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Plant Species Diversity in the Melaleuca Forest Ecosystem of Lower U Minh National Park in Vietnam

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----------***ABSTRACT***----------
The effects of land use changes, burning foreest and forest fragmentation on plant species diversity in Lower U Minh Narional Park were reviewed. Forty five plots were established at a size of 1,600m^2 (40mx40m) in the plantation Melaleuca forest and in natural Melaleuca forest. The number of species, diameter at breast height (DBH) for woody trees, other living forms (woody trees, shrubs, vines, herbaceous) were determined in each plot. The results showed that The lower U Minh national park has been dominated by M. cajuputi trees with 88.64% of the total area and rest was comprised of bare soil, canals and grassland. There are 104 plant species of natural plants belonging to 48 different families were found. Among them, there are 12 woody tree species, 4 shrub species, 4 herbaceous species, 38 grass species, 27 liana species, 13 aquatic weed species, and 6 fern species were recorded.
KEYWORDS;-*Melaleuca; Plant diversity, Lower U Minh National Park*

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I. INTRODUCTION

Wetlands are one of the most important ecosystems on Earth. Due to the characteristic ecological functions,wetlands can be considered as the "kidneys" of a regional landscape, in which, geography, geomorphology, soil, water and living organisms have an interact connected relationships to create typical wetland ecosystem.

Due to unsustainable management, hamesting land for forest products, conversion for socio-economic development, forest area and forest types have qualitatively been decreased continuously over the past years. Based on the documents of Forest Science Institute of Vietnam, Vietnam had 14.3 million ha of forests in 1943, with 43% forest cover [8]; [13]. However, by the year 1990 only 9.18 million ha remained, with a forest cover of 27.2% from the total land area. During the period 1980-1990, the average forest lost was more than 100,000 ha each year. However, from 1990 to the present, the forest area has been increased gradually due to afforestation and rehabilitation of natural forest (exception for the case of some areas, such as the central highlands and the South-East region, where the forest area still has the tendency to be reduced).According to the National Forest Inventory Report of VNFOREST (2017) Viet Nam has around 14.4 million hectares of forested land, which constitutes 41.2% of the total land area. Around 10.2 million hectares are primary or otherwise naturally regenerated forest, and around 4.2 million hectares are planted forest [18].

Mekong Delta has many forest areas which have been restored and preserved, including the lower UMinh national park wetland. This wetland supplys a variety of ecological services that contribute to ecosystem functions. In addition, It provides numerous valuable functions such as ground water recharge, flood mitigation, regulation of pollutants and water as well as other attributes including biodiversity support, amenity and creation, cultural heritage. Over the time, the vegetation cover in the lower U Minh national park has been constantly changing because of natural disasters or under the impacts of humans. Fires and land conversionfor agriculture have reduced many plant species as well as the area of intact peatland in the lower U Minh national park. Fires have been a major problem for the Melaleuca forest grown on peatland of this area [14]. Further, the loss of the vegetation in this area has led to the exposure of the underlying acid sulfate soils.

Species diversity is an important index in community ecology [9]. Although species richness and diversity are useful indicators of the effects of forest management practices, species diversity per se is also important in biodiversity. For example, forest stands with relatively higher species richness or diversity are not always much better for biodiversity, as undesirable species (e.g., invasive or exotic species), which frequently comprise a high proportion of early successional species [3]; [4] can contribute toward a marked increase in diversity [7]; [10]; [17]. Therefore, the vegetation is also an important component of the valuable contribution of the ecosystem [5]; [6]. It is also an excellent indicator for early signs of any physical or chemical degradation in such ecosystems [2]. A comprehensive understanding of plant species diversity, species composition, and the

ecological traits of species [19] is thus considered necessary in order to understand and evaluate biodiversity [11]; [12];[16]. Therefore, management, monitoring and measuring of the plant species in the lower U Minh national park is a necessential steps to gain a better understanding of this resource and this is also the goal of this study.

Characteristics the study area

The lower U Minh national parkbelongs to U Minh and Tran Van Thoi districts of Ca Mau province in Vietnam. Thetotalextent of the park is estimated to be about 8,476 ha. It is located between $9^o12'30"$ to $9^o17'41"$N and $104^o54'11"$ to $104^o59'29"$E (Figure 1).The average temperature in the area is26.5^0C and the average annual precipitation is 2,360 mm. Its terrain is relatively flat and the average elevation varies from 1 to 1.5m above sea level. The main soil types are peat and clay with alum sub-soils dominating in water logging areas.

Due to the presence of dyke systems in the area, lower U Minh national park is not affected by the diurnal tidal of the WestSea. However, the area isflooded from 0.1 to 1m during the rainy seasonfor5-6months from June to November in each year. The amount of waterin the forestcan be adjusted, lowered orstoredineach zonebyregulatingwater through culverts. The vegetation of the lowerU Minhnational park dominates with Melaleucacajuputiibelongs to Myrtaceae family.

II. METHODOLOGY

The location of the sampling area was determined based on the random design. Survey routes were selected so that they cover all vegetation types as much as possible. Landsat satellite imagery was used to plan for survey routes. Local people and the managers of the survey area were also consulted.

Based on the map of the area set up survey lines, total of 9 survey lines (transects) (6 surveys lines for plantation and 3 lines for natural forests) were surveyed. 3-5 plots were set up along each line which are 1,600 m^2 (40x40m). A total of 45 plots (33 plots of plantation forest and 12 plots for natural forest) was set up for the lower U Minh national park. The total area of 45 plots was accounted for the total area of the national park (Figure 1).

In each main plot 1600 m^2 (40x40m), set up and 5 sub-plots of 100 m^2 (10x10m), they were placed at four corners of the main plot and one was placed in the center. The total area of the sub-plots were at least 1/3 the area of each main plot. The number of species, diameter at breast height (DBH) for woody trees, other living forms (woody trees, shrubs, vines, herbaceous) were determined in each plot. The species density was calculated by using equation below:

Density= (Number of species appearing in all sample plots)/(Total plot size)

Species were identified by the experience of experts. Unknown species were collected to identify its name according to the plant named book of the Pham (1991) and Chung (2008) [15]; [1].

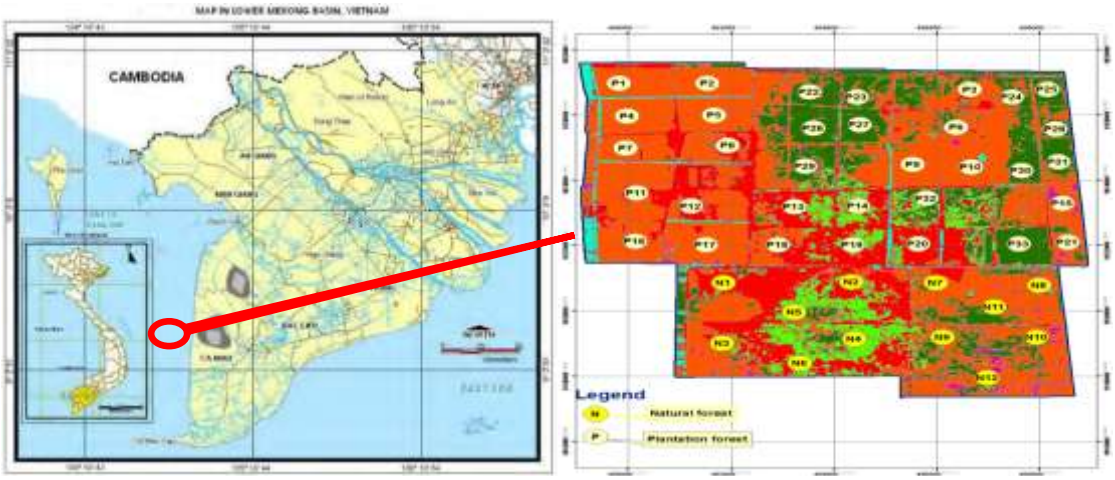

Figure 1. Location of the lower U Minh National Park (right) and Mekong Delta (left)and layout of sample plots

III. RESULTS AND DISCUSSION

The lower U Minh national park has been dominated byM. cajuputi trees withagrasscommunity and vines. The M. cajuputi forests is88.64%of the totalarea ofthe lower U Minh national park in 2015 and rest was comprised of bare soil, canals and grassland. There are 104 plant species of natural plants belonging to 48 different families in lower U Minh national park. Among them, grass and liana are the most dominant types.

Although known as M. cajuputi forests, there are 11 other tree species (Annona glabra; Alstoniaspathuluta blume; llex thorelii piere; Trema orientalis blume; Acacia auriculiformis; Ficus microcarpa;Ficus pisocarpa; Morus alba; Eugenia cumini ; Euodia lepta; Premma intergrifolia) found in small numbers. Apart from that, 4 shrub species, 4 herbaceous species, 38 grass species, 27 liana species, 13 aquatic weed species, and 6 fern species were recorded.The M. cajuputi forest could be divided into two sub-zones as natural zone and plantation zone.

The results of ground survey revealed that the abundance of wood species in different zones were different. M. cajuputi had the highest abundance ranging from 61.47% to 85.33%. The highest coverage belongs to the plantation forest (85.33%), followed by regenerated forest (74.99%) and natural forest (61.47%). In addition to M. cajuputi, some of the woody trees also appeared in the study areas, such as Annona glabra, Alstonia spathuluta, Llex thorelii, Ficus microcarpa... Percentage of presence ofthese trees is very low, ranging from 1.37% to 5.69% in natural forest, from 0.75 to 4.78% in the regenerated forest and 0.55 to 2.49%in the planted forest. Percentages of presence of woody species in the lower U Minh national park in 2015 were shown in Table 1 and Figure 2.

Species	Natural forest	Plantation forest	Regenerated forest
Melaleuca cajuputi	61.47%	85.33%	74.99%
Annona glabra	3.69%	1.83%	4.78%
Alstonia spathuluta	4.20%	2.49%	2.19%
llex thorelii	5.69%	0.75%	2.78%
Trema orientalis	2.69%	1.67%	1.57%
Acacia auriculiformis	4.42%	0.95%	1.39%
Ficus microcarpa	3.26%	1.67%	1.17%
Ficus pisocarpa	1.59%	1.28%	4.66%
Morus alba	2.24%	1.33%	2.08%
Eugenia cumini	5.84%	0.55%	2.39%
Euodia lepta	3.54%	1.25%	0.75%
Premma intergrifolia	1.37%	0.90%	1.25%

Table 1. Percentage of presence of woody species in the lower U Minh national park in 2015

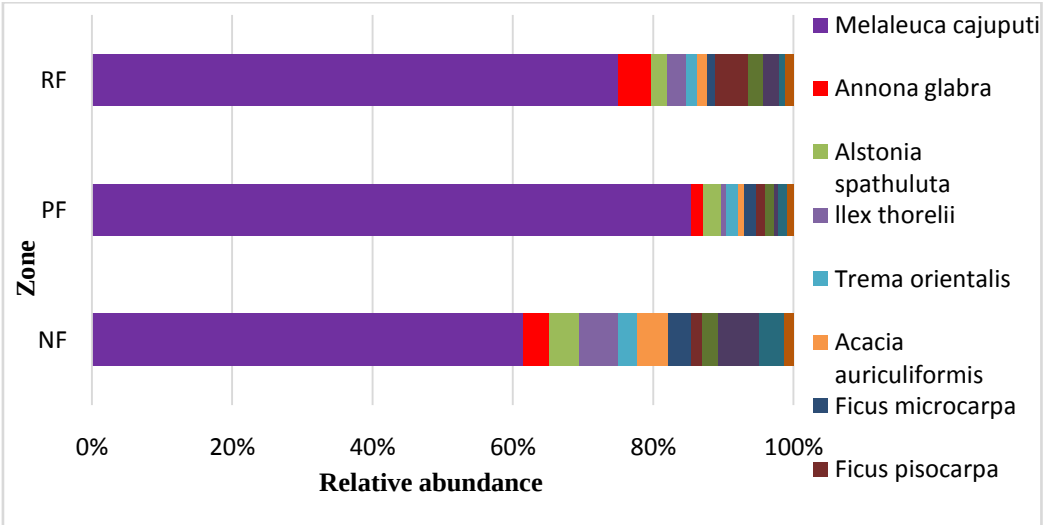

Figure 2. Woody species zonation at the lower U Minh in 2015.
NF= Natural forest; PF= Plantation forest; RF= Regenerated forest.

Natural Melaleuca cajuputi forest

The M. cajuputi trees growing naturally covers a large area, i.e., 1,844.46 ha in 2015 which is accounted for 21.76% of the total area, which was distributed in the southwest of the national park. Most of the natural M. cajuputi on peatland is older than 13 years, and it is thedominant tree, with averageheight of 14.73±3.01m, and the average diameter of 17.17±7.05cm(Table.2). The highestpercentage at DBH greater than 20 cm was 31.03%. The highest trees around 20 m in height withDBH>62cmwas alsofound, but it is in small quantities. However, although the natural M. cajuputi foreston peatland in the lowerU Minh national park was anold forest, it's tree density was low. The highestdensityofM. cajuputi was675trees/ha, the lowestdensitywas318.75trees/ha, and the average densitywas528.65 trees/ha. Average volume of main stem was 0.151±0.015m^3/tree. The depthof thepeat layer was 1.2m.

It was distributed in the southwest of the lower U Minh national park. 59 flora species belonging to 34 families were identified in this zone, of which there were 9 species of woody plants, 4 shrubs, 4 herbaceous species, 26 species of liana, 6 fern species and 10 species of grass. Apart from dominant M. cajuputi, some other plants such as Alstonia spathulata (Apocynaceae), llex cymosa (Aquifoliaceae), Euodia lepta (Rutaceae) and Syzygium cumini (Myrtaceae)were recorded in large numbers. Further, this forest type is characterised by an abundance of ferns, of which the two most common species are Stenochlaena palustris and Nephrolepis falcate. Shrub species areGlochidion littorale, Senna alata, Melastoma affine and Phyllanthus reticulatus. The M. cajuputi density was low in the areas of the dominant grass and vines

Plantation Melaleuca cajuputiforest

TheM. cajuputi plantation area is5,668.87 ha in 2015, accounted for 66.88% of the total area of the lower U Minh national park and this forest typeusually appearsat the outer edgeof the peatland. The regenerated M. cajuputi afterfiressearedaway on the layers ofprimitive peats with the area total of 1,653.97 ha, accounted for 19.51% of the area total of the lower U Minh national park, wasdistributed in the north and east locations.The plantation M. cajuputi trees (4,014.9 ha) were 5 to 13 years old. The averagedensityofplantation M. cajuputi was 6,285.71 trees/ha with the average ground cover of 72.87%. The averageheight was11.45±2.25 m, and the average DBH of 9.01±2.14 cm (Table.2).Average volume of stem was 0.028 ± 0.016 m^3/tree.
Phragmites vallatoria is the next common species with the average coverage of 16.1% and the rest was comprised of fern and liana. The total number of species in the plantation zone was 38 of which 4 species are woody plants, 4 shrubs, 3 herbaceous species, 5 fern and 10 liana species. In addition, 12 grass species were also found.

Type	Diameterclass (cm)	N (tree/ha)	DBH (cm)	H (m)
Natural forest	5-10	114.07	7.90 ± 1.48	9.94 ± 2.05
	10-15	139.06	12.55 ± 1.57	13.16 ± 0.95
	15-20	111.46	17.36 ± 1.40	15.56 ± 1.19
	>20	164.06	25.53 ± 4.87	17.75 ± 1.34
Plantation forest	< 5	112.12	4.68 ± 0.20	5.51 ± 1.11
	5-10	5,169.70	7.90 ± 1.39	10.44 ± 1.77
	10-15	1,024.24	11.24 ± 1.00	13.65 ± 0.53
	15-20	6.06	15.62 ± 0.58	13.78 ± 0.67

Table 2: The growth parameters of M.cajuputi trees

Note: Average ± standard deviation; N: the density of M. cajuputi; DBH; H: the average height of tree.

In the lower U Minh national park, the stem DBHof plantation M. cajuputi growing on clay soilwassmaller than the DBH of natural M. cajuputi growing on peatland. Differences in DBH distribution of M. cajuputi forests at different ages and soil types may be due to the following reasons: (i) non-uniform genetic resources (ii) seedlings are different in size; (iii) greatdifferences of geology (iv) competition and dominance of weeds; (v) after planting, the forest is not pruned and take care careful. However, densityof plantation M. cajuputigrowingon clay soilwassignificantly higher than the natural M. cajuputi growing on peatland. This could be due tothe characteristics ofpeatland which werevery thickand softsoil, and the ground was covered withmanyweedsand vines. In contrast,alkaline soil had a thinner and harder surface soil layerbecause there was more clay soil. Weedsand vines were growing less onthe ground.Therefore, to adapt topeatland, M. cajuputi stems develop strongly at the base. On the other hand, duetostrong competitionwith weedsand vines, natural M. cajuputitrees growing on peatlanddid notsurvive as seedlings.The result wasthe density ofthe natural M. cajuputi growing on peatland was lower thanthe plantationM. cajuputi growing on clay soil. Detailedstructuralanalysis of natural M. cajuputi growing on peatlandfound that about 2-4% of the total treesgrow slowly. In the process ofdevelopment of theforest, theless developedtreesdiegradually. Naturaldeath tree rates were 1-2%.
It was very interesting to observe that there aremanytreesbent in the lower U Minh national parkat the baseat a height ofaround 1m. This might be caused on the one handby genetic characteristicsof thespecies, or on the other handdueto their naturalreactionto the impactof the wind. Indeed, M. cajuputi are plantedbybare roots according to a floatingimplantation method. Therefore, aftertransplanting, the rootsystemis still veryweak and did nothave the ingrained abilityinthesoil.Therefore, when encounteringlarge impactforceof the wind, the M.

cajuputi rootscanbeseparated from thesoftsoil. When they were separated fromthe soil layer, the rootsystemis stillhad the abilitytodevelopin the water environment. Undernatural reaction, the M. cajuputi root systemwilldevelopgraduallyandis able to be established inthesoil. Buttostand firmly againstmechanicalforces, the M. cajuputi stems have to change morphology and bendat the base. This metamorphosis changehelpedto sustain the treesand grownormally in the softsoil environment of long termflooding.

Grass species were usually present in wet areas along the canals and bogs where previously M. cajuputi forests were burnt or cut down by people living in the area. Besides, the two dominant species of Eleocharis dulcis and Phragmitex sp., this habitat also had 38 other grass species and 13 aquatic weed species. Vallatoria reeds grow along the main road from the front gateway of the National Park to the back gate and along the banks of canals on the dyke with the total reed area of approximately 596.017ha. However, height of reeds can reach up to 4m, forming single-species areas. Further, Eleocharis dulcis was found to be common along the routes distributed throughout the park along with reed grassland. The total area of Eleocharis dulcis grassland was estimated to be 119 ha. It was usually the dominant species, with the density of about 95%, and height ofabout 30-70 cm. Apart from Eleocharis dulcis, the other species such as Cyperusextent elatus, Cyperus exaltatus, Cyperus compactus, Eleocharis attropurea, Phragmites karka, Ludwigia adscendens, Ceratopteris thalictroides, Pistia stratiotes, Lemna minor and Nymphaea nouchali were also present in the area.

The dominant species found in marsh were Nymphaea nouchali,Pistia stratiotes,Salvinia cucullata,Ludwigia adscendensand Hydrilla verticillata. These plants distribute into dense floating arrays covering the entire water surface of the area forming dense-mat like vegetation. In addition, the other plant species is also appeared along with this species. Among them the common species wereEichhornia crassipes, Eleocharis dulcis, Ipomoea aquatic, Ludwigia adscendens, Leersia hexandra and Commelina diffusa. Apart from that, aquatic species such as Ceratopteris thalictroides; Ludwigia adscendens;Eichhornia crassipesand Monochoria vaginalis were found in the swamp. The total area of swamps was estimated to be 83.3 ha in extent.

Plant groups found in man-made canals were quite diverse. Vigna luteola, Commelina diffusa, Cyperus elatus and Ischaemum rugosum were found along the canal banks. Utricularia aurea, Hydrilla verticillata, Pistia stratiotes, Salvinia cucullata and Eichhornia crassipes were submerged or floating species in the canals. Many channel segments in the core area were heavily covered with dense floating carpet-like Eichhornia crassipes and Pistia stratiotes. Canal segments in the outer core areas often do not have this situation due to better water flow.The total canal area is 199 ha.

A main hazards related to the utilization and management of peatlands in the study area is: During the summer of 2016, an extreme period of high temperatures and low rainfall resulted in widespread and prolonged fires on drained peatlands in lower U Minh national park. Wherever they occur, peat fires are very difficult to extinguish. They are often located at some distance from roads, making it difficult to apply conventional fire-fighting techniques. In addition, the nature of the smoldering material means that the fires can persist for weeks, or even months, burning slowly at and below the peat surface. Under very dry conditions, smouldering fires can continue to burn even following days of rain. Fire suppression efforts have been successful, but have resulted a lot of additional canals in the area. As part of the suppression effort, salt water has been pumped into both areas, which can lead to negative impacts on fresh water plants, organisms, and native wildlife.The canals alter the historic/natural water regime in the peat forest, causing lower than normal soil ground water levels that increase. The severity and extent of seasonal drying and fragment the habitat of the area. These impacts make it difficult to achieve the current land management objectives of the area.

Melaleuca cajuputi *Nepenthes mirabilis*


Eleocharis dulcis Dischidia rafflesoawa


Ludwigia adscendens Pistia stratiotes


Ficus pisocarpaCeratopteris thalictroides

IV. CONCLUSIONS

The lower U Minh national park has been dominated by M. cajuputi trees with 88.64% of the total area and rest was comprised of bare soil, canals and grassland. In Natural forest zone, total of 59 flora species belonging to 34 families were identified in this forest, of which there were 9 species of woody plants, 4 shrubs, 4 herbaceous species, 26 species of liana, 6 fern species and 10 species of grass.In the plantation zone, the total number of species was 38, of which 4 woody, 4 shrubs, 3 herbaceous species, 5 fern and 10 liana species and 12 grass species were also found. Thirty eight grass species and 13 aquatic weed species were also present in wet areas along the canals and bogs where previously M. cajuputi forests were burnt or cut down by humans. Below are some of our recommendations:

Assessment the presence and distribution of rare and endangered plants species for both study sites are recommended to identify further ecological importance.Incorporatethe local people and their ideas in proper management activities.Strengthening forest fire control, especially occured in recent years in the lower U Minh national park must be done for managing it is proper manner without destruction.

Appendix

Table 4. List of plant families and species recorded in the lower U Minh national park of Vietnam.

No	Family	Scientific name	Plant types
1	Acanthaceae	Ruellia tuberosa	Grass
2	Aizoaceae	Polygonum hydropiper	Grass
3	Amaranthaceae	Achyranthes aspera L.	Grass
4		Althernanthera repens	Grass
5		Celosia argentea L.	Grass
6	Annonaceae	Annona glabra	Wood
7	Apocynaceae	Alstonia spathuluta Blume	Wood
8	Aquifoliaceae	llex thorelii Pierre	Wood
9	Araceae	Licuala spinosa Roxb	Grass
10		Colocasia esculenta	Aquatic
11		Pistia stratiotes	Aquatic
12	Asclepiadaceae	Dischidia rafflesiana	Liana
13		Finlaysonia obovata	Liana
14		Stenochlena palusstris (Burmf.)	Liana
15		Sarcolobus globosus Wall.	Liana
16	Aspleniaceae	Asplennium confusum	Fern
17	Asteraceae	Xanthium strumarium L.	Grass
18		Wedelia biflora (L.) Wild.	Grass
19		Blumea lacera (Blume.f.)	Grass
20		Eclipta prostrala L.	Grass
21		Ageratum conyzoides L	Grass
22		Eupatorium odoratum L.	Grass
23		Chromolaena odorata (L.)	Grass
24	Athyriaceae	Diplazium esculentum (Retz.)	Fern
25	Blechnaceae	Blechnum serrulatum Rich.	Fern
26	Cannabaceae	Trema orientalis (L.) Blume.	Wood
27	Commelinaceae	Commelina diffusa Burm.f.	Grass
28	Convolvulaceae	Ipomea aquatica	Liana
29		Operculina turpethum (L.) Silva	Liana
30		Cuscuta hygrophyllae H. Pear-son	Liana
31	Cucurbitaceae	Gymnopetalum cochinchinense L	Liana
32		Trichosanthes tricuspidata	Liana
33		Gymnopetalum intergrifolium	Liana
34		Zehneria indica	Liana
35		Scleria sumatrensis	Liana
36	Cyperaceae	Cyperus compactus	Grass
37		Cyperus elatus	Grass
38		Cyperus andreanus Maury	Grass
39		Cyperus exaltatus	Grass
40		Eleocharis dulcis	Grass
41		Thoracostachyum sp.	Grass
42		Mimosa pudica	Grass
43		Eleocharis attropurpurea (Retz.)	Grass
44	Dioscoreaceae	Dioscorea glabra Roxb	Herbaceous
45		Dioscorea trinervia Roxb	Herbaceous
46		Abelmoschus moschatus	Herbaceous
47		Hydnophytum formicarrum Jack.	Herbaceous
48	Euphorbiaceae	Glochidion littorale	Shrub
49		Senna alata	Shrub
50	Fabaceae	Vigna luteola (JACQ)	Liana
51		Canavallia lineata (Thunberg)	Liana
52		Acacia auriculiformis	Wood
53		Arachis pintoi	Grass
54	Flagellariaceae	Flagellaria indica L.	Liana
55	Hydrochurilaceae	Hydrilla verticillata (L.)	Aquatic
56	Lemnaceae	Lemna minor	Aquatic
57	Lentibulariaceae	Utricularia aurea	Aquatic
58	Lepidopteridaceae	Pteropsis piloselloides	Liana
59	Loranthaceae	Dendrophthoe pentandra	Liana
60	Malvaceae	Urena lobata	Grass
61		Hibiscus sabdariffa	Grass
62	Melastomaceae	Melastoma affine D.Don	Shrub
63	Menyanthceae	Nymphoides indicum	Aquatic
64	Moraceae	Ficus microcarpa	Wood
65		Ficus pisocarpa	Wood
66		Morus alba	Wood
67	Myrtaceae	Eugenia cumini (L.)	Wood

68		Eugenia oblata	Wood
69		Melaleuca cajuputi L.	Wood
70		Euodia lepta (Spreng.) Merr.	Wood
71	Nepenthaceae	Nepenthes mirabilis	Liana
72	Nephrolepidaceae	Nephrolepis radicans	Fern
73		Nephrolepis faclcata (Cav.) C. Chr.	Fern
74	Nyctaginaceae	Boerhavia diffusa L.	Grass
75	Onagraceae	Ludwigia adscendens	Aquatic
76	Parkeriaceae	Ceratopteris thalictroides (L.)	Aquatic
77	Passifloraceae	Passiflora foetida	Liana
78	Phyllanthaceae	Phyllanthus reticulatus	Shrub
79	Pleridaceae	Acrostichum aureum L.	Fern
80	Poaceae	Panicum repens	Grass
81		Ischaemum indicum	Grass
82		Echinochloa procera	Grass
83		Leersia hexandra	Grass
84		Phragmites karka(Retz.)Trin.	Grass
85		Kerriochloa Siamensis	Grass
86		Imperata cylyndrica (L.)	Grass
87		Cynodon dactylon L.	Grass
88		Ischaemum rugosum	Grass
89		Saccharum arundinaceum	Grass
90		Sacciolepis myosuroides (R. Br.)	Grass
91	Polypodiaceae	Pyrrosia acrostichoides G. Forst.	Aquatic
92	Pontederiaceae	Eichhornia crassipes	Aquatic
93		Monochoria vaginalis	Aquatic
94	Pteridaceae	Acrostichum aureum	Aquatic
95	Rubiaceae	Paederia consimilis Pierre	Liana
96		Psychotria serpens L.	Liana
97	Salviniaceae	Salvinia cucullata	Aquatic
98	Schizeaceae	Lygodium microphyllum (Cav.)	Liana
99	Urticaceae	Poikilospermum suaveolens (Vlume)	Liana
100	Verbenaceae	Lantana cama	Grass
101	Vitaceae	Cayratia trifolia (L.) Domin.	Liana
102		Cissus quadrangularis L.	Liana
103		Tetrastigma strumarium Gagn.	Liana
104		Cissus modeccoides Planch	Liana

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