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THE FLORA OF PULAU SEMAKAU: A PROJECT SEMAKAU CHECKLIST

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INTRODUCTION

The Republic of Singapore originally had over 60 offshore islands (Ministry of Information and the Arts, 1997). Owing to extensive land reclamation to meet various needs, many islands were expanded or merged together, resulting in an inevitable loss of floristic diversity. However, because of their isolation, some offshore islands remain as a refuge for many plants, and Pulau [=Island] Semakau is one of them.

"Project Semakau" is a community involvement and conservation project led by the Raffles Museum of Biodiversity Research (RMBR), National University of Singapore (NUS), and sponsored by the Hongkong and Shanghai Banking Corporation Limited (HSBC). The project aims to realise and enhance the island's value as a nature education and conservation site, and one of the main objectives is to obtain data on the island's biodiversity via comprehensive surveys.

Having credible and accessible checklists on the biodiversity of a locality not only allows relevant agencies and stakeholders to have a snapshot of its conservation value, it also promotes public awareness of Singapore's natural heritage. In this context and as part of Project Semakau, we prepared an updated list of the vascular plant species that can be found on Pulau Semakau.

MATERIAL AND METHODS

Pulau Semakau (1°12'25"N, 103°45'31"E) lies approximately 8 km south of Singapore Island. The original island was once inhabited by a village with around 200 families but by 1977, most of the residents were relocated to Singapore Island (Ng, 2009). Presently, it is enjoined with a neighbouring island, Pulau Sakeng, to form the Semakau Landfill. During the construction of the landfill (1995–1999), much care was taken to preserve the original habitats of Pulau Semakau. While 13.6 ha of mangrove forests were lost during the construction, an equivalent area was replanted with 400,000 mangrove saplings. In 2005, the Semakau Landfill was open to the public for recreational and educational activities. However, from our knowledge, the forests were left relatively intact, except for the creation of a forest trail (Fig. 1) for nature groups to conduct educational tours at the western shore.

Floristic surveys were conducted to document all the vascular plant species in the beach and secondary forests, and in both the natural and replanted mangroves (Fig. 1). Seven surveys were carried out on 7 Feb.2009, 16 May 2009, 28 May 2010, 23 Oct.2010, 18–19 Jun.2011, and 17 Jul.2011. The areas surveyed included the boundary and the interior (by making opportunistic explorations along the visible trails) of the secondary and the mangrove forest patches. Plants that were identifiable on-site were recorded, while voucher specimens were collected for further investigation for those that were not.

To obtain a thorough list of all the plants previously and presently found in Pulau Semakau, a checklist (see Supplementary Material, Table 1) was compiled based on data from the present floristic surveys, a previous survey conducted on 26 Jun.2006, a checklist from surveys conducted by Lai (2005), and records in the Herbarium, Singapore Botanic Gardens (SING) and the Herbarium, Raffles Museum of Biodiversity Research, National University of Singapore (SINU). The national status categories of all species were obtained from the recent checklist of Singapore's vascular flora (Chong et al., 2009).

RESULTS AND DISCUSSION

The vegetation of Pulau Semakau can be broadly classified into three types—mangrove forest, beach vegetation, and secondary forest. The natural mangrove forest is found on the north-eastern and south-eastern parts of the original

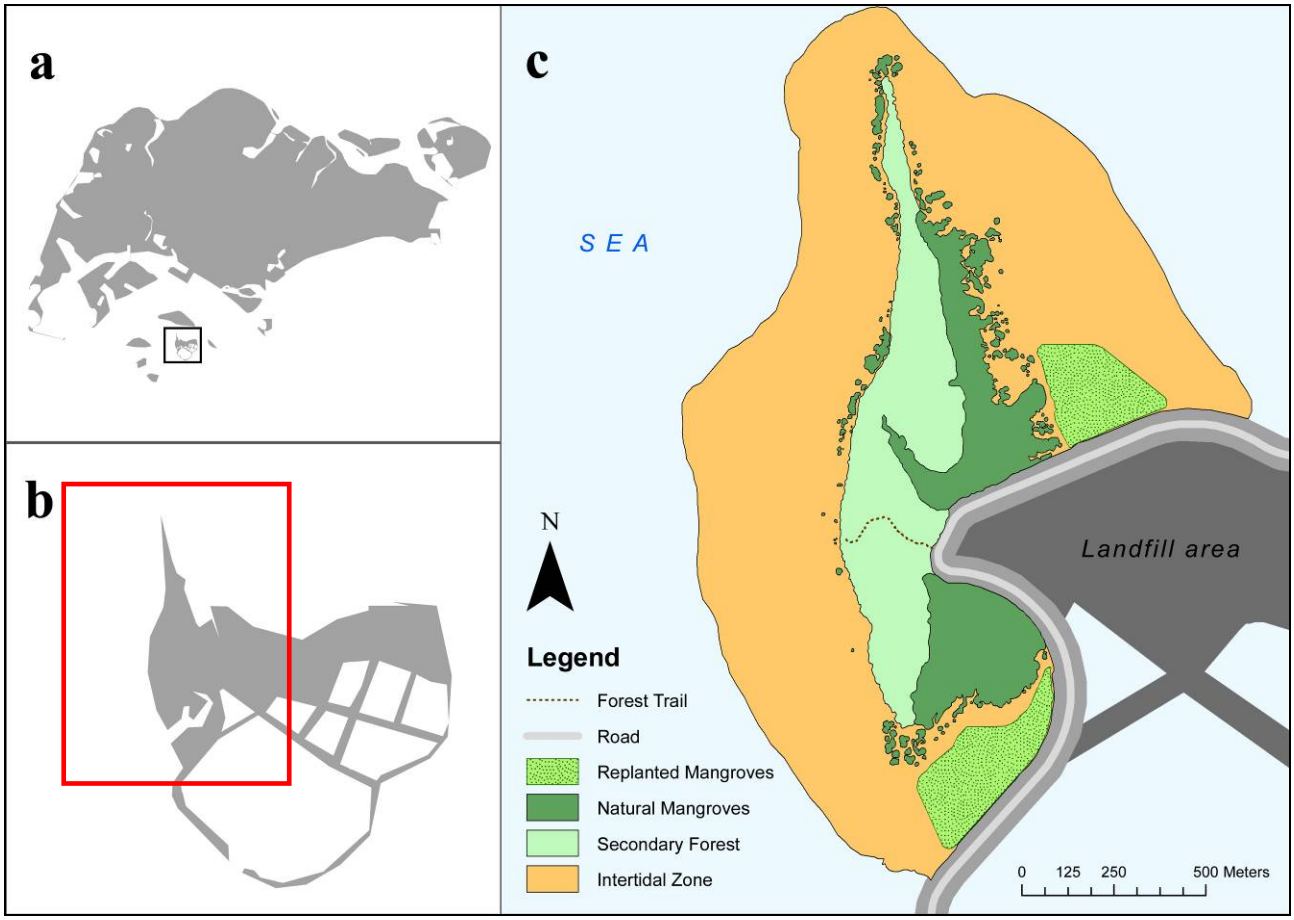

Fig. 1. Maps of Pulau Semakau. (a) Black-outlined box showing the position of Semakau Landfill in Singapore. (b) Red box showing the position of the original Pulau Semakau on the current landfill island. (c) Habitat map of Pulau Semakau. The beach forest (not shown here) fringes the western border of the secondary forest patch. Maps were constructed from IKONOS satellite images, dated 6 Jul.2007. The habitat zones were demarcated by general classification from the maps and subsequent ground-truthing.

island (Fig. 1). The seaward portions are dominated by *Rhizophora stylosa* Griff. and *Rhizophora apiculata* Blume, while further inland, *Avicennia rumphiana* Hallier f., *Bruguiera cylindrical* (L.) Blume, and *Lumnitzera littorea* (Jack) Voigt are more common. There are two patches of replanted *Rhizophora stylosa* plants on the island—one to the east of the north-eastern natural mangrove forest patch and the other to the south of the south-eastern natural mangrove forest patch (see Fig. 1c). Many other mangrove species have established naturally near the fringe of these replanted forest patches, including the critically endangered *Avicennia marina* (Forsk.) Vierh. Beach vegetation fringes the seaward side of the secondary forest patch and consists mainly of *Talipariti tiliaceum* (L.) Fryxell, *Ximenia americana* L., *Pandanus odorifer* (Forssk.) Kuntze, and *Terminalia catappa* L. The secondary forest interior is dominated by food plants [e.g., the rambutan, *Nephelium lappaceum* L.; rambai, *Baccaurea motleyana* (Müll. Arg.) Müll. Arg.; Malay apple, *Syzygium malaccense* (L.) Merr. & L.M. Perry; sentul, *Sandoricum koetjape* (Burm.f.) Merr.; water apple *Syzygium aqueum* (Burm.f.) Alston; Indian mango, *Mangifera indica* L.; tapioca, *Manihot esculenta* Crantz; star gooseberry, *Sauropus androgynus* (L.) Merr.; and betel nut palm, *Areca catechu* L.] that have established widely after past cultivation—indicating this site was the orchard of the former village. The most prominent formerly cultivated species is the coconut (*Cocos nucifera* L.), the numerous individuals being relics of the large coconut plantation before the resettlement of the local villagers (Fairey Surveys Ltd, 1970a, 1970b).

A total of 165 species from 63 families were recorded from the past and present surveys (see Supplementary Material, Table 1). A total of 118 species are native, 35 are exotic, and 12 are cryptogenic (i.e. of uncertain origin). Fig. 2 shows the breakdown of the native and exotic categories. A climber, *Paraderris elliptica* is of indeterminate status as it was not listed in Chong et al. (2009) and was not assessed in the 2008 Singapore Red Data Book (Davison et al., 2008). However, the plant was previously listed in Keng et al. (1990) as *Derris elliptica* (Wall.) Benth, now considered a synonym (Adema, 2000). On a separate note, this paper recommends the upgrading of the status of *Diospyros blancoi* A.DC. from "cultivated only" (Chong et al., 2009) to casual, as there were many saplings found in the secondary forest patch.

There was no conclusive evidence of any drastic floristic loss on the island attributable to the construction of the landfill. Though there were 22 species recorded before the completion of the landfill that were not found in subsequent surveys, with most of them being common, naturalised or cryptogenic herbs. Only one species is critically

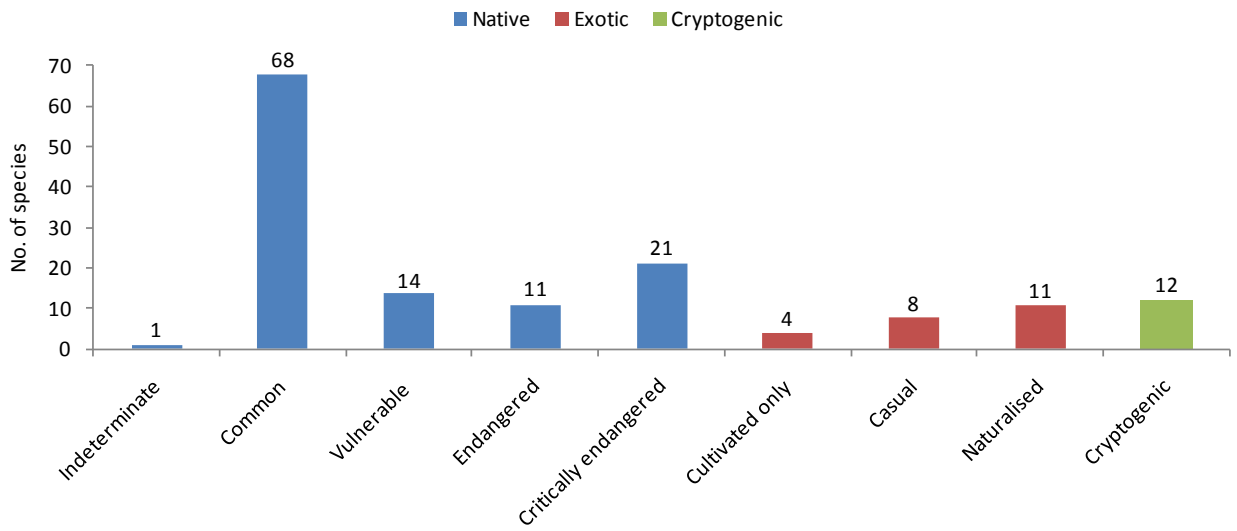

Fig. 2. Relative numbers of native, exotic and cryptogenic vascular plants found on Pulau Semakau. Refer to Chong et al. (2009) for the definitions of the status categories. Note that two critically endangered plants, *Nephelium lappaceum* and *Baccaurea motleyana* are likely to have been introduced to the island from cultivated stock.

endangered—*Serianthes grandiflora* Benth.—but there is a possibility that it was previously introduced to the island as an ornamental plant or food crop (Keng, 1990). Interestingly, 85 new species (with 60 native species) were recorded after the construction of the landfill. This is likely to be mainly owed to insufficient sampling during the previous surveys, and also possibly because of the establishment of new species to the island once the disturbance to the forests was significantly lowered after the relocation of the villagers when they were resettled to Singapore Island.

The most recent surveys of the island were conducted by the RMBR staff and volunteers of Project Semakau. A total of 123 species from 31 families were recorded from our surveys, of which 36 species are new records for the island (see Supplementary Material). Despite these new discoveries, we failed to find 42 species that were previously recorded. However, we attributed this lapse to incomplete sampling and sampling bias against less noticeable life forms such as small herbs and climbers. Indeed, most of the species we did not re-encounter were either herbs (20 species) or climbers (11 species), with the remainder as epiphytes (two species), shrubs (five species) and trees (four species). These species are also of little conservation concern, since most of them are either exotic (14 species) and common species (14 species), or cryptogenic weeds (eight species). Five species are nationally vulnerable [*Calamus erinaceus* (Becc.) J.Dransf., *Salacia chinensis* L., *Euphorbia atoto* G.Forst., *Syzygium palembanicum* Miq., and *Palaquium obovatum* (Griff.) Engl.], and one is critically endangered (*Serianthes grandiflora*).

The presence of exotic plant species on the island is likely the result of anthropogenic activities (deliberately planted or accidental introductions by former villagers or accidental introductions during the construction of the landfill) and natural establishment through seed/fruit dispersal by wind or animals. Natural plant succession in the landfill cells are dominated by exotic weeds, and some of these species may have been recently dispersed into the nearby secondary forest patch. The only exotic plant that is a cause for concern is *Acacia auriculiformis* A.Cunn. ex Benth. as it occurs at high densities in the beach forest and appears to be out-competing the native vegetation at various locations.

Despite the past developments and on-going activities on the island, some notably rare plants still exist. *Tacca leontopetaloides* (L.) Kuntze (Fig. 3a) is a rhizomatic herb where its only other presently known location is Pulau Pawai. *Xylocarpus rumphii* (Kostel.) Mabb. (Fig. 3b), one of the new records for Pulau Semakau, has only been previously recorded from Sungei Buloh Wetland Reserve, Sentosa, and Pulau Sakijang Bendera (St. John's Island). We discovered a sapling, hence it is likely to have established from seeds of trees growing on other islands since the seeds are water-dispersed. *Avicennia marina* (Fig. 3c) is a mangrove tree also found on Pulau Tekong, Pulau Sakijang Bendera, and along Sungei Pandan. It has also been previously documented on Pulau Unum (Tan et al., 1999), and Pulau Sudong (Keng et al., 1990) but these records have not been verified in recent years. *Caesalpinia bonduc* (L.) Roxb. (Fig. 3d) is a dioecious woody climber also found on Pulau Sakijang Pelepah (Lazarus Island) and more recently, at Punggol Beach (Lok et al., 2011). Lastly, *Cynometra ramiflora* L. (Fig. 3e), another new record, was also found on Pulau Ubin and in the Western Catchment Area, in 2005 and 2004, respectively. Other records in SING showed that it was also found along Sungei Jurong and in Kranji in the late 1800s and mid 1900s but these are likely to be eradicated by now, owing to habitat destruction.

There are two critically endangered and one extinct plant species formerly found on Pulau Semakau that were not included in the checklist as they were based on isolated sightings. *Pemphis acidula* J.R. & G.Forst. was discovered by

Fig. 3. Some critically endangered plants of Pulau Semakau. (a) Habit of *Tacca leontopetaloides*; (b) Sapling of *Xylocarpus rumphii*; (c) Fruits of *Avicennia marina*; (d) Fruits and seed of *Caesalpinia bonduc*; (e) Sapling of *Cynometra ramiflora*. (Photographs by: Teo Siyang).

A. Tay (pers. comm.) at the southern tip of the island in 2006–2007. Unfortunately, in 2008 he noticed that the tree had disappeared. A lone *Cycas edentata* de Laub. (as *Cycas rumphii* Miq.) sapling was also found at "an eroding beach" on the island in the mid 1990s (Tan et al., 1995). It was then transplanted to the Botany Teaching Garden of the then Department of Botany (now Department of Biological Sciences), National University of Singapore, and subsequently to the Singapore Botanic Gardens Plant Resource Centre. Lastly, a single *Dodonaea viscosa* Jacq. shrub was seen by A. H. B. Loo and E. E. L. Seah (pers. comm.) along the coastline in the 1990s but it was not observed thereafter, probably having been killed or washed away by erosion. It has since been declared nationally extinct (Chong et al., 2009), with this sighting likely to be the last specimen seen alive.

CONCLUSIONS

Corroborating with the recent survey results of intertidal molluscs in Pulau Semakau (Tan & Yeo, 2010), the island hosts a significant species richness because for its small area, it has more than 160 species of vascular plants. Eighteen present and naturally occurring species are critically endangered, with some only found in very few localities in Singapore, making them very vulnerable to extinction if their natural habitats are not protected.

ACKNOWLEDGEMENTS

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SUPPLEMENTARY MATERIAL

Table 1. Checklist of the vascular flora of Pulau Semakau. Record 1 refers to the records from the Singapore Botanic Gardens Herbarium (SING) and Herbarium, Raffles Museum of Biodiversity Research, National University of Singapore (SINU) of plants that were collected before the completion of the Semakau Landfill; Record 2 refers to herbarium records from SING and SINU of plants that were collected after the completion of the Semakau Landfill; Survey 1 refers to surveys conducted by Lai (2005); Survey 2 refers to the survey conducted on 26 Jun.2006; Survey 3 refers to surveys conducted by the Project Semakau team. Note that the status category of *Morinda citrifolia* was updated from the list in Chong et al. (2009). Three species based only on sightings have been omitted: *Cycas edentata* de Laub. (Cycadaceae); *Dodonaea viscosa* Jacq. (Sapindaceae); *Pemphis acidula* J.R. & G.Forst. (Lythraceae).

S/No.	Species	Native/Exotic	National Status	Record		Survey		
				1	2	1	2	3
	Family: ACANTHACEAE							
1.	*Avicennia alba* Blume	Native	Common	+	+	+	+	+
2.	*Avicennia marina* (Forsk.) Vierh. ssp. *marina*	Native	Critically endangered				+	+
3.	*Avicennia officinalis* L.	Native	Common					+
4.	*Avicennia rumphiana* Hallier f.	Native	Common	+	+	+	+	+
5.	*Asystasia gangetica* (L.) T.Anderson ssp. *micrantha* (Nees) Ensermu	Exotic	Naturalised					+
6.	*Hemigraphis confinis* T.Anderson.	Exotic	Naturalised	+				
	Family: AIZOACEAE							
7.	*Sesuvium portulacastrum* (L.) L.	Native	Common	+	+	+	+	+
	Family: AMARYLLIDACEAE							
8.	*Crinum asiaticum* L.	Native	Critically endangered	+			+	+
	Family: ANACARDIACEAE							
9.	*Lannea coromandelica* (Houtt.) Merr.	Exotic	Cultivated only	+		+	+	+
10.	*Mangifera indica* L.	Exotic	Casual			+		+
	Family: APOCYNACEAE							
11.	*Anodendron candolleanum* Wight	Native	Critically endangered	+		+		+
12.	*Cerbera manghas* L.	Native	Critically endangered	+		+		+
13.	*Cerbera odollam* Gaertn.	Native	Vulnerable			+	+	+
14.	*Dischidia major* (Vahl) Merr.	Native	Common	+		+	+	+
15.	*Dischidia nummularia* R.Br.	Native	Common	+				
16.	*Hoya verticillata* (Vahl) G.Don var. *verticillata*	Native	Common				+	+
	Family: AQUIFOLIACEAE							
17.	*Ilex cymosa* Blume	Native	Common					+
	Family: ARACEAE							
18.	*Colocasia esculenta* (L.) Schott	Exotic	Casual					+
19.	*Philodendron hederaceum* (Jacq.) Schott	Exotic	Casual					+
	Family: ARECACEAE							
20.	*Areca catechu* L.	Exotic	Casual			+		+
21.	*Calamus erinaceus* (Becc.) J.Dransf.	Native	Vulnerable	+				
22.	*Cocos nucifera* L.	Exotic	Naturalised			+	+	+
23.	*Nypa fruticans* Wurmb	Native	Vulnerable				+	+
	Family: ASPLENIACEAE							
24.	*Asplenium nidus* L.	Native	Common				+	+
	Family: ASTERACEAE							
25.	*Melanthera biflora* (L.) Wild	Native	Common	+	+			
26.	*Mikania micrantha* Kunth	Exotic	Naturalised		+			+
27.	*Pluchea indica* (L.) Less.	Native	Common	+				
28.	*Tridax procumbens* L.	Exotic	Naturalised					+
29.	*Vernonia cinerea* (L.) Less.	Cryptogenic	—	+				
	Family: BIGNONIACEAE							
30.	*Spathodea campanulata* P.Beauv.	Exotic	Naturalised					+
31.	*Dolichandrone spathacea* (L. f.) K.Schum.	Native	Critically endangered	+	+			+

S/No.	Species	Native/Exotic	National Status	Record		Survey		
				1	2	1	2	3
	Family: BLECHNACEAE							
32.	*Stenochlaena palustris* (Burm. f.) Bedd.	Native	Common					+
	Family: BORAGINACEAE							
33.	*Cordia cylindristachya* (Ruiz & Pav.) Roem. & Schult.	Exotic	Naturalised				+	
	Family: CALOPHYLLACEAE							
34.	*Calophyllum inophyllum* L.	Native	Critically endangered		+	+	+	+
	Family: CASUARINACEAE							
35.	*Casuarina equisetifolia* L.	Native	Common	+		+	+	+
	Family: CELASTRACEAE							
36.	*Salacia chinensis* L.	Native	Vulnerable				+	
	Family: CLEOMACEAE							
37.	*Cleome rutidosperma* DC.	Exotic	Naturalised		+			+
	Family: CLUSIACEAE							
38.	*Garcinia hombroniana* Pierre	Native	Endangered	+			+	+
	Family: COMBRETACEAE							
39.	*Combretum tetralophum* C.B.Clarke	Native	Critically endangered	+			+	+
40.	*Lumnitzera littorea* (Jack) Voigt	Native	Endangered	+		+	+	+
41.	*Lumnitzera racemosa* Willd.	Native	Endangered	+	+		+	+
42.	*Terminalia catappa* L.	Native	Common		+	+	+	+
	Family: CONVOLVULACEAE							
43.	*Ipomoea cairica* (L.) Sweet	Exotic	Naturalised	+				
44.	*Ipomoea pes-caprae* (L.) R.Br.	Native	Common				+	
45.	*Ipomoea pes-tigridis* L.	Exotic	Naturalised	+				
46.	*Ipomoea violacea* L.	Native	Common	+				
	Family: CYPERACEAE							
47.	*Cyperus rotundus* L.	Cryptogenic	—	+				
48.	*Cyperus stoloniferus* Retz.	Native	Common	+	+			
49.	*Fimbristylis dichotoma* (L.) Vahl ssp. *dichotoma*	Cryptogenic	—					+
50.	*Kyllinga polyphylla* Willd. ex Kunth	Exotic	Naturalised		+			
51.	*Remirea maritima* Aubl.	Native	Common	+		+		
52.	*Scleria levis* Retz.	Cryptogenic	—	+				
	Family: DILLENIACEAE							
53.	*Tetracera indica* (Christm. & Panz.) Merr.	Native	Common			+		
	Family: DAVALLIACEAE							
54.	*Davallia denticulata* (Burm.) Mett.	Native	Common					+
	Family: DIOSCOREACEAE							
55.	*Tacca leontopetaloides* (L.) Kuntze	Native	Critically endangered	+		+	+	+
	Family: EBENACEAE							
56.	*Diospyros blancoi* A.DC.	Exotic	Cultivated only					+
	Family: EUPHORBIACEAE							
57.	*Excoecaria agallocha* L.	Native	Common	+			+	+
58.	*Euphorbia atoto* Forst. f.	Native	Vulnerable	+				
59.	*Microstachys chamaelea* (L.) Müll.Arg.	Cryptogenic	—	+	+		+	
60.	*Manihot esculenta* Crantz	Exotic	Naturalised	+				+
61.	*Manihot carthagenesis* (Jack) Müll. Arg. ssp. *glaziovii* (Müll. Arg.) Allem	Exotic	Naturalised	+				
	Family: FABACEAE							
62.	*Acacia auriculiformis* A. Cunn. ex Benth.	Exotic	Naturalised	+	+	+	+	+
63.	*Adenanthera pavonina* L.	Exotic	Naturalised					+
64.	*Aganope heptaphylla* (L.) Polhill	Native	Critically endangered					+

S/No.	Species	Native/Exotic	National Status	Record		Survey		
				1	2	1	2	3
65.	*Archidendron jiringa* (Jack) Nielsen	Native	Vulnerable					+
66.	*Caesalpinia bonduc* (L.) Roxb.	Native	Critically endangered	+		+		+
67.	*Caesalpinia crista* L.	Native	Common		+		+	+
68.	*Canavalia cathartica* Thouars	Native	Common		+	+		+
69.	*Canavalia rosea* (Sw.) DC.	Native	Common	+	+			
70.	*Cynometra ramiflora* L.	Native	Critically endangered					+
71.	*Dalbergia candenatensis* (Dennst.) Prain	Native	Common			+	+	+
72.	*Dendrolobium umbellatum* (L.) Benth.	Native	Common			+	+	+
73.	*Derris scandens* (Roxb.) Benth.	Native	Critically endangered	+		+	+	+
74.	*Derris trifoliata* Lour.	Native	Common	+	+	+	+	+
75.	*Paraderris elliptica* (Wall.) Adema	Native	Indeterminate					+
76.	*Peltophorum pterocarpum* (DC.) Backer ex K. Heyne	Native	Critically endangered	+		+	+	+
77.	*Pongamia pinnata* (L.) Pierre	Native	Endangered			+	+	+
78.	*Serianthes grandiflora* Benth.	Native	Critically endangered	+				
79.	*Tamarindus indica* L.	Exotic	Casual				+	
80.	*Vigna marina* (Burm.) Merr.	Native	Common				+	
	Family: FLAGELLARIACEAE							
81.	*Flagellaria indica* L.	Native	Common	+	+	+	+	+
	Family: GENTIANACEAE							
82.	*Fagraea fragrans* Roxb.	Native	Common	+				+
	Family: GOODENIACEAE							
83.	*Scaevola taccada* (Gaertn.) Roxb.	Native	Common	+	+	+	+	+
	Family: LAMIACEAE							
84.	*Clerodendrum inerme* (L.) Gaertn.	Native	Common			+	+	+
85.	*Premna serratifolia* L.	Native	Vulnerable		+	+	+	+
86.	*Vitex pinnata* L.	Native	Common			+		+
	Family: LAURACEAE							
87.	*Cassytha filiformis* L.	Native	Common	+	+	+	+	+
	Family: LECYTHIDACEAE							
88.	*Barringtonia asiatica* (L.) Kurz	Native	Critically endangered				+	+
	Family: LYTHRACEAE							
89.	*Sonneratia alba* Sm.	Native	Common	+	+	+	+	+
	Family: MALVACEAE							
90.	*Heritiera littoralis* Aiton	Native	Endangered	+		+	+	+
91.	*Sida rhombifolia* L.	Cryptogenic	—	+				
92.	*Talipariti tiliaceum* (L.) Fryxell	Native	Common		+	+	+	+
93.	*Thespesia populnea* (L.) Sol. ex Corrêa	Native	Common		+	+	+	+
	Family: MELASTOMATACEAE							
94.	*Memecylon edule* Roxb.	Native	Endangered		+			+
95.	*Melastoma malabathricum* L.	Native	Common	+				+
96.	*Clidemia hirta* (L.) D. Don	Exotic	Naturalised					+
	Family: MELIACEAE							
97.	*Sandoricum koetjape* (Burm. f.) Merr.	Native	Endangered					+
98.	*Xylocarpus granatum* J.Koenig	Native	Common			+	+	+
99.	*Xylocarpus moluccensis* (Lam.) M. Roem.	Native	Endangered					+
100.	*Xylocarpus rumphii* (Kostel.) Mabb.	Native	Critically endangered					+
	Family: MORACEAE							
101.	*Ficus grossularioides* Burm. f. var. *grossularioides*	Native	Common					+
	Family: MYRSINACEAE							
102.	*Ardisia elliptica* Thunb.	Native	Endangered	+		+	+	+
103.	*Embelia ribes* Burm. f.	Native	Common		+			

S/No.	Species	Native/Exotic	National Status	Record		Survey		
				1	2	1	2	3
	Family: MYRTACEAE							
104.	*Syzygium aqueum* (Burm. f.) Alston	Exotic	Cultivated only					+
105.	*Syzygium cumini* (L.) Skeels	Exotic	Naturalised			+	+	+
106.	*Syzygium grande* (Wight) Walp.	Native	Common	+				+
107.	*Syzygium lineatum* (DC.) Merr. & L.M.Perry	Native	Common	+	+		+	+
108.	*Syzygium malaccense* (L.) Merr. & L.M.Perry	Exotic	Casual					+
109.	*Syzygium palembanicum* Miq.	Native	Vulnerable			+		
110.	*Syzygium zeylanicum* (L.) DC.	Native	Common					+
	Family: NEPENTHACEAE							
111.	*Nepenthes gracilis* Korth.	Native	Common	+				
	Family: OLACACEAE							
112.	*Ximenia americana* L.	Native	Common	+	+	+	+	+
	Family: OLEANDRACEAE							
113.	*Nephrolepis auriculata* (L.) Trimen	Cryptogenic	—					+
	Family: ONAGRACEAE							
114.	*Ludwigia hyssopifolia* (G.Don) Exell	Cryptogenic	—	+				
	Family: ORCHIDACEAE							
115.	*Dendrobium crumenatum* Sw.	Native	Common	+		+	+	+
116.	*Eulophia graminea* Lindl.	Cryptogenic	—	+	+	+		
	Family: PANDANACEAE							
117.	*Pandanus odorifer* (Forssk.) Kuntze	Native	Common	+	+	+	+	+
	Family: PASSIFLORACEAE							
118.	*Passiflora foetida* L.	Exotic	Naturalised	+	+			+
	Family: PENTAPHYLACACEAE							
119.	*Adinandra dumosa* Jack	Native	Common					+
	Family: PHYLLANTHACEAE							
120.	*Breynia racemosa* (Blume) Mull. Arg.	Native	Common	+			+	+
121.	*Baccaurea motleyana* (Müll. Arg.) Müll. Arg.	Native	Critically endangered					+
122.	*Bridelia stipularis* (L.) Blume	Native	Vulnerable					+
123.	*Phyllanthus debilis* Klein ex Willd.	Exotic	Naturalised	+	+			
124.	*Sauropus androgynus* (L.) Merr.	Native	Common	+				+
	Family: POACEAE							
125.	*Axonopus compressus* (Sw.) Beauv.	Exotic	Naturalised	+				
126.	*Bambusa vulgaris* Schrad. ex J.C.Wendl.	Exotic	Casual			+		
127.	*Bambusa multiplex* (Lour.) Raeusch. ex Schult. & Schult.f.	Exotic	Cultivated only					+
128.	*Imperata cylindrica* (L.) P. Beauv.	Cryptogenic	—	+				
129.	*Ischaemum muticum* L.	Native	Common		+	+		+
130.	*Panicum repens* L.	Native	Common	+				
	Family: POLYPODIACEAE							
131.	*Drynaria quercifolia* (L.) J.Sm.	Native	Common			+		
132.	*Pyrrosia lanceolata* (L.) Farwell	Native	Common				+	+
133.	*Pyrrosia piloselloides* (L.) M.G.Price	Native	Common					+
	Family: PTERIDACEAE							
134.	*Acrostichum aureum* L.	Native	Common				+	+
135.	*Acrostichum speciosum* Willd.	Native	Common			+	+	+
	Family: RHAMNACEAE							
136.	*Colubrina asiatica* (L.) Brongn.	Native	Common			+	+	+
137.	*Smythea lanceata* Summerh	Native	Critically endangered			+		+
	Family: RHIZOPHORACEAE							
138.	*Bruguiera cylindrica* (L.) Blume	Native	Common	+	+		+	+
139.	*Bruguiera gymnorhiza* (L.) Lamk.	Native	Common	+	+	+	+	+

S/No.	Species	Native/Exotic	National Status	Record		Survey		
				1	2	1	2	3
140.	*Ceriops tagal* (Pers.) C.B.Robins	Native	Vulnerable	+	+		+	+
141.	*Ceriops zippeliana* Blume	Native	Endangered					+
142.	*Rhizophora apiculata* Blume	Native	Common	+	+	+	+	+
143.	*Rhizophora mucronata* Lam.	Native	Common		+	+	+	+
144.	*Rhizophora stylosa* Griff.	Native	Vulnerable	+	+		+	+
	Family: RUBIACEAE							
145.	*Diodia ocymifolia* (Willd. ex Roem. & Schult.) Bremek.	Exotic	Naturalised		+			
146.	*Guettarda speciosa* L.	Native	Endangered	+		+	+	+
147.	*Morinda citrifolia* L.	Cryptogenic	—		+		+	+
148.	*Oldenlandia corymbosa* L.	Exotic	Naturalised	+				
149.	*Oxyceros longiflorus* (Lam.) T.Yamazaki	Native	Vulnerable			+	+	+
150.	*Scyphiphora hydrophylacea* C.F.Gaertn.	Native	Common	+	+	+	+	+
151.	*Gynochthodes sublanceolata* Miq.	Native	Common	+	+			+
152.	*Psychotria sarmentosa* Blume	Native	Critically endangered					+
	Family: SAPINDACEAE							
153.	*Allophylus cobbe* (L.) Reausch.	Native	Common	+	+		+	+
154.	*Guioa pleuropteris* (Blume) Radlk.	Native	Vulnerable	+		+	+	+
155.	*Nephelium lappaceum* L.	Native	Critically endangered					+
156.	*Dimocarpus longan* Lour. ssp. *malesianus* Leenh.	Exotic	Casual					+
	Family: SAPOTACEAE							
157.	*Planchonella obovata* (R.Br.) Pierre	Native	Vulnerable			+		+
158.	*Palaquium obovatum* (Griff.) Engl.	Native	Vulnerable	+		+		
	Family: SCHIZAEACEAE							
159.	*Lygodium microphyllum* (Cav.) R.Br.	Native	Common					+
	Family: SOLANACEAE							
160.	*Physalis minima* L.	Exotic	Naturalised	+				
	Family: VERBENACEAE							
161.	*Stachytarpheta indica* (L.) Vahl	Exotic	Naturalised	+				
	Family: VITACEAE							
162.	*Cayratia trifolia* (L.) Domin	Native	Vulnerable	+	+	+	+	+
163.	*Cissus hastata* Miq.	Cryptogenic	—	+		+		+
	Family: VITTARIACEAE							
164.	*Vittaria elongata* Sw.	Native	Common			+		+
	Family: ZINGIBERACEAE							
165.	*Alpinia aquatica* (Retz.) Roscoe	Native	Critically endangered					+