitat</p> <ul style="list-style-type: none"> • Vegetation type: low elevation evergreen humid forest • Bioclimate: humid • Geology: basement rocks • Altitude: 300 - 500 m 	
<p>Biology</p> <ul style="list-style-type: none"> • Pollination: probably insects (but observations at Betampona RN failed to record any potential pollinators visiting the flowers) • Seed dispersal: fruits eaten by two species of lemur: <i>Varecia variegata</i> and <i>Eulemur fulvus flavifrons</i> (R. B. Iambana, pers. comm.) 	
<p>Uses</p> <p>None reported</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <ul style="list-style-type: none"> • Location: Betampona RN (49°12', 17°57') • Regeneration observed: Yes • Tolerant to disturbance: No • Density: 8.3 mature individuals per ha. • Abundance: probably > 10,000 mature individuals
	<p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 0% (currently Betampona RN is well protected) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of are large vertebrate seed dispersers.
	<p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 22 km² • Area of occupancy : 22 km² • Number of subpopulations: 1 (Note: In addition to Betampona RN this species has been collected from a unknown location within the Anisianaka region (<i>Humblot 437</i>). However searches in this area have not relocated this population. Given that this specimen is over 100 years old, and much forest has been destroyed in this area it is possible that this population is now extinct. Searches have also been made in two forested areas close to Betampona RN, i.e. Mangerivola RS and Antanamalaza FC but also failed to locate additional populations of this plant).
	<p>Distribution attributes for population within protected areas</p> <ul style="list-style-type: none"> • Number of subpopulations: 1 • Protected areas: Betampona RN
<p>Herbarium specimens examined : Toamasina: Betampona RN, RN (Rakotoniama) 5904 Antsianaka, H. Humblot 437: Betampona RN, RN(Rajanaparamy) 8312: Betampona RN, SF(Rajanaparamy) 17300: Betampona RNI, R. Randrianaivo et al. 280</p>	

<i>Melanophylla modestei</i> Schatz, Lowry & Wolf	Risk of extinction Vulnerable (D2)
Vernacular names: Dindemo	Conservation Recommendations: good management of Masoala PN, ex-situ conservation.
<p>Description: Unbranched or sparsely branched tree to 6 m high with trunk to 10 cm diameter and stems 1-2 cm diameter with leaves clustered towards their end. Leaves very large, oblanceolate/broadly obovate with cuneate base and obtuse/abruptly acuminate apex, margin untoothed or toothed in upper part of leaf, clustered towards stem apex, texture of cabbage when fresh; petiole to 15 cm long, winged, with sheathing amplexicaul base. Inflorescence a many branched panicle with main axis to 49 cm long. Flowers with long pedicel (to 5 mm), petals, dark pink to purple on the outside, very pale pink inside. Fruit ovoid to ellipsoid, to 18 mm long and 11 mm wide, colour unknown.</p>	
<p>Habitat</p> <ul style="list-style-type: none"> • Vegetation type: low elevation evergreen humid forest • Bioclimate: humid • Geology: basement rocks • Altitude: 25-250 m 	
<p>Biology:</p> <ul style="list-style-type: none"> • Pollination: flowers visited by bees and these insects are presumably the pollinator (pers. obs., Johny Rabenantoandro). • Seed dispersal: probably lemurs and/or birds 	
<p>Uses</p> <p>None reported</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <ul style="list-style-type: none"> • Location: Ambanizana (49°50', 15°37') • Regeneration observed: yes • Tolerant to disturbance: no • Density: 25 mature plants per ha. • Abundance: >10,000 <p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: 50-80 % (cause of habitat loss = shifting cultivation, selective felling and cultivation of clove trees) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of are large vertebrate seed dispersers. <p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 11km² • Area of occupancy : 11 km² • Number of subpopulations: 2 <p>Distribution attributes for population within protected areas</p> <ul style="list-style-type: none"> • Number of subpopulations: 1 • Protected areas: Masoala PN
<p>Herbarium specimens examined: Toamasina: Ambanizana, Porter P. Lowry II, A. Rakotozafy & M.F. Nicoll 4150: Ambanizana, G.E. Schatz, H. van der Werff, B. Gray & S.G. Razafimandimbison 3319 Ambanizana, G.E. Schatz & G. Modeste 3131: Ambanizana, Porter P. Lowry II, A. Rakotozafy & M.F. Nicoll 4149: [Ambanizana], Rakotozafy, A. 2079: Ambanizana, Justin Rabe 206: Masoala PN, Johny Rabenantoandro et al. 230: Masoala PN, Jao Aridy & Jao Toly 280.</p>	

<p><i>Melanophylla perrieri</i> Keraudren</p>	<p>Risk of extinction: Critically Endangered (A3c)</p>
<p>Vernacular names: Tsipalamplana</p>	<p>Conservation Recommendations: a) inclusion in a new protected area, b) ex-situ conservation.</p>
<p>Description: Sparsely branched tree to 6 m high, trunk to 10 cm dbh. Leaves clustered towards stem apex, blade very large, elliptic/obovate with cuneate base and obtuse apex, margin untoothed or toothed in upper part, coriaceous with strongly revolute margins; petiole to 8 cm long, winged, with sheathing base. Inflorescence a many branched, panicle with main axis to 15 cm long. Flowers with pedicel to 3 mm and large (to 6 mm long) pink petals. Mature fruit unknown.</p>	
<p>Habitat</p> <ul style="list-style-type: none"> • Vegetation type: low elevation evergreen humid forest • Bioclimate: humid • Geology: basement rocks • Altitude: 450-600 m 	
<p>Biology</p> <ul style="list-style-type: none"> • Pollination: probably insects • Seed dispersal : lemurs and birds (according to local people <i>Cooua cristata</i> et <i>Varecia variegata</i> eat the fruits of this species) 	
<p>Uses None known</p>	
<p>Distribution:</p> 	<p>Observations of study population(s)</p> <ul style="list-style-type: none"> • Location: Andranobetokana (48°05'E, 20°49'S) • Regeneration observed: yes • Tolerant to disturbance: no • Density: 44 mature individuals per ha. • Abundance: > 10,000 mature individuals
	<p>Predicted future decline:</p> <ul style="list-style-type: none"> • Due to habitat loss: > 80% (cause of habitat loss = shifting cultivation) • Due to exploitation or poor regeneration: decline possible because of increasing rarity of are large vertebrate seed dispersers.
	<p>Distribution attributes for total population</p> <ul style="list-style-type: none"> • Extent of occurrence: 8.743 km² • Area of occupancy : 2.122 km² • Number of subpopulations: 3
	<p>Distribution attributes for population within protected areas Not known from any protected areas.</p>
<p>Herbarium specimens examined : Fianarantsoa: Andranobetokana, Fidy Ratovoson & F. Randriantafika 5 Toamasina: Mananara Avaratra, SF(Javelo, A.) 26108; Ambalafary, H. Perrier de la Bâthie 8709</p>	

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