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Technical Report · July 2015

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**A Synopsis of the Preliminary Forest Inventory
Survey of Mahausakande Regenerating Rain Forest
Stand (MKFS) in Kiriella, Ratnapura, Sri Lanka**



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July 2015

FOREWORD

The 20th Century witnessed the denudation of vast tracts of forests and its replacement with income generating agricultural pursuits which included tea and rubber. Landslides and recurrent floods were experienced as a result of this massive destruction and interference with nature. It was at the beginning of the 21st Century that a handful of environmentalists led by the late Mr Lyn De Alwis began to discuss the importance of regenerating the tropical rain forests of the island. As a result of these discussions, Mr Tom Ellawala made available a block of land which belonged to him, located in the Sinharaja belt, for the group to experiment with the concept. Accordingly, the Ellawala Foundation Trust was set up in 2005, and the land made available to the Trust to carry out the work of re-forestation. A project plan was designed and Dr Channa Bambaradeniya offered his honorary services to the project. Within 3 years the basic infrastructural needs of the project had been met with funds being made available by the Ellawala Foundation Trust, when the HSBC joined the group to facilitate a truly scientific exercise.

Almost 10 years later, the Trust engaged Dr Asanga Wijetunga to prepare an Inventory of the entire flora at the site and to include the following:

- A comprehensive Forest Inventory of the Mahausakanda Regenerating Rain Forest Stand (MKFS).
- A Reference Herbarium for the existing flora of MKFS.
- A Report on the Inventory and the Reference Herbarium of MKFS.

Additionally, some floristic data obtained during the survey would facilitate estimation of the carbon stocks (or the extent of carbon sequestration) of the MKFS and hence, would be precious in the potential carbon trading/carbon credits in the future and to contribute ongoing REDD+ programme with the support of the Forest Department.

This Report is published by Ellawala Horticulture (Pvt) Ltd with the expectation that it will stimulate other land owners in the island to set apart similar blocks of land to help mitigate the harmful impact of large-scale deforestation.

For a detailed description of Mahausakande please visit: www.mahausakande.org

Nalini Ellawala

(Trustee of the EFT and Coordinator of the Mahausakande Project)

ABSTRACT

THE PRELIMINARY FOREST INVENTORY SURVEY OF MAHAUSAKANDE REGENERATING RAIN FOREST STAND (MKFS) IN KIRIELLA, RATNAPURA, SRI LANKA

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The systematic collection of data and forest information for assessment or analysis is known as Forest Inventory. Mahausakande Regenerating Rain Forest Stand (MKFS) is located in the village of Hindurangala, in the electorate of Kiriella, Ratnapura District, Sabaragamuwa Province of Sri Lanka. Preliminary Forest Inventory Survey of MKFS was conducted from August 2013 to April 2014 and the Forest Inventory was completed in June 2015. Fifty three thousand two hundred and fifty four (53,254) individuals of woody perennial trees, shrubs and or lianas (woody climbers) were recorded from MKFS, with floristic richness of 62 plant families, 155 plant genera and 207 species of plants. The structure and composition of the MKFS, its regenerating process and sustainable management and conservation are at a satisfactory state. However, necessary precautions must be implemented to protect the flora and fauna of the system, physical environment of the system and also to get more ecological services and socioeconomic benefits from the system. Experiences gained during this Preliminary Forest Inventory Survey of Mahausakande Regenerating Rain Forest Stand would definitely be beneficial to conduct the second successive survey, recommended to commence in the year 2024.

Key words: Forest Inventory, Mahausakande, Ratnapura, Regenerating

1 Introduction

1.1 Forest Inventory

The systematic collection of data and forest information for assessment or analysis is known as 'forest inventory'. Plant species, diameter at breast height (DBH) and height of trees, site quality, age of stands, defects are considered as important things to measure, enumerate and note when taking forest inventory. The number of trees per hectare, the basal area, the volume of trees in an area, and the value of the timber can be calculated from the data collected during a survey. An estimate of the value and possible uses of timber is an important part of the broader information required to sustain ecosystems. Inventories can be done for other reasons than just calculating the value. The results of this type of inventory can be used in preventative actions and also awareness. Wildlife surveys also can be undertaken in conjunction with timber inventory to determine the number and type of wildlife within a forest. The aim of the statistical forest inventory is to provide comprehensive information about the state and dynamics of forests for strategic and management planning (Henning & Mercker 2009).

1.2 Mahausakande Regenerating Rain Forest Stand (MKFS)

Mahausakande Regenerating Rain Forest Stand (MKFS) is located in the village of Hindurangala, adjacent to Galpurana settlement in the electorate of Kiriella, Ratnapura District, Sabaragamuwa Province of Sri Lanka (6°76'68.9"N-80°25'38.4"E). A block of 40 acres (c.a. 16 ha) had been replanted with rubber in 1960s. For replanting of rubber, a patch of Tropical Wet Evergreen Forest, the climatic climax forest type of the area at that time had probably been cleared. With the passing of the Land Reform Bill in 1970, the original owners handed over this property to the Land Reform Commission as excess land and from then onwards the rubber estate was abandoned and allowed to go into natural regeneration, to a forest (Ellawala 2012).

In late 1980s, Land Reform Commission decided to allocate this block of land to the Ellawala family and presently this block is maintained under the guidance and supervision of the Ellawala Foundation Trust as a regenerating (deliberate and natural) forest stand, in a succession process. Deliberate introduction of indigenous plant species into Mahausakande has been commenced in 2005 and the rubber plantation was already in a degenerated state since c.a. 2000 (Ellawala 2012).

1.3 A Brief Review of Literature on Regenerating Rain Forest Stand

Four systematic studies have been done on the flora and fauna of Mahausakande Tropical Rainforest Regeneration Initiative in the year 2012. One study is on diversity of herpetofauna of Mahausakande (Wickramasinghe *et al.* 2012), and another study on valuation of ecosystem services and options for sustainable financing of Mahausakande (Ranasinghe & Bambaradeniya 2012). Third study is an assessment of forest regeneration in Mahausakande, which was done by Fernando, Ekanayake & Bambaradeniya (2012) and the fourth study is a baseline assessment of sequestered standing carbon in Mahausakande by Ekanayake, Fernando & Bambaradeniya (2012). In addition to the above publications, there are some other technical reports, lists of flora and fauna, booklets, pamphlets, brochures, flyers and handouts on flora and fauna, and ecological and socioeconomic (community) services of Mahausakande, prepared by Ellawala Foundation Trust. However, the book titled *Enjoying Freedom, the Story of Mahausakande* by Ellawala (2012) gives an ample amount of information on MKFS and its services.

However, it had been identified that the complete systematic documentation of floristic component of this forest stand is a timely need. Hence, the present study, the *Preliminary Forest Inventory Survey of Mahausakande Regenerating Rain Forest Stand* was initiated in the year 2013.

1.4 Objectives of the Study

Overall objective of the study was to document floristic component, i.e., to prepare an Inventory for the Mahausakande Forest Stand (MKFS) with the following specific objectives.

Specific Objectives:

- To survey the entire forest stand (16 ha) for its tree and shrub (woody perennial plants) component, i.e., in qualitative and quantitative means.
- To survey the saplings of the woody perennials and herbaceous community in representative manner.
- To prepare herbarium vouchers of the plant species existing in the forest stand and to establish a reference/working herbarium.
- To assess the present condition of the forest and to predict the future trends
- To make recommendations to improve the quality of the stand and to propose remedies to mitigate the risks and threats, if any.

1.5 Expected Outcome of the Survey

1. Forest Inventory of Mahausakande Regenerating Rain Forest Stand (MKFS).
2. Reference Herbarium for the existing flora of MKFS.
3. Report on the Inventory and the Reference Herbarium of MKFS.
4. In addition to the three main direct outcomes; some floristic data obtained during the survey would facilitate the estimation of the carbon stocks (or to get an idea on the carbon sequestration) of the MKFS and hence, would be precious in the potential carbon trading/carbon credits in the future and contribute to ongoing REDD+ programme (Appendix – 6.1).

2 Methodology

Forty (40) acres, i.e., 16.188 ha (16 ha approximately) of the MKFS were divided into 400 hypothetical blocks of 400 m² (20 m x 20 m quadrats/plots) in order to survey the woody perennial component of the flora (Note: 1 ha = 10,000 m², 1 ha = 2.471 acre and 1 acre = 0.4047 ha) keeping the available map of MKFS as a reference. This demarcation was considered as an estimated mean. Flexibility was maintained throughout the survey to adjust the shape and the size of the plot in some unavoidable circumstances, such as at the edges of the forest, the boundary and uneven terrain; and was determined accordingly.

Two groups of surveyors were appointed to carry out the inventory survey. Each group was comprised of a leader (one of two permanent field assistants of the MKFS) and two temporary field assistants selected from the peripheral community. The two survey teams were trained by the scientist appointed to the project with necessary instructions (with lectures and practical component) on residential basis before the commencement of the survey with continuous guidance and supervision throughout the survey.

Each group was assigned one block of 400 m² (20 m x 20 m quadrat/plot) per day to complete survey at the initial stage. Two such plots to be surveyed per day by two groups and initially planned to complete 400 blocks within 200 days: i.e., to complete the survey within 10 months (20 working days per month and therefore, 10 months to complete). The number of plots per day was increased gradually after proper training and according to the vegetation density of the sites and managed to complete the entire survey within eight months, from August 2013 to April 2014 (Plate 01 and Plate 02; Appendix – 6.2.1 and 6.2.2).

Each and every plant with a circumference of 3cm (i.e. 1 cm DBH, thickness of an ordinary pencil) and height equal or above 1.5 m was considered for the inventory survey. Circumference was measured using a sewing tape, and height of selected individuals was estimated using calibrated pole. Due to the lack of DBH tape, the circumferences of trees were measured instead of DBH and the DBHs were calculated using the standard formula $C=2\pi r$; where C = circumference, $\pi = 22/7$ and r = radius.

Individuals were identified at the site (on site basis) and/or a samples were collected, tagged/labeled and herbarium vouchers were prepared to be identified using expert knowledge or comparing with authentic samples in National Herbarium, Peradeniya.

Two, 1 m x 1 m quadrats form each large plot (20 m x 20 m) were surveyed for saplings of woody perennials and herbaceous component of the flora. Individuals were identified at site and/or samples were collected, tagged/labeled and herbarium vouchers were prepared for further identification and confirmation.

Data entry and the preparation of herbarium vouchers were done parallel to the survey on a weekly basis. Including the 10 months of field survey, the entire project was planned to complete within one year duration.

The inventory survey was initiated on August 2013 and completed by April 2014. Initial data entry was completed by July 2014. Data merging, editing, checking and analyzing was completed in early June 2015.

3 Results and Discussion

Fifty three thousand two hundred and fifty four (53,254) individuals of woody perennial trees, shrubs and or lianas (woody climbers) were recorded from Mahausakande Regenerating Rain Forest Stand (MKFS) in Kiriella, Ratnapura, Sri Lanka during its preliminary survey and all of them were tagged. Out of 53,254 individuals 53,207 were within the criterion stipulated at the beginning of the survey, above 2.0 cm girth (circumference), i.e. above 1.0 cm (0.64 cm) diameter at breast height (DBH). Only 47 individuals were below 2.0 cm girth, i.e. below 0.64 cm DBH, the pencil thickness (Table 01 and Chart 01). This has happened accidentally. However, they were also included in the inventory.

Table 01: Distribution of Individuals among Different DBH Classes.

DBH Class No.	DBH Class (cm)	Number of Individuals	DBH Class No.	DBH Class (cm)	Number of Individuals
1	< 1.0	47	12	20-29	1912
2	1.0 – 1.9	92	13	30-39	692
3	2.0 – 2.9	21737	14	40-49	141
4	3.0 – 3.9	10059	15	50-59	33
5	4.0 – 4.9	6433	16	60-69	15
6	5.0 – 5.9	2717	17	70-79	9
7	6.0 – 6.9	2086	18	80-89	1
8	7.0 – 7.9	1512	19	90-99	2
9	8.0 – 8.9	1140	20	100-199	8
10	9.0 – 9.9	872	21	100-200	1
11	10-19	3745	22	Total	53,254

Out of 53,254 woody perennials, 46,695 (87.68%) were below 10.0 cm DBH and the rest 6,559 (12.32%) were only equal or above 10.0 cm DBH. Forty six thousand six hundred and ninety five (46,695) individuals could be further categorized into two lumped classes of DBH as 0-5 cm (i.e. 0.0 – 4.9) and 5-10 cm (5.0 – 9.9) to show the distribution of individuals below 10 cm DBH in only two separate clusters. Accordingly 38,368 individuals were with DBH of equal or less than 5.0 cm and the rest 8,327 were within DBH of more than 5.0 cm and less than 10.0 cm, i.e. 72.05% and 15.63% of the total population respectively. Therefore, only 27.95% of the

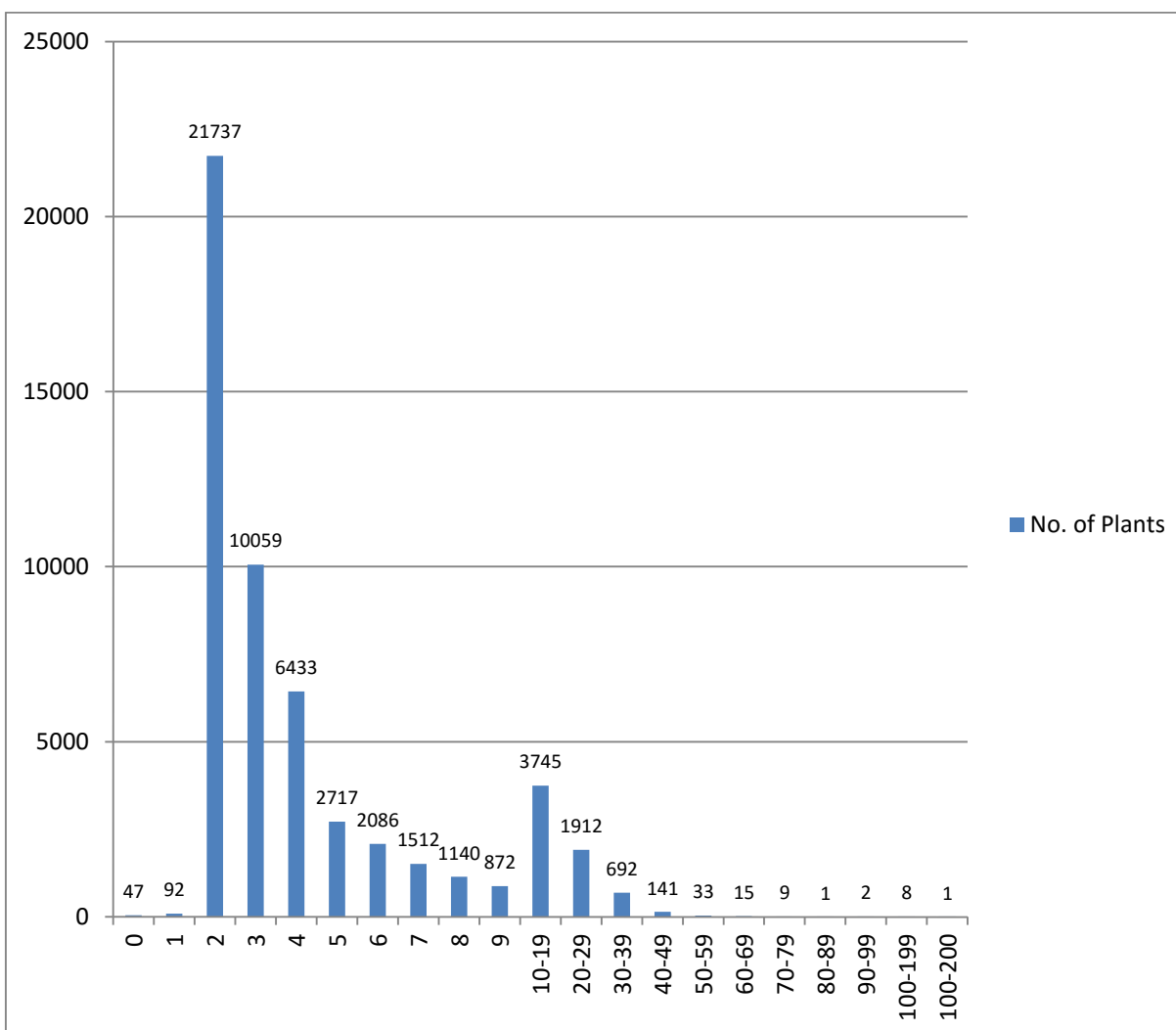
community has reached up to tree level and the rest (72.05%) were either tree-lets, saplings of large trees or pioneer shrubs of the succession, the regenerating system. Pioneers are 17.63% of *Clerodendrum infortunatum* [Pinna (S)], 15.87% of *Symplocos cochinchinensis* [Bombu (S)], 5.43% of *Syzygium caryophyllatum* [Dan (S)] and 1.87% of *Melastoma malabathricum* [Maha-bowitiya (S)] etc. Some exotics (introduced) were also with higher percentages such as *Hevea brasiliensis*, *Gliricidia sepium*, and *Alstonia macrophylla*. Some climatic climax indigenous species such as *Cleistocalyx nervosum*, *Carallia brachiata*, *Litsea longifolia*, *Cinnamomum verum* and *Artocarpus nobilis* were also among the higher percentage species (Table 02).

Table 02: First Twenty Species of Plants with Higher Percentages Reported from MKFS

No.	Plant Name (Species or Genus)	Family	Vernacular Name (Sinhala)	No. of Ind.	%
1	<i>Clerodendrum infortunatum</i>	Lamiaceae	Pinna	9391	17.63
2	<i>Symplocos cochinchinensis</i>	Symplocaceae	Bombu	8451	15.87
3	<i>Cleistocalyx nervosum</i>	Myrtaceae	Batadomba	2912	5.47
4	<i>Syzygium caryophyllatum</i>	Myrtaceae	Dan	2893	5.43
5	<i>Hevea brasiliensis</i>	Euphorbiaceae	Rubber	2642	4.96
6	<i>Carallia brachiata</i>	Rhizophoraceae	Dawata	2037	3.83
7	<i>Litsea longifolia</i>	Lauraceae	Rath-keliya/Rath-kela	1512	2.84
8	<i>Cinnamomum verum</i>	Lauraceae	Kurundu	1379	2.59
9	<i>Melastoma malabathricum</i>	Melastomataceae	Maha-bowitiya	995	1.87
10	<i>Gliricidia sepium</i>	Fabaceae	Laadappa	934	1.75
11	<i>Alstonia scholaris</i>	Apocynaceae	Rukattana	926	1.74
12	<i>Acronychia pedunculata</i>	Rutaceae	Ankenda	836	1.57
13	<i>Caryota urens</i>	Arecaceae	Kithul	822	1.54
14	<i>Artocarpus nobilis</i>	Moraceae	Kele-del/Badi-del	767	1.44
15	<i>Gaertnera vaginans</i>	Rubiaceae	Pera-thambala	760	1.43
16	<i>Artocarpus heterophyllus</i>	Moraceae	Kos	621	1.17
17	<i>Macaranga peltata</i>	Euphorbiaceae	Kenda/Path-kenda	579	1.09
18	<i>Alstonia macrophylla</i>	Apocynaceae	Gini-kuru/Hawari-nuga	568	1.07
19	<i>Mallotus tetraococcus</i>	Euphorbiaceae	Bu-kenda	533	1.00
20	<i>Ficus hispida</i>	Moraceae	Kotadimbula	502	0.94

Table 03 presents the Botanical Names of plants, their families, Sinhala vernacular names of the plants and number of individuals of each species found during the survey. Floristic richness of the MKFS is 62 plant families, 155 plant genera and 207 species of plants.

Chart 01: DBH Class Distribution.



Herbarium vouchers were prepared by the members of the two teams of surveyors, parallel to the inventory survey under my guidance and supervision. Identification of the specimens was also done by me to a certain extent while planning to prepare vouchers of all the species found in MKFS was with help from the permanent staff of MKFS.

Inventory of MKFS is presented as a Microsoft Excel Work Sheet of 1567 pages, with 34 entries per page. First 5 pages with 171 data entries, i.e. data for 171 woody perennial plants are presented in the Appendix (6.3) for representing the Forest Inventory of MKFS.

In addition to the 207 plant species already identified, some specimens are being identified and will be authenticated and then will be documented after the completion of herbarium process by December 2016.

Table 03: Botanical Names, Plant Families, Sinhala Vernacular Name/s and Number of Individuals per Species Recorded in MKFS during the Preliminary Inventory Survey.

No.	Plant Name (Species or Genus)	Family	Vernacular Name (Sinhala)	No. of Ind.
1	<i>Acronychia pedunculata</i>	Rutaceae	Ankenda	836
2	<i>Adenanthera pavonina</i>	Fabaceae	Madatiya/Manchadi	19
3	<i>Adenia hondala</i>	Passifloraceae	Hondala	2
4	<i>Albizia odoratissima</i>	Fabaceae	Suriya-mara	95
5	<i>Allophylus cobbe</i>	Sapindaceae	Kobbe	21
6	<i>Alstonia macrophylla</i>	Apocynaceae	Gini-kuru/Hawari-nuga	568
7	<i>Alstonia scholaris</i>	Apocynaceae	Rukattana	926
8	<i>Anamirta cocculus</i>	Menispermaceae	Thiththa-wel	84
9	<i>Anisophyllea cinnamomoides</i>	Rhizophoraceae	Welipenna	74
10	<i>Annona glabra</i>	Annonaceae	Wel-aaththa	1
11	<i>Annona muricata</i>	Annonaceae	Katu-anoda	38
12	<i>Annona reticulata</i>	Annonaceae	Weli-anoda	1
13	<i>Anodendron paniculatum</i>	Apocynaceae	Duhul/Dul-wela	478
14	<i>Antidesma alexiteria</i> ?	Phyllanthaceae	Embilla	9
15	<i>Aporusa</i> sp.	Euphorbiaceae	Kebella	253
16	<i>Areca catechu</i>	Arecaceae	Puwak	182
17	<i>Areca concinnaira</i>	Arecaceae	Lenathari	13
18	<i>Argyreia (thwaitesii)?</i>	Convolvulaceae	Ma-banda	4
19	<i>Artabotrys zeylanicus</i>	Annonaceae	Kalu-bambara-wel	14
20	<i>Artocarpus altilis</i>	Moraceae	Del/Rata-del	14
21	<i>Artocarpus heterophyllus</i>	Moraceae	Kos	621
22	<i>Artocarpus nobilis</i>	Moraceae	Kele-del/Badi-del	767
23	<i>Averrhoa bilimbi</i>	Oxalidaceae	Biling	1
24	<i>Averrhoa carambola</i>	Oxalidaceae	Kambaranka	6
25	<i>Baccaurea motleyana</i>	Phyllanthaceae	Gaduguda	26
26	<i>Bambusa</i> sp.	Poaceae	Bata	1
27	<i>Barringtonia racemosa</i>	Lecythidaceae	Diya-midella	27
28	<i>Berrya cordifolia</i>	Malvaceae	Halmilla	1

29	<i>Bhesa ceylanica</i>	Centroplacaceae	Pelan/Pelanga	244
30	<i>Bombax ceiba</i>	Malvaceae	Imbul/Katu-imbul	123
31	<i>Bridelia moonii</i>	Euphorbiaceae	Path-kela	192
32	<i>Bridelia retusa</i>	Euphorbiaceae	Keta-kela	32
33	<i>Caesalpinia bonduc</i>	Fabaceae	Kumburu-wel	3
34	<i>Calamus thwaitesii</i>	Arecaceae	Wewal/Ma-wewal	341
35	<i>Callistemon sp.</i>	Myrtaceae	Lothsumbul	1
36	<i>Calophyllum bracteatum</i>	Calophyllaceae	Walu-keena	32
37	<i>Calophyllum calaba</i>	Calophyllaceae	Guru-keena	5
38	<i>Calophyllum inophyllum</i>	Calophyllaceae	Domba	131
39	<i>Calophyllum sp. ?</i>	Calophyllaceae	Cheena	4
40	<i>Camellia sinensis</i>	Theaceae	The	1
41	<i>Canarium zeylanicum</i>	Burseraceae	Kekuna	22
42	<i>Canthium coromandelicum</i>	Rubiaceae	Kara	41
43	<i>Carallia brachiata</i>	Rhizophoraceae	Dawata	2037
44	<i>Caryota sp. (Kuru-kithul)</i>	Arecaceae	Kuru-kithul	5
45	<i>Caryota urens</i>	Arecaceae	Kithul	822
46	<i>Cassia fistula</i>	Fabaceae	Ehela	6
47	<i>Ceiba pentandra</i>	Malvaceae	Kotta-pulun	3
48	<i>Celtis timorensis</i>	Cannabaceae (Ulmaceae)	Gurenda	1
49	<i>Chaetocarpus castanocarpus</i>	Euphorbiaceae	Hedawaka	192
50	<i>Cheilocostus speciosus</i>	Costaceae	Thebu	1
51	<i>Chloroxylon swietenia</i>	Rutaceae	Burutha	4
52	<i>Chrysophyllum cainito</i>	Sapotaceae	Kiri-palu	8
53	<i>Cinnamomum dubium ?</i>	Lauraceae	Wal-kurudu	1
54	<i>Cinnamomum verum</i>	Lauraceae	Kurundu	1379
55	<i>Citrus aurantiifolia</i>	Rutaceae	Dehi	4
56	<i>Citrus aurantium</i>	Rutaceae	Ambul-dodam	14
57	<i>Citrus grandis</i>	Rutaceae	Jambola	1
58	<i>Citrus reticulata</i>	Rutaceae	Naran	10
59	<i>Citrus sinensis ?</i>	Rutaceae	Dodam/Dodan	21

60	<i>Citrus x madurensis</i>	Rutaceae	Nas-naran	7
61	<i>Cleistocalyx nervosum</i>	Myrtaceae	Batadomba	2912
62	<i>Clerodendrum infortunatum</i>	Lamiaceae	Pinna	9391
63	<i>Cocos nucifera</i>	Arecaceae	Pol	13
64	<i>Cocos nucifera</i> var. <i>aurantiaca</i>	Arecaceae	Thambili	2
65	<i>Codiaeum variegatum</i>	Euphorbiaceae	Croton	1
66	<i>Coffea arabica</i>	Rubiaceae	Kopi	265
67	<i>Combretum albidum</i>	Combretaceae	Kaduru-ketiya-wel	50
68	<i>Coscinium fenestratum</i>	Menispermaceae	Weniwel	4
69	<i>Croton laccifer</i>	Euphorbiaceae	Keppetiya	10
70	<i>Cynometra cauliflora</i>	Fabaceae	Naminan	4
71	<i>Dalbergia pseudo-sissoo</i>	Fabaceae	Bambara-wel	25
72	<i>Dillenia indica</i>	Dilleniaceae	Honda-para	46
73	<i>Dillenia suffruticosa</i>	Dilleniaceae	Kaha-para/Kaha-diya-para	51
74	<i>Dimocarpus longan</i>	Sapindaceae	Mora	16
75	<i>Diospyros blancoi</i>	Ebenaceae	Bool-apple/Velvet-apple	9
76	<i>Diospyros insignis</i>	Ebenaceae	Poro-mara/Porwa-mara	8
77	<i>Diospyros</i> sp. 1 (<i>Kalumadiriya</i>)	Ebenaceae	Kalumadiriya	1
78	<i>Diospyros</i> sp. 2 (<i>Kaluwara</i>)	Ebenaceae	Kaluwara	59
79	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	Hora	404
80	<i>Durio zibethinus</i>	Malvaceae	Duriyan	73
81	<i>Elaeagnus latifolia</i>	Elaeagnaceae	Embilla-wel	63
82	<i>Elaeocarpus serratus</i>	Elaeocarpaceae	Weralu	337
83	<i>Entada pusaetha</i>	Fabaceae	Pus-wel	9
84	<i>Erythroxylum moonii</i>	Erythroxylaceae	Batakirilla	2
85	<i>Ficus arnottiana</i>	Moraceae	Kaputu/Pathan/Wal-bo	8
86	<i>Ficus callosa</i>	Moraceae	Gonna	101
87	<i>Ficus exasperata</i>	Moraceae	Bu-deliya	50
88	<i>Ficus fergusonii</i> ?	Moraceae	Kos-gona	9
89	<i>Ficus hispida</i>	Moraceae	Kotadimbula	502
90	<i>Ficus laevis</i>	Moraceae	Nuga-wel	10

91	<i>Ficus religiosa</i>	Moraceae	Bo	1
92	<i>Ficus tinctoria</i>	Moraceae	Ehetu	188
93	<i>Ficus tsjahela</i>	Moraceae	Kiri-pela, Kiripella (Nuga)	30
94	<i>Filicium decipiens</i>	Sapindaceae	Pihimbiya	17
95	<i>Flacourtia indica</i>	Salicaceae (Flacourtiaceae)	Uguressa	9
96	<i>Gaertnera vaginans</i>	Rubiaceae	Pera-thambala	760
97	<i>Garcinia mangostana</i>	Clusiaceae	Mangus	13
98	<i>Garcinia quaesita</i>	Clusiaceae	Goraka	190
99	<i>Gardenia jasminoides</i>	Rubiaceae	Gardiniya	1
100	<i>Gliricidia sepium</i>	Fabaceae	Laadappa	934
101	<i>Glochidion sp.</i>	Euphorbiaceae	Kirilla	477
102	<i>Gomphia serrata</i>	Ochnaceae	Bo-kera	54
103	<i>Gyrinops walla</i>	Thymelaeaceae	Walla-patta	442
104	<i>Hedyotis fruticosa</i>	Rubiaceae	Weraniya	313
105	<i>Hevea brasiliensis</i>	Euphorbiaceae	Rubber	2642
106	<i>Hibiscus furcatus</i>	Malvaceae	Napiriththa	17
107	<i>Hiptage benghalensis</i>	Malpighiaceae	Puwak-gediya-wel	2
108	<i>Homalium ceylanicum</i>	Flacourtiaceae	Eta-heraliya/Liyan	1
109	<i>Horsfieldia irya</i>	Myristicaceae	Iriya/Eeriya	279
110	<i>Ixora coccinea</i>	Rubiaceae	Rath-mal/Rathambala	221
111	<i>Jatropha multifida</i>	Euphorbiaceae	Mayura-paada	1
112	<i>Lagerstroemia speciosa</i>	Lythraceae	Murutha	11
113	<i>Lannea coromandelica</i>	Anacardiaceae	Hik	207
114	<i>Lantana camara</i>	Verbenaceae	Baloliya/Gandapana	1
115	<i>Leea indica</i>	Leeaceae/Vitaceae	Burulla/Gurulla	128
116	<i>Limonia acidissima</i>	Rutaceae	Diwul	1
117	<i>Litsea longifolia</i>	Lauraceae	Rath-keliya/Rath-kela	1512
118	<i>Macaranga peltata</i>	Euphorbiaceae	Kenda/Path-kenda	579
119	<i>Madhuca longifolia</i>	Sapotaceae	Mee	54
120	<i>Magnolia champaca</i>	Magnoliaceae	Sapu/Gini-sapu	5
121	<i>Mallotus tetraococcus</i>	Euphorbiaceae	Bu-kenda	533

122	<i>Mangifera indica</i>	Anacardiaceae	Amba	77
123	<i>Margaritaria indica</i>	Phyllanthaceae	Karaw	1
124	<i>Melastoma malabathricum</i>	Melastomataceae	Maha-bowitiya	995
125	<i>Melia azedarach</i> ?	Meliaceae	Lunu-midella	2
126	<i>Melicope lunu-ankenda</i>	Rutaceae	Lunu-ankenda	1
127	<i>Memecylon sp.</i>	Melastomataceae	Kora-kaha	25
128	<i>Mesua ferrea</i>	Calophyllaceae	Na	439
129	<i>Mimusops elengi</i>	Sapotaceae	Muna-mal	6
130	<i>Morinda citrifolia</i>	Rubiaceae	Ahu	2
131	<i>Moringa oleifera</i>	Moringaceae	Murunga	1
132	<i>Murraya koenigii</i>	Rutaceae	Karapincha	2
133	<i>Murraya paniculata</i>	Rutaceae	Etteria	5
134	<i>Mussaenda frondosa</i>	Rubiaceae	Mussenda	66
135	<i>Myristica dactyloides</i>	Myristicaceae	Malaboda	274
136	<i>Myristica fragrans</i>	Myristicaceae	Sadikka	1
137	<i>Neolitsea cassia</i>	Lauraceae	Dawul-kurundu	35
138	<i>Nephelium lappaceum</i>	Sapindaceae	Rambutan	303
139	<i>Nothopegia beddomei</i>	Anacardiaceae	Bala	1
140	<i>Ochna sp.</i>	Ochnaceae	Mal-kera	65
141	<i>Oncosperma fasciculatum</i>	Arecaceae	Katu-kithul	5
142	<i>Oroxylum indicum</i>	Bignoniaceae	Thotila	2
143	<i>Osbeckia octandra</i>	Melastomataceae	Bowitiya	31
144	<i>Pagiantha dichotoma</i>	Apocynaceae	Goda-kaduru	86
145	<i>Palaquium sp.</i>	Sapotaceae	Kiri-hambiliya	7
146	<i>Pandanus sp.</i>	Pandanaceae	Wetakeiya	2
147	<i>Paraserianthes falcataria</i>	Fabaceae	Albeesiya	210
148	<i>Passiflora edulis</i>	Passifloraceae	Wel-dodam	4
149	<i>Pericopsis mooniana</i>	Fabaceae	Nadun	140
150	<i>Persea americana</i>	Lauraceae	Ali-geta-pera	3
151	<i>Persea macrantha</i>	Lauraceae	Ululu/Ulul	254
152	<i>Phyllanthus emblica</i>	Phyllanthaceae	Nelli	3

153	<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Kayila/Kaila	320
154	<i>Pometia pinnata</i>	Sapindaceae	Na-imbul	439
155	<i>Pouteria campechiana</i>	Sapotaceae	Lawulu	12
156	<i>Psidium guajava</i>	Myrtaceae	Pera	4
157	<i>Psidium guineense</i>	Myrtaceae	Ambul-pera	1
158	<i>Pterocarpus indicus</i> ?	Fabaceae	Gammalu	3
159	<i>Pterospermum suberifolium</i>	Malvaceae	Welang	56
160	<i>Quassia indica</i>	Simaroubaceae	Samadara	107
161	<i>Salacia reticulata</i>	Celastraceae	Kothala-himbutu	11
162	<i>Samanea saman</i> ?	Fabaceae	Maara	4
163	<i>Sandoricum koetjape</i>	Meliaceae	Donka/Donga	11
164	<i>Santalum album</i>	Santalaceae	Sudu-handun	1
165	<i>Saraca asoca</i>	Fabaceae	Asoka	1
166	<i>Sauropus androgynus</i>	Euphorbiaceae	Japan-batu/Malla-dum	15
167	<i>Schefflera stellata</i>	Araliaceae	Iththa	154
168	<i>Schumacheria castanaefolia</i>	Dilleniaceae	Kekiri-wara	135
169	<i>Scolopia acuminata</i>	Salicaceae (Flacourtiaceae)	Katu-kenda	5
170	<i>Semecarpus sp.</i>	Anacardiaceae	Badulla	44
171	<i>Senna auriculata</i>	Fabaceae	Ranawara	1
172	<i>Shorea affinis</i>	Dipterocarpaceae	Beraliya-dun	23
173	<i>Shorea congestiflora</i>	Dipterocarpaceae	Thiniya	11
174	<i>Shorea sp. (Dun)</i>	Dipterocarpaceae	Dun	412
175	<i>Shorea trapezifolia</i>	Dipterocarpaceae	Yakahalu	4
176	<i>Smilax sp.</i>	Smilacaceae	Kabarasa/Kabaressa	12
177	<i>Spondias dulcis/Spondias pinnata</i>	Anacardiaceae	Ambarella	3
178	<i>Stachytarpheta mutabilis (Pink)</i>	Verbenaceae	Balu-naguta (Rosa)	1
179	<i>Stachytarpheta urticaefolia</i> ?	Verbenaceae	Balu-baguta (Nil)	2
180	<i>Sterculia balanghas</i>	Malvaceae	Nawa	2
181	<i>Strobilanthes sp.</i>	Acanthaceae	Nelu	9
182	<i>Swietenia macrophylla</i>	Meliaceae	Mahogany	14
183	<i>Symplocos cochinchinensis</i>	Symplocaceae	Bombu	8451

184	<i>Syzygium aromaticum</i>	Myrtaceae	Karambu	2
185	<i>Syzygium caryophyllatum</i>	Myrtaceae	Dan	2893
186	<i>Syzygium cumini</i>	Myrtaceae	Damba	3
187	<i>Syzygium jambos</i>	Myrtaceae	Pini-jambu	9
188	<i>Syzygium rubicundum</i>	Myrtaceae	Kurumbattiya	43
189	<i>Syzygium samarangense?</i>	Myrtaceae	Jambu	22
190	<i>Syzygium sp. (Wal-jambu)</i>	Myrtaceae	Wal-jambu	5
191	<i>Syzygium zeylanicum</i>	Myrtaceae	Yakul-maran/Yakada-maran	27
192	<i>Terminalia arjuna</i>	Combretaceae	Kumbuk	8
193	<i>Terminalia catappa</i>	Combretaceae	Kottamba	4
194	<i>Tetracera sarmentosa</i>	Dilleniaceae	Korasa-wel	141
195	<i>Theobroma cacao</i>	Malvaceae	Koko	24
196	<i>Thottea siliquosa</i>	Aristolochiaceae	Thapasara-bulath	72
197	<i>Toddalia asiatica</i>	Rutaceae	Kudumiris	37
198	<i>Trema orientalis</i>	Cannabaceae (Ulmaceae)	Gadumba	235
199	<i>Turpinia malabarica</i>	Staphyleaceae	Kankumbala/Kukul-messa	376
200	<i>Uncaria elliptica</i>	Rubiaceae	Apassa-wel	11
201	<i>Vateria copallifera</i>	Dipterocarpaceae	Hal	86
202	<i>Vitex pinnata</i>	Lamiaceae	Milla	107
203	<i>Wendlandia bicuspidata</i>	Rubiaceae	Rawan-idala	4
204	<i>Xylopia parviflora</i>	Annonaceae	Netaw	457
205	<i>Ziziphus lucida</i>	Rhamnaceae	Yak-eraminiya	16
206	<i>Ziziphus mauritiana</i>	Rhamnaceae	Masan	1
207	<i>Ziziphus oenoplia</i>	Rhamnaceae	Eraminiya/Heen-eraminiya	145
208	ZZ-Unknown	Unknown	Unknown	336
209	ZZ-Unknown 1, 2, 3 & 4	Unknown	Unknown	4
210	ZZZ-Mahanidikumba ?	Unknown	Unknown	1
Total	207 Species / 155 Genera	62 Families	Total Tagged Plants	53,254

4 Observations, Conclusions and Recommendations

Forest Inventory of Mahausakande Regenerating Rain Forest Stand (MKFS), the first expected outcome of the project has been achieved successfully. It will be completed after completion of the second outcome, the **Reference Herbarium for the Existing Flora of MKFS**. A number of new herbarium vouchers of the flora of MKFS prepared according to the standard herbarium techniques were added to its herbarium, arranged systematically according to the plant families and deposited in the insect-proof herbarium cupboard in the resource centre of MKFS. Third outcome is the **Report on the Inventory and the Reference Herbarium of MKFS**. First part of the third outcome is the present report and the second part will be prepared after achieving the second outcome. Floristic data obtained during the survey would be used in estimating the carbon stocks (i.e., to get an idea on the carbon sequestration) of the MKFS in future programmes. This is an important additional outcome of the survey.

Frequent removal of invasive alien species (IAS) of plants, as a management routine, from ground cover of the forest (removal of the forest floor vegetation) is not a fine practice. It will enhance the soil erosion, degrade the quality of seed bank and reduce seedling bank of the climatic climax species, the native woody perennials and further facilitate the light demanding species to invade the system. Economically this removal may have some advantages, but ecologically rather disadvantageous, especially when the soil disturbance is at an extensive level and if it happens during heavy rainy season. This is considered as a great interruption to the succession. Therefore, the removal of IAS of plants should be minimized or completely avoid to assist the natural regeneration of the forest stand, though MKFS is an administered (managed) forest. If the removal of the invasive aliens is a must, then it should be done with zero level of disturbance to the forest soil.

With the advancement of forest succession, with the canopy closing, the menace of invasive plants would disappear because most of them are light demanding species, and not shade tolerating. Occasionally the hiding places of herpetofauna in a semi-natural or regenerating forest like MKFS may be the luxuriant growth of some invasive alien plant species, in the absence of native flora. Therefore, the removal of such growth will cause the direct exposure of these vulnerable fauna and hence it would further help the predators for easy spotting and make quite easy for illegal collectors.

I observed that the frequency of appearing some herpetofauna, such as *Lyriocephalus scutatus* in the MKFS is being reduced significantly (qualitative reduction). Illegal collection for selling, excess predation or escape to the surrounding rubber estates due to the removal of ground flora may be some possible reasons for this population drop. However, it is essential to do an immediate systematic survey to check this quantitative reduction, and accordingly take necessary and timely precautions for their wellbeing.

Further, necessary measures must be implemented to prevent if there is any illegal collection of herpetofauna within the premises of MKFS. The cautious monitoring should be done throughout the day (and night, if possible) to recognize the collectors.

However, spreading of exotic crop plants such as coffee, cocoa and rubber has to be controlled. This can be achieved by removing the early seedlings (emergent from seeds) of these plants. Removal of them at their seeding level is the promising way rather than removal of saplings and/or cutting down of trees, in order to minimize the environmental damage due to such removal, especially the damage caused to the forest soil.

Introduction of exotic ornamentals and/or exotic or native crop plants has to be minimized or completely stopped due to two reasons. Already, there are enough such trees in the system and if more crops or exotics are added to the system, it will disturb first the scenic beauty of the regenerating forest stand and further it will affect the structure and the composition of the system, i.e. the overall physiognomy.

Further incorporation of climatic climax species of tropical wet evergreen vegetation, i.e. lowland rain forest species to MKFS is recommended. However, introduction of several individuals from many species is better than introducing higher number of individuals from a few species in order to increase the diversity and the richness of the forest. Introduction of *Mesua thwaitesii* [Diya-na (S)], *Humboldtia laurifolia* [Gal-karanda (S)], *Cullenia ceylanica* and *C. rosayroana* [Kata-boda or Katu-boda (S)], native rainforest *Calamus* species other than already existing *C. thwaitesii* [Ma-wewal (S)], *Shorea megistophylla* [Honda-beraliya, Kana-beraliya, Maha-beraliya (S)], *Shorea hulanidda* [Hulan-idda, Nawa-dun (S)], other *Dipterocarpus* species such as *D. glandulosus* [Dorana (S)] and *D. hispidus* [Bu-hora (S)], *Loxococcus rupicola* [Dothalu, Ran-dotalu (S)], *Hortonia floribunda* [Wawiya (S)] and some *Stemonoporus* species are suggested herewith.

Addition of fertilizer to crop plants may not be a great issue, if they are without any harmful elements to the water bodies and the system itself. However frequent removal of surrounding vegetation before adding fertilizer and clearing of cover vegetation may not be a healthy practice in the long run.

With the continuing growth of climatic climax woody perennials, all the pioneers, secondary vegetation species and invasive aliens such as *Trema orientalis* [Gadumba (S)], *Clerodendrum infortunatum* [Pinna (S)] and *Clidemia hirta* [Kata-kalu-bowitiya (S)] will disappear gradually from the system. This is clearly evident in some sites of the MKFS, as they are almost like a part of a typical rainforest community with giants like *Artocarpus nobilis* [Kele-del (S)] and some native lianas.

Some illegal damages to the *Gyrinops walla* [Walla-patta (S)] trees by peripheral communities were observed throughout my visits to the MKFS during the inventory survey. Any such removal and disturbance will directly affect not only the regeneration process and the forest health, but also the reputation of the management of MKFS. Therefore, steps should be taken to prevent such illegal practices.

As a concluding remark, I must say that the structure and composition of the MKFS, its regenerating process and sustainable management and conservation are at a satisfactory state. However, necessary precautions must be implemented to protect the flora and fauna of the system, physical environment of the system and also to get more ecological services and socioeconomic benefits from the system.

Experiences gained during this *Preliminary Forest Inventory Survey of Mahausakande Regenerating Rain Forest Stand* would definitely be beneficial to conduct the second successive survey. Commencing the second inventory survey is recommended in early 2024, i.e. approximately after 10 years of the first survey and to complete by the end of 2025 and further surveys in 10 year intervals.

5 References

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6 Appendix

6.1 Glossary of Terms

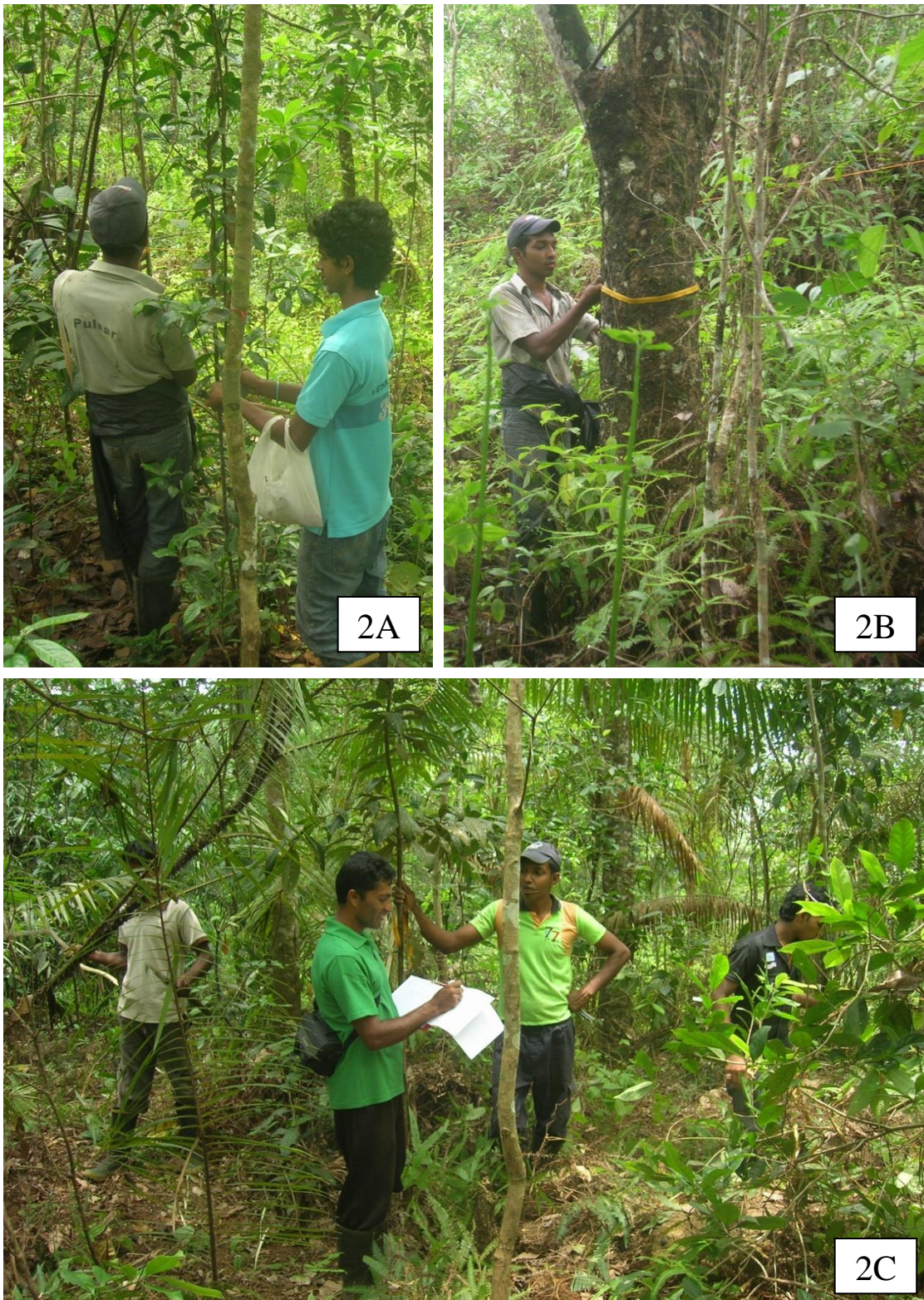
- 6.1.1. **Forest Carbon Stocks:** The following carbons pools (a) above-ground tree biomass, (b) above-ground sapling biomass, (c) below-ground biomass, (d) soil organic carbon, (e) leaf litter, herbs, and grass and (f) dead wood and fallen stumps will be measured in forest carbon estimation. In the present study only (a) and part of (b) and (e) will be considered as it is a preliminary forest inventory survey of MKFS.
- 6.1.2. **Carbon sequestration** describes long-term storage of carbon dioxide (CO₂) or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change. It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels.
- 6.1.3. **Carbon emissions trading** is a form of emissions trading that specifically targets carbon dioxide (calculated in tonnes of carbon dioxide equivalent or tCO₂e) and it currently constitutes the bulk of emissions trading. This form of permit trading is a common method countries utilize in order to meet their obligations specified by the Kyoto Protocol; namely the reduction of carbon emissions in an attempt to reduce (mitigate) future climate change.
- 6.1.4. **REDD+** (Reducing Emissions from Deforestation and Forest Degradation "plus" conservation, the sustainable management of forests and enhancement of forest carbon stocks), presents a key opportunity to generate the funding, political will and mechanism necessary to protect forests while combating climate change and improving human well-being in developing nations. It represents a suite of policies, institutional reforms and programs that provide monetary incentives for developing countries to reduce greenhouse gas emissions and sustain economic growth by halting or preventing the destruction of their forests.

6.2.1 Plate 01: Glimpse of Inventory Survey of MKFS - Part 1



Part of MKFS before tagging (1A), during plot demarcation (1B) and after tagging (1C)

6.2.2 Plate 02: Glimpse of Inventory Survey of MKFS - Part 2



Survey in Action - tagging (2A), measuring girth (2B) and recording and checking (2C)

6.3 First Five Pages of the Inventory of Mahausakande Regenerating Rain Forest Stand (MKFS)

Inventory of Mahausakande Regenerating Rain Forest Stand (MKFS) in Kiriella, Ratnapura, Sri Lanka								
Tree Tag No.	Plot	Sheet	Tree No.	Speceis	Family	Height	Circf (cm)	DBH (cm)
1	2	5	6	<i>Alstonia macrophylla</i>	Apocynaceae	18	101	32
2	2	3	15	<i>Alstonia macrophylla</i>	Apocynaceae	5	8	3
3	2	4	2	<i>Cleistocalyx nervosum</i>	Myrtaceae	2	5	2
4	2	4	7	<i>Carallia brachiata</i>	Rhizophoraceae	8	25	8
5	2	4	14	<i>Cleistocalyx nervosum</i>	Myrtaceae	5	15	5
6	2	5	5	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
7	1	1	13	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	10	3
8	1	1	14	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	12	4
9	1	1	12	<i>Nephelium lappaceum</i>	Sapindaceae	5	11	4
10	1	1	15	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	10	3
11	2	2	2	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	5	2
12	2	2	5	<i>Pericopsis mooniana</i>	Fabaceae	4	13	4
13	2	2	14	<i>Symplocos cochinchinensis</i>	Symplocaceae	1	5	2
14	2	2	13	<i>Litsea longifolia</i>	Lauraceae	2	5	2
15	2	1	1	<i>Symplocos cochinchinensis</i>	Symplocaceae	1	13	4
16	2	2	15	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	7	2
17	2	2	9	<i>Hevea brasiliensis</i>	Euphorbiaceae	17	94	30
18	2	2	10	<i>Calamus thwaitesii</i>	Arecaceae	10	9	3
19	2	2	11	<i>Pericopsis mooniana</i>	Fabaceae	4	14	4
20	1	1	3	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	5	2
21	1	6	10	<i>Caryota urens</i>	Arecaceae	2	27	9
22	2	4	6	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	8	3
23	2	4	8	<i>Cleistocalyx nervosum</i>	Myrtaceae	10	26	8
24	2	4	5	<i>Cleistocalyx nervosum</i>	Myrtaceae	5	11	4

25	2	4	1	<i>Hevea brasiliensis</i>	Euphorbiaceae	20	118	38
26	2	5	10	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	8	3
27	2	4	9	<i>Gyrinops walla</i>	Thymelaeaceae	3	16	5
28	2	4	15	<i>Calamus thwaitesii</i>	Arecaceae	8	12	4
29	2	5	4	<i>Cleistocalyx nervosum</i>	Myrtaceae		6	2
30	2	4	11	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	9	3
31	2	4	10	<i>Cinnamomum verum</i>	Lauraceae	4	7	2
32	2	5	3	<i>Melastoma malabathricum</i>	Melastomataceae	2	8	3
34	2	4	3	<i>Cleistocalyx nervosum</i>	Myrtaceae	3	7	2
35	2	4	4	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	10	3
36	2	5	8	<i>Cleistocalyx nervosum</i>	Myrtaceae	5	13	4
37	2	4	13	<i>Alstonia macrophylla</i>	Apocynaceae	6	10	3
37	2	5	9	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	7	2
38	2	4	12	<i>Cleistocalyx nervosum</i>	Myrtaceae	7	18	6
39	2	5	2	<i>Bridelia moonii</i>	Euphorbiaceae	4	9	3
40	1	1	9	<i>Clerodendrum infortunatum</i>	Lamiaceae	4	7	2
41	2	5	7	<i>Cleistocalyx nervosum</i>	Myrtaceae	6	18	6
42	2	5	1	<i>Litsea longifolia</i>	Lauraceae	5	13	4
43	1	1	10	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	6	13	4
44	1	6	13	<i>Symplocos cochinchinensis</i>	Symplocaceae	8	23	7
45	1	1	7	<i>Hevea brasiliensis</i>	Euphorbiaceae	3	6	2
46	1	1	11	<i>Macaranga peltata</i>	Euphorbiaceae	4	17	5
47	2	2	8	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	5	2
48	2	2	12	<i>Litsea longifolia</i>	Lauraceae	6	17	5
49	2	1	10	<i>Symplocos cochinchinensis</i>	Symplocaceae	5	10	3
50	2	2	3	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	5	2
51	2	1	6	<i>Alstonia macrophylla</i>	Apocynaceae	3	5	2
52	2	1	5	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	5	2
53	2	2	4	<i>Alstonia macrophylla</i>	Apocynaceae	3	5	2
55	1	1	8	<i>Alstonia macrophylla</i>	Apocynaceae	3	5	2

56	1	6	11	<i>Clerodendrum infortunatum</i>	Lamiaceae	4	11	4
57	1	6	4	<i>Symplocos cochinchinensis</i>	Symplocaceae	7	14	4
57	10	4	3	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	9	3
59	1	6	9	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	9	3
60	1	6	5	<i>Alstonia macrophylla</i>	Apocynaceae	6	11	4
61	1	6	3	<i>Symplocos cochinchinensis</i>	Symplocaceae	6	15	5
62	1	1	1	<i>Mesua ferrea</i>	Calophyllaceae	8	73	23
63	1	6	7	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	8	16	5
64	1	6	1	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	9	3
66	1	1	6	<i>Horsfieldia irya</i>	Myristicaceae	7	27	9
67	1	6	14	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	6	2
68	2	3	8	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
69	2	2	6	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	5	2
70	1	6	6	<i>Alstonia macrophylla</i>	Apocynaceae	8	17	5
71	2	3	6	<i>Calamus thwaitesii</i>	Arecaceae	9	5	2
72	2	1	4	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	7	2
73	2	1	3	<i>Hevea brasiliensis</i>	Euphorbiaceae	102	18	6
74	2	1	13	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	6	2
75	2	1	14	<i>Pericopsis mooniana</i>	Fabaceae	4	13	4
76	2	1	8	<i>Syzygium caryophyllatum</i>	Myrtaceae	3	6	2
77	2	1	9	<i>Calamus thwaitesii</i>	Arecaceae	10	12	4
78	2	3	12	<i>Calamus thwaitesii</i>	Arecaceae	13	10	3
79	2	3	11	<i>Hevea brasiliensis</i>	Euphorbiaceae	19	69	22
80	1	6	8	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	8	3
80	2	2	1	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	8	3
81	2	1	11	<i>Hevea brasiliensis</i>	Euphorbiaceae	20	88	28
82	2	3	3	<i>Pterospermum suberifolium</i>	Malvaceae	18	33	11
83	2	3	13	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	12	4
84	2	3	4	<i>Pericopsis mooniana</i>	Fabaceae	5	14	4
85	1	1	2	<i>Clerodendrum infortunatum</i>	Lamiaceae	4	9	3

85	2	3	2	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	7	14	4
86	2	1	2	<i>Alstonia macrophylla</i>	Apocynaceae	5	7	2
87	1	6	2	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	13	4
88	2	1	12	<i>Calamus thwaitesii</i>	Arecaceae	8	12	4
89	2	1	15	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
90	1	6	15	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	8	3
91	2	1	7	<i>Cleistocalyx nervosum</i>	Myrtaceae	3	5	2
92	2	2	7	<i>Myristica dactyloides</i>	Myristicaceae	2	5	2
93	2	3	10	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	9	3
94	1	6	12	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	3	10	3
95	2	3	5	<i>Hevea brasiliensis</i>	Euphorbiaceae	17	60	19
96	1	2	5	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	8	3
97	2	3	7	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	8	3
98	2	3	1	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	8	3
99	2	3	14	<i>Pericopsis mooniana</i>	Fabaceae	7	14	4
100	2	3	9	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
102	2	5	13	<i>Anodendron paniculatum</i>	Apocynaceae		5	2
102	2	5	11	<i>Pericopsis mooniana</i>	Fabaceae	4	13	4
103	2	5	14	<i>Combretum albidum</i>	Combretaceae		5	2
105	2	5	12	<i>Acronychia pedunculata</i>	Rutaceae	8	33	11
106	2	6	1	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
107	2	7	2	<i>Pericopsis mooniana</i>	Fabaceae	8	17	5
108	2	6	2	<i>Chaetocarpus castanocarpus</i>	Euphorbiaceae	2	6	2
109	2	5	15	<i>Pericopsis mooniana</i>	Fabaceae	4	8	3
109	2	7	3	<i>Symplocos cochinchinensis</i>	Symplocaceae	6	5	2
110	2	6	3	<i>Cinnamomum verum</i>	Lauraceae	2	6	2
111	2	6	5	<i>Calamus thwaitesii</i>	Arecaceae	15	11	4
112	2	6	4	<i>Hevea brasiliensis</i>	Euphorbiaceae	20	127	40
113	2	6	6	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	5	2
114	2	6	7	<i>Alstonia macrophylla</i>	Apocynaceae	4	9	3

115	2	6	9	<i>Pericopsis mooniana</i>	Fabaceae	5	18	6
116	2	6	11	<i>Symplocos cochinchinensis</i>	Symplocaceae	9	17	5
117	2	6	15	<i>Hedyotis fruticosa</i>	Rubiaceae	6	7	2
118	2	6	12	<i>Alstonia macrophylla</i>	Apocynaceae	4	6	2
119	2	6	13	<i>Hevea brasiliensis</i>	Euphorbiaceae	19	111	35
120	2	10	8	<i>Calamus thwaitesii</i>	Arecaceae	10	10	3
121	1	8	8	<i>Litsea longifolia</i>	Lauraceae	2	10	3
122	1	7	8	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	6	2
123	1	8	13	<i>Persea macrantha</i>	Lauraceae	3	9	3
124	1	8	14	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	9	3
125	2	10	4	<i>Acronychia pedunculata</i>	Rutaceae	7	2	1
127	1	9	2	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	8	3
128	1	9	1	<i>Cleistocalyx nervosum</i>	Myrtaceae	6	28	9
129	1	9	9	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	5	2
130	2	10	11	<i>Calamus thwaitesii</i>	Arecaceae	13	12	4
133	1	8	9	<i>Cleistocalyx nervosum</i>	Myrtaceae	7	15	5
134	1	8	7	<i>Litsea longifolia</i>	Lauraceae	2	5	2
136	2	10	14	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	11	4
137	1	3	8	<i>Calamus thwaitesii</i>	Arecaceae		8	3
138	1	3	11	<i>Pericopsis mooniana</i>	Fabaceae	6	16	5
138	2	10	7	<i>Pericopsis mooniana</i>	Fabaceae	6	15	5
139	1	4	11	<i>Cleistocalyx nervosum</i>	Myrtaceae	3	5	2
140	1	3	5	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	6	2
141	1	3	6	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
143	1	4	9	<i>Horsfieldia irya</i>	Myristicaceae	3	6	2
144	1	4	7	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	5	2
145	1	5	12	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	7	2
146	1	5	14	<i>Cleistocalyx nervosum</i>	Myrtaceae	8	19	6
147	1	4	8	<i>Litsea longifolia</i>	Lauraceae	6	12	4
148	1	7	3	<i>Horsfieldia irya</i>	Myristicaceae	6	15	5

148	1	4	6	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	8	3
149	1	3	13	<i>Bridelia moonii</i>	Euphorbiaceae	11	38	12
151	1	4	14	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	7	2
152	1	4	15	<i>Acronychia pedunculata</i>	Rutaceae	9	42	13
152	1	4	12	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	6	2
153	1	3	7	<i>Pericopsis mooniana</i>	Fabaceae	5	14	4
154	1	5	13	<i>Horsfieldia irya</i>	Myristicaceae	2	6	2
155	1	4	10	<i>Horsfieldia irya</i>	Myristicaceae	2	6	2
156	1	4	13	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	8	3
157	1	5	15	<i>Hevea brasiliensis</i>	Euphorbiaceae	4	6	2
158	1	5	11	<i>Cleistocalyx nervosum</i>	Myrtaceae	4	8	3
159	1	3	9	<i>Symplocos cochinchinensis</i>	Symplocaceae	3	6	2
160	1	3	12	<i>Clerodendrum infortunatum</i>	Lamiaceae	3	7	2
161	1	5	5	<i>Dipterocarpus zeylanicus</i>	Dipterocarpaceae	3	8	3
162	1	4	4	<i>Horsfieldia irya</i>	Myristicaceae	3	9	3
163	1	5	3	<i>Cinnamomum verum</i>	Lauraceae	2	5	2
164	1	5	4	<i>Symplocos cochinchinensis</i>	Symplocaceae	2	5	2
165	1	5	1	<i>Syzygium caryophyllatum</i>	Myrtaceae	4	10	3
166	1	5	8	<i>Litsea longifolia</i>	Lauraceae	6	14	4
167	1	3	14	<i>Carallia brachiata</i>	Rhizophoraceae	7	15	5
169	1	4	5	<i>Symplocos cochinchinensis</i>	Symplocaceae	4	7	2
171	1	4	3	<i>Cleistocalyx nervosum</i>	Myrtaceae	3	11	4

ACKNOWLEDGEMENTS

- **Consultancy and Training, Overall Conduction and Monitoring of Inventory Survey:**
Dr W.M.G. Asanga S.T.B. Wijetunga
- **Financial and Logistic Support:**
Mrs Nalini Ellawala, the Trustee and the Management of Ellawala Foundation Trust
- **Filed Assistance (Surveying and Recording Data):**
Permanent Field Assistants of (Messrs Sarath Bandara and Pradeep) and Temporary Field Assistants (Messrs Rohan, Kusumsiri, Asanka, Shelton, Chamitha etc.) of MKFS
- **Regular Filed Monitoring and Routine Conduction of Inventory Survey:**
Manager/s of the MKFS (Messrs Gamage and Athula) and Mrs Nalini Ellawala
- **Data Entry:**
Mr Yasantha Indrajith Warnathilake, Mrs Achini Erandathie Wijetunga, Master Haritha Chayana Wijetunga and Asanga Wijetunga
- **Data Merging:**
Mr Manoj Kaushalya Ratnayake and Dr Asanga Wijetunga
- **Data Analysis:**
Dr Asanga Wijetunga
- **Herbarium Work:**
Dr Asanga Wijetunga and Mr Sarath Bandara
- **Documentation of Inventory:**
Dr Asanga Wijetunga
- **Communication:**
Messrs Sanoj and Athula
- **Transportation:**
Messrs Ranji and Bandara

I would like express my sincere gratitude to my mother Mrs Karuna Wijetunga, my wife Achini Erandathie, my two sons Haritha Chayana & Asitha Rawana, and my daughter Harini Tikiri Menike for their continuous support and encouragement during the entire process of the survey, my visits to MKFS, data processing and report writing.

W.M.G. Asanga S.T.B. Wijetunga

July 2015