Chapter 4

Results of data collection

1. The results of forest survey and inventory in 30x50 m sampling plots set in 4 different types of habitat.

1.1 The Riparian Deciduous Forest along Mae Ngae Gully (GL)

The plants found in 8 sampling plots were 48 species in 23 families and 34 genera. Species diversity indices (*H'*) from 1st plot – 8th plot were respectively**,** 2.0774, 2.3960, 2.6240, 2.3914, 2.2128, 2.7613, 1.4977, and 1.9097 (Table 4.1)

The 6th plot had the highest diversity (*H'*=2.7613) and contained 26 species and 61 trees**.** *Terminalia alata* was highest in Importance Value Index (IVI) and Relative Frequency (RF) which were 55.54 and 13.04, respectively**.** It is plausible that *Terminalia alata* was widely distributed in this study area. Its Relative Density Index (RD) was 19.67 indicating that numbers of *Terminaria alata* were highest. Its Relative Dominance (RDo) was 22.82 indicating the dominance of this species.

In contrast, plot 7 had the least diversity index. It consisted of only 6 species and 17 trees.

When pooling data from 8 plots, the 3 most important trees were *Tectona grandis* L.f. (IVI=39.46), *Xylia xylocarpa* Tuab. var. *kerrii* Nielsen (IVI=34.76) and *Schleichera oleosa* (Lour.) Oken (IVI=22.94), respectively. Therefore, GL was dominated by teaks.

Table 4.1 Details of Relative Frequency (RF), Relative Density (RD), Relative Dominance (RDo), Importance Value Index (IVI) and Diversity Index (*H´)* of riparian forest along Mae Ngae Gully (GL)

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
GL1	15	65	1.*Tectona grandis* L.f.	30.77	41.54	52.7	125	2.0774
			2.*Miliusa velutina* (Dunal) Hook.f. Thomson	12.82	12.31	1.23	26.35	
			3.*Schleichera oleosa* (Lour.) Oken	2.56	6.15	16.15	24.87	
			4.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	10.26	9.23	2.32	21.81	
GL2	14	46	1.*Holoptelea integrifolia* Planch.	10	15.22	16.17	41.38	2.396
			2.*Terminalia bellirica* (Gaertn.) Roxb.	10	8.7	21.82	40.52	
			3.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	16.67	13.04	10.41	40.12	
			4.*Senna garrettiana* (Craib) Irwin & Garneby	13.33	13.04	3.44	29.82	
GL3	19	79	1.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	15.09	13.92	27.99	57.01	2.624
			2.*Terminalia bellirica* (Gaertn.) Roxb.	13.21	15.19	11.16	39.56	
			3.*Strychnos nux* - vomica L.	11.32	16.46	5.8	33.58	
			4.*Tectona grandis* L.f.	3.77	3.77	5.06	24	
GL4	13	31	1.*Schleichera oleosa* (Lour.) Oken	7.69	6.45	35.22	49.36	2.3914
			2.*Terminalia bellirica* (Gaertn.) Roxb.	15.38	16.13	5.14	36.65	
			3.*Terminalia alata* Heyne ex Roth.	7.69	6.45	21.45	35.6	
			4.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	11.54	9.68	10.83	32.04	
GL5	11	22	1.*Tectona grandis* L.f.	20	22.73	22.93	65.66	2.2128
			2.*Ficus sp*.	5	5	4.55	42.86	
			3.*Pterocarpus macrocarpus* Kurz	10	13.64	14.5	38.13	
			4.*Terminalia bellirica* (Gaertn.) Roxb.	15	13.64	8.17	36.81	
GL6	22	61	1.*Terminalia alata* Heyne ex Roth.	13.04	19.67	22.82	55.54	2.7613
			2.*Schleichera oleosa* (Lour.) Oken	6.52	4.92	19.07	30.51	
			3.*Tectona grandis* L.f.	4.35	3.28	18.53	26.16	
			4.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	6.52	9.84	7.77	24.13	
GL7	6	17	1.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	41.67	47.06	52.31	141.04	1.4977
			2.*Tectona grandis* L.f.	16.67	17.65	21.11	55.42	
			3.*Pterocarpus macrocarpus* Kurz	16.67	11.77	15.09	43.52	
			4.*Dalbergia rimosa* Roxb.	8.33	11.77	4.36	24.46	
GL8	10	25	1.*Tectona grandis* L.f.	36.36	40	52.34	128.7	1.9097
			2.*Xylia xylocarpa* Tuab. var. kerrii	13.64	16	13.8	43.44	

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
			Nielsen					
			3.*Terminalia bellirica* Gaertn.) Roxb.	9.09	8	14.28	31.37	
			4.*Terminalia mucronata* Craib & Hutch.	9.09	8	6.96	24.05	

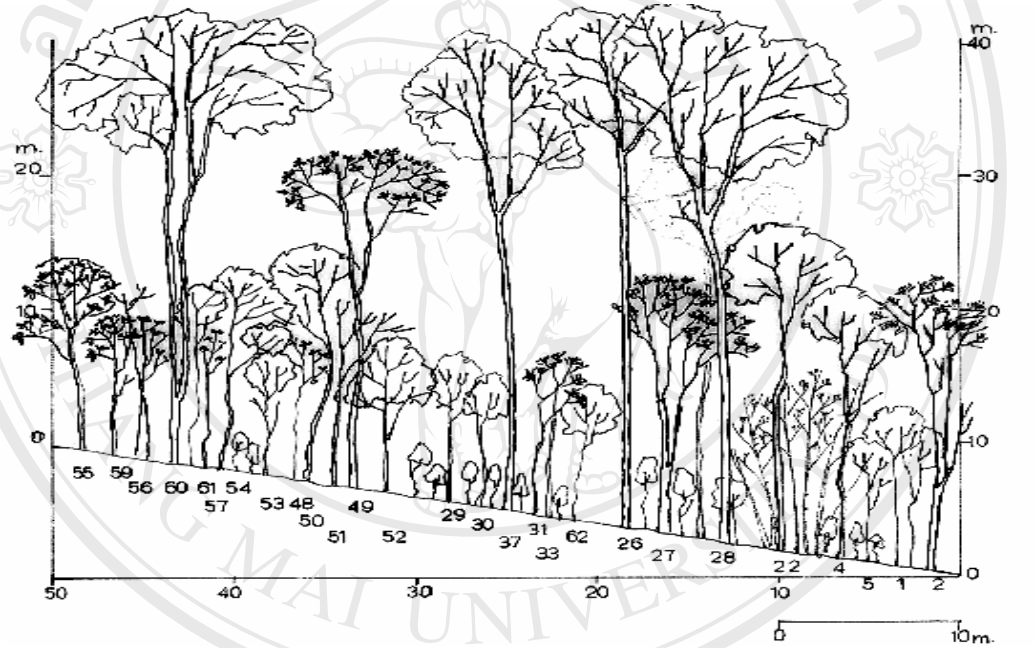

Figure 5 The vertical profile of GL plot 6 which has the highest Diversity Index (*H'*=2.7613). The other profiles of GL are given in Appendix J-1 to J-8

In plot 6 vertical structure was very dense between 0-10 meters, then very sparse at top of canopy. *Terminalia alata*, *Schleichera oleosa* and *Xylia xylocarpa* were dominant in this plot. Understorey has plenty of *Dioecrescis erythroclada.*

1.2 Deciduous Forest (DF)

Deciduous Forest (DF) is situated adjacent to the headquarters of Salween Wildlife Sanctuary. Altitude ranged from 500-750 msl. and 81 species from 30 families, 58 genera were identified. Shannon Diversity Indices from plots 1-8 were 2.9831, 2.6253, 2.8563, 2.5477, 1.8243, 2.6229, 2.3805, and 2.6743 (Table 4.2)

The highest diversity index was in plot 1, which comprised of 26 species and 52 trees. *Xylia xylocarpa* had Important Value Index of 60.04 and RF of 14.29, indicating that this tree had the most scattered distribution. On the contrary, *Tectona grandis* possessed the most RDo of 60.04, indicating that teak was dominant.

In contrast, plot 5 was the least diversified plot in DF. It contained only 16 species of 71 trees. When combined, the 3 most important trees according to IVI were *Shorea obtusa* Wall.ex Blume (27.39), *Tectona grandis* L.f. (18.99) and *Xylia xylocarpa* Tuab. var. kerrii Nielsen (17.53), respectively.

Table 4.2 Details of Relative Frequency (RF), Relative Density (RD), Relative Dominance (RDo), Importance Value (IVI) and Diversity Index (*H´)* of Deciduous Forest (DF)

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
DF1	26	52	1.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	14.29	11.54	34.21	60.04	2.9831
			2.*Tectona grandis* L.f.	9.52	15.38	23.4	48.31	
			3.*Ficus racemosa* L.	2.38	1.92	17.56	21.86	
			4.*Croton roxburghii* N.P. Balaker.	7.14	9.62	1.81	18.57	
DF2	20	58	1.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	14.29	25.86	31.43	71.58	2.6253
			2.*Protium serratum* Engl.	11.9	8.62	4.49	25.01	
			3.*Litsea glutinosa* (Lour.) C.B. Rob.	9.52	8.62	5.7	23.85	
			4.*Satium braccatum* Bl.	2.38	1.72	17.74	21.85	
DF3	24	61	1.*Aporusa villosa* (Wall. ex Lindl.) Bail	5.13	4.92	39.51	49.56	2.8563
			2.*Croton roxburghii* N.P. Balaker.	12.82	19.67	2.74	35.24	

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
			3.*Castanopsis sp.*	2.56	4.92	26.13	33.62	
			4.*Xylia xylocarpa* Tuab. var. kerrii Nielsen	10.26	9.84	3.47	23.56	
DF4	19	48	1.*Quercus mespilifolia* Wall.	3.33	6.25	55.4	64.98	2.5477
			2.*Terminalia alata* Heyne ex Roth.	16.67	25	5.82	47.49	
			3.*Schleichera oleosa* (Lour.) Oken	13.33	12.5	7.35	33.19	
			4.*Terminalia mucronata* Craib & Hutch.	6.67	10.42	7.08	24.17	
DF5	16	71	1.*Shorea obtusa* Wall.ex Blume	18.18	36.62	43.34	98.14	1.8243
			2.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	31.82	32.39	32.39	96.6	
			3.*Quercus mespilifolia* Wall.	13.64	8.45	1.45	23.53	
			4.*Strychnos nux - vomica* L.	2.27	1.41	17.83	21.51	
DF6	24	72	1.*Shorea obtusa* Wall.ex Blume	18.87	25	29.33	73.2	2.6229
			2.*Shorea siamensis* Miq.	15.09	13.89	14.01	42.99	
			3.*Gluta usitata* (Wall.) Ding Hou	7.55	5.56	14.8	27.9	
			4.*Terminalia alata* Heyne ex Roth.	5.66	11.11	6.36	23.13	
DF7	22	65	1.*Shorea obtusa* Wall.ex Blume	21.57	29.23	33.51	84.31	2.3805
			2.*Shorea siamensis* Miq.	21.57	24.62	26.11	72.29	
			3.*Gluta usitata* (Wall.) Ding Hou	5.88	4.62	8.88	19.37	
			4.*Wendlandia tinctoria* (Roxb.) DC.	7.84	6.15	4.04	18.03	
DF8	23	71	1.*Dipterocarpus tuberculatus* Roxb.	14.29	28.17	58.71	101.17	2.6743
			2.*Terminalia alata* Heyne ex Roth.	12.24	11.27	8.48	31.99	
			3.*Shorea siamensis* Miq.	8.16	5.63	6.11	19.91	
			4.*Shorea obtusa* Wall.ex Blume	6.12	5.63	6.98	18.74	

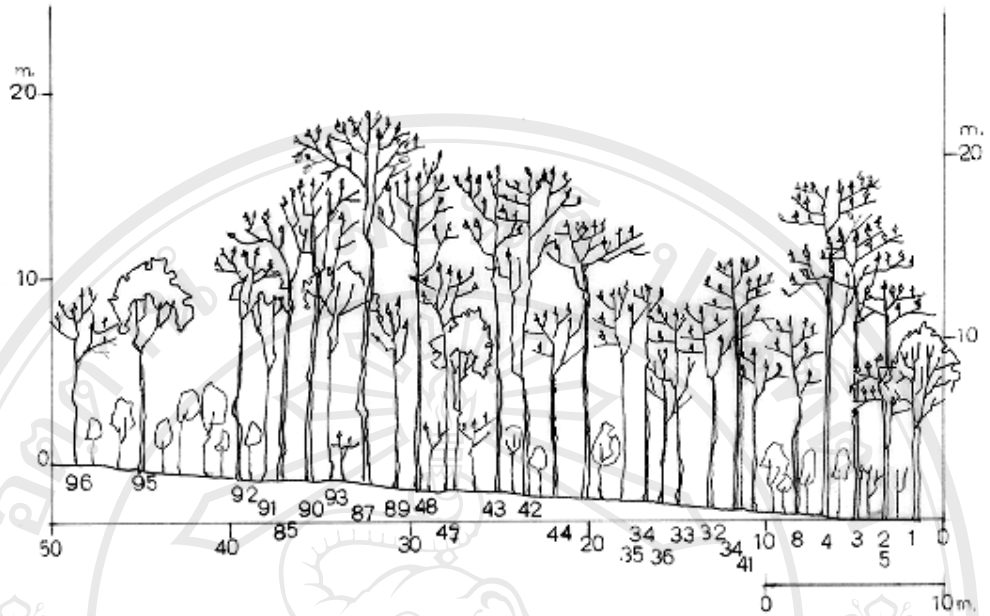

Figure 6 The vertical profile of DF plot 1 that had the highest Diversity Index (*H'*=2.9831). The other profiles of DF are given in Appendix J-9 to J-16

The 1st DF plot was characterised by opened middle storey. The dominant trees were *Dipterocarpus tuberculatus.* Lower storey was dominated by seedlings and saplings.

1.3 Dry Dipterocarp Forest (DDF).

This line transect was situated on the central ridge of the wildlife sanctuary area. Approximate attitude was 520 msl. and 37 species from 18 families and 30 genera were present in the plots. Diversity indices, from plots 1-8, were 0.8835, 1.5188, 1.5506, 1.9065, 2.5925, 1.5796, 1.1560, and 1.8381 (Table 4.3). The most and least diversified plots were plots 5 and 7, respectively. Twenty-one species of 79 trees were identified in plot 5 compared to 10 species from 85 trees of the least diversified plot 7. *Dipterocarpus obtusifolius* was the most important tree with IVI of 45.17 and RD of 20.25, indicating that it was the most abundant. However, *Quercus mespilifolia* ranked first in RDo of plot 7, which was 32.79 and implied that *Quercus mespilifolia* was the dominant tree in plot 5. Data from 8 plots were pooled to elucidate the DDF overall. The 3 most important trees found in this type of forest

were *Shorea obtusa* Wall.ex Blume (IVI= 67.06), *Dipterocarpus tuberculatus* Roxb. (IVI= 65.91) and *Dipterocarpus obtusifolius* Teijsm. Ex Miq. (IVI=24.68).

Table 4.3 Details of Relative Frequency (RF), Relative Density (RD), Relative Dominance (RDo), Importance Value Index (IVI) and Diversity Index (*H´)* of Dry Dipterocarp Forest (DDF)

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
DDF1	10	109	1.*Dipterocarpus tuberculatus* Roxb.	44.12	80.73	76.03	200.88	0.8835
			2.*Gluta usitata* (Wall.) Ding Hou	11.76	3.67	8.92	24.36	
			3.*Syzygium toddlioides* (Wight) Walp	8.82	4.59	4.36	17.77	
			4.*Shorea obtusa* Wall.ex Blume	8.82	2.75	4.51	16.08	
DDF2	12	113	1.*Shorea obtusa* Wall.ex Blume	28.57	55.75	52.77	137.09	1.5188
			2.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	22.45	11.5	19.25	53.21	
			3.*Shorea siamensis* Miq.	10.2	14.16	7.92	32.29	
			4.*Terminalia alata* Heyne ex Roth.	14.29	6.19	8.06	28.54	
DDF3	12	90	1.*Dipterocarpus tuberculatus* Roxb.	26.19	35.56	55.84	117.59	1.5506
			2.*Shorea obtusa* Wall.ex Blume	30.95	42.22	26.05	99.22	
			3.*Wendlandia tinctoria* (Roxb.) DC.	9.52	4.44	2.37	16.34	
			4.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	4.76	3.33	5.29	13.38	
DDF4	15	100	1.*Shorea obtusa* Wall.ex Blume	22.92	45	32.77	100.69	1.9065
			2.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	12.5	14	23.83	50.33	
			3.*Dipterocarpus tuberculatus* Roxb.	16.67	12	12.73	41.4	
			4.*Gluta usitata* (Wall.) Ding Hou	8.33	5	11.32	24.66	
DDF5	21	79	1.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	13.11	20.25	11.8	45.17	2.5925
			2.*Quercus mespilifolia* Wall.	6.65	5.06	32.79	44.41	
			3.*Shorea siamensis* Miq.	9.84	7.59	22.77	40.2	
			4.*Terminalia alata* Heyne ex Roth.	14.75	14.75	18.99	6.15	
DDF6	16	103	1.*Shorea obtusa* Wall.ex Blume	29.17	58.25	62	149.42	1.5796
			2.*Dipterocarpus obtusifolius* Teijsm. Ex Miq.	14.58	13.59	13.55	41.72	
			3.*Terminalia alata* Heyne ex Roth.	12.5	7.77	9.06	29.33	
			4.*Gluta usitata* (Wall.) Ding Hou	12.5	5.83	7.34	25.67	
DDF7	10	85	1.*Dipterocarpus tuberculatus* Roxb.	38.89	64.71	67.61	171.21	1.156
			2.*Shorea obtusa* Wall.ex Blume	27.78	21.18	21.24	70.19	
			3.*Gluta usitata* (Wall.) Ding Hou	11.11	4.71	7.09	22.91	
			4.*Semecarpus cochinchinensis* Engl.	5.56	2.35	0.79	8.7	
DDF8	14	87	1.*Dipterocarpus tuberculatus* Roxb.	28.3	47.13	54.01	129.44	1.8381

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
			2.*Shorea obtusa* Wall.ex Blume	16.98	14.94	20.9	52.83	
			3.*Gluta usitata* (Wall.) Ding Hou	9.43	8.05	9.65	27.13	
			4.*Terminelia chebula* Retz. Var. Nana Gagnep.	9.43	8.05	4.65	22.13	

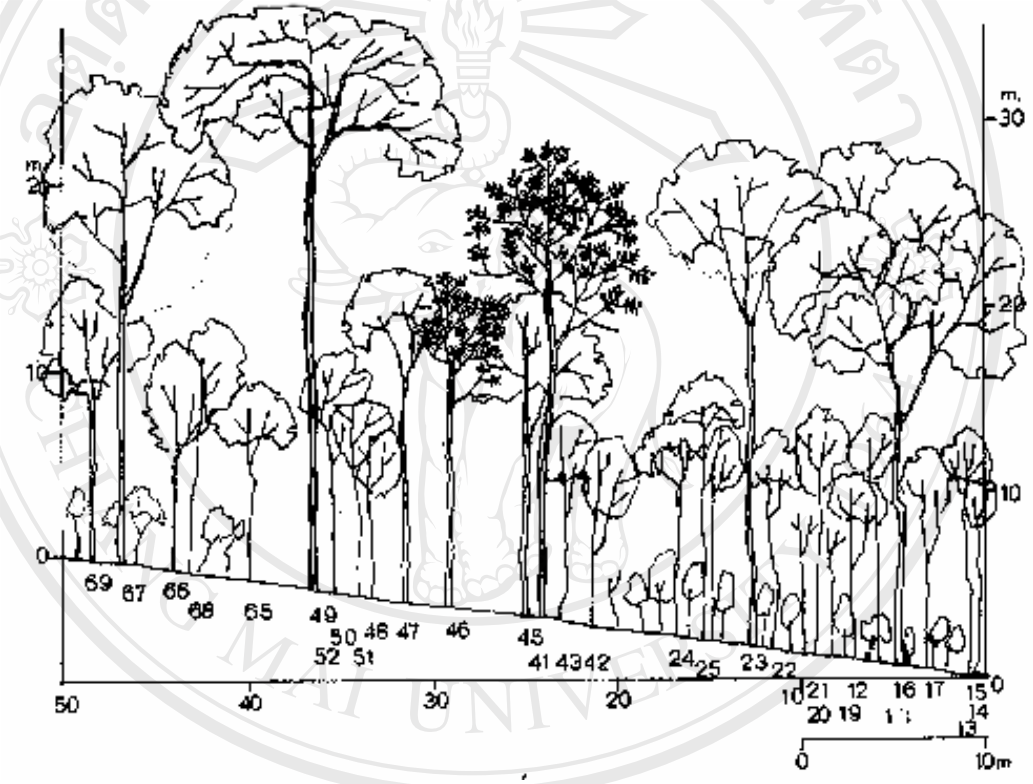

Figure 7 The vertical profile of DDF plot 5 containing the highest Diversity Index (*H'*=2.5925). The other profiles of DDF are given in Appendix J-17 to J-24

The vertical and horizontal structures of the 5th plot were relatively sparse. Dominant trees were *Dipterocarpus obtusifolius, Lagerstroemia macrocarpa and Terminalia alata.*

1.4 Dry Evergreen Forest (DEF)

Dry Evergreen Forests (DEF) occupy areas of altitude ranging from 900-1100 msl. and 41 species from 21 families and 30 genera were identified.

Diversity Indices were, from plots 1-8, 1.6602, 2.6333, 2.7471, 1.9983, 2.4504, 2.1482, 2.4050, and 2.4371 (Table 4.4). Twenty-six species from 76 trees made plot 2 the most diverse. *Shorea siamensis* in plot 2 had the highest IVI of 88.1, RD of 14.55 and RDo of 41.98, indicating that *Shorea siamensis* was most abundant and dominant in plot 2.

Plot 1 was the least diverse containing only 16 species from 100 trees identified.

In summary, *Shorea obtusa* Wall.ex Blume was the most important species in DEF with IVI= 58.10. *Shorea siamensis* Miq. was the second and *Quercus sp.* was the third with IVI=35.21 and 23.01, respectively.

Table 4.4 Details of Relative Frequency (RF), Relative Density (RD), Relative Dominance (RDo), Importance Value Index (IVI) and Diversity Index (*H´)* of Dry Evergreen Forest (DEF)

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
DEF1	16	100	1.*Shorea obtusa* Wall.ex Blume	30.61	61	61.2	152.81	1.6602
			2.*Anneslea fragrans* Wall.	10.2	5	5.24	20.44	
			3.*Terminelia chebula* Retz. var. nana Gagnep.	10.2	5	4.47	19.67	
			4.*Quercus sp.*	6.12	4	7	17.12	
DEF2	26	76	1.*Shorea siamensis* Miq.	14.55	31.58	41.98	88.1	2.6323
			2.*Quercus sp.*	10.91	9.21	18	38.12	
			3.*Gluta usitata* (Wall.) Ding Hou	9.09	7.89	10.65	27.64	
			4.*Grewia eriocarpa* Juss.	7.27	7.89	5.27	20.44	
DEF3	21	61	1.*Quercus sp.*	20	19.67	18.05	57.72	2.7471
			2.*Shorea obtusa* Wall.ex Blume	8	6.56	13.15	27.7	
			3.*Shorea roxburghii* G.Don	8	6.56	9.78	24.34	
			4.*Berrya mollis* Wall. Ex Kurz	10	8.2	4.46	22.66	
DEF4	16	78	1.*Shorea siamensis* Miq.	22.45	38.46	41.52	102.43	1.9983
			2.*Gluta usitata* (Wall.) Ding Hou	20.41	19.23	15.67	55.31	
			3.*Shorea obtusa* Wall.ex Blume	12.24	12.82	9.55	34.61	
			4.*Anneslea fragrans* Wall.	8.61	6.41	8.78	23.38	
DEF5	20	76	1.*Shorea obtusa* Wall.ex Blume	15.09	27.63	16.79	59.52	2.4504
			2.*Anneslea fragrans* Wall.	15.09	10.53	15.77	41.39	

Plot	Number of Species	Number of Trees	Scientific name	RF	RD	RDo	IVI	*H´*
			3.*Shorea siamensis* Miq.	13.21	14.47	11.16	38.84	
			4.*Shorea roxburghii* G.Don	5.66	5.26	17.52	28.44	
DEF6	17	62	1.*Shorea obtusa* Wall.ex Blume	29.55	43.55	44.73	117.82	2.1482
			2.*Tristaniopsis burmanica* (Griff.) Peter G. Wilson & J.T. Waterh. Var. Rufescens (Hance) J.Pam. & Nic Lughadha	9.09	8.06	15.84	32.99	
			3.*Gluta usitata* (Wall.) Ding Hou	11.36	9.68	9.02	30.06	
			4.*Quercus sp.*	6.82	4.84	6.36	18.02	
DEF7	19	77	1.*Shorea obtusa* Wall.ex Blume	20.37	31.17	26.64	78.18	2.405
			2.*Shorea siamensis* Miq.	14.81	14.29	14.84	43.94	
			3.*Gluta usitata* (Wall.) Ding Hou	11.11	7.79	16.48	35.38	
			4.*Anneslea fragrans* Wall.	5.56	3.9	8.03	17.49	
DEF8	19	75	1.*Shorea obtusa* Wall.ex Blume	21.82	30.67	27.05	79.54	2.4371
			2.*Quercus sp.*	9.09	8	17.4	34.49	
			3.*Tristaniopsis burmanica* (Griff.) Peter G. Wilson & J.T. Waterh. Var. Rufescens (Hance) J.Pam. & Nic Lughadha	10.91	12	4.12	27.03	
			4.*Shorea roxburghii* G.Don	5.45	5.33	15.6	26.39	

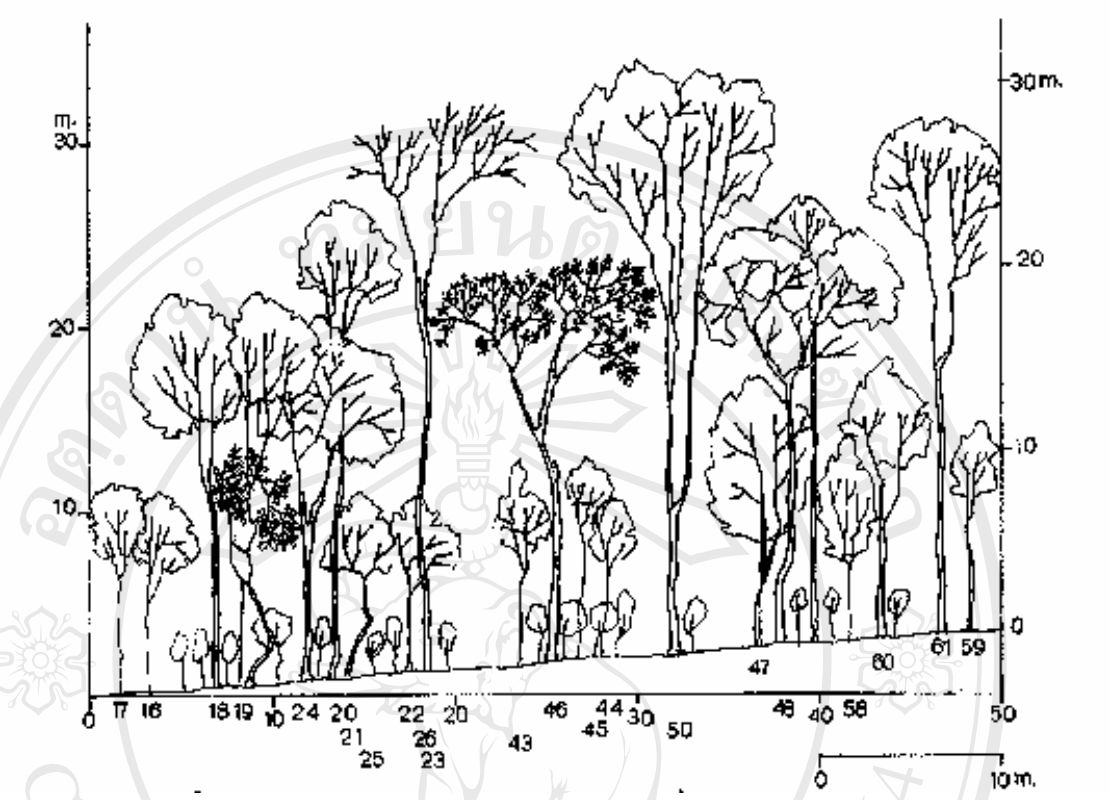

Figure 8 The vertical profile of DEF plot 3 that had the highest Diversity Index (*H'*=2.7471). The other profiles of DEF are given in Appendix J-25 to J-32

The profile of the 3rd plot in DEF was consistent in order in that lower, middle and upper layers were continuous. Dominant trees were of the genus *Shorea*.

All of the collected data of plants in the study plots was used to construct profiles, and photographs were also taken (see Appendix J-1 to J-32).

2. The results of collecting data of birds in study area.

Table 4.5 Summary of bird data collected in this research

Study area	**Number of Species**	**(1) Collecting data by considered territory (individual)**	**(2) Collecting data by unconsidered territory (individual)**		
			morning (07.00-10.00)	**afternoon (14.00-17.00)**	**Total**
GL	65	2,494	1,407	1,290	2,697
DF	84	2,875	1,764	1,521	3,285
DDF	77	1,620	928	804	1,727
DEF	88	2,006	978	1,145	2,123
Total		**8,995**	**5,072**	**4,760**	**9,832**

From Table 4.5 the fundamental detail about bird data from this research can be explained as follows:

2.1 The occurrence of birds

Each line transect was in the following descending order. DEF had the most numerous species found, at 88 species. DF was the second amounting to 84 species. Birds that occurred in DDF were 77 species, and GL had the least diversity found with only 65 species. In addition, numbers of individuals counted in each area can be interpreted into 2 types.

(1) Territory Birds: For groups of territorial birds, such as flycatchers and Gulliformes, Sitasuwan (2004) advised to use the highest numbers of individuals from all counts, regardless of time of day, from line transects to be the number of birds in that habitat. Based on this criteria, DF was occupied by 2875 individuals while GL contained 2494 individuals, DEF harbored 2006 and DDF

maintained 1620 individuals. In total, 8995 individuals were present in the 4 different habitats.

(2) Non-territory Birds: For groups of non-territorial birds such as Family Pycnonotidae, the numbers of individuals present in particular habitats were determined by numbers sighted and voices recorded. The survey was divided into 2 periods, from 07.00-10.00 and from 14.00-17.00. From this criteria, 2,697 individuals were found in GL, DF was occupied by 3,285 individuals, 1,727 individuals were counted in DDF and 2,123 were recorded in DEF. In total, there were 9832 individuals from the 4 different habitats.

In DF, 1,764 individuals were recorded in the morning and 1,521 in the afternoon. GL had 1,407 individuals in the morning and 1,290 in the afternoon. In DEF, 978 individuals were counted in the morning and 1,145 in the afternoon. In DDF, 928 individuals were found in the morning and 804 individuals in the afternoon.

2.2 Species richness

Surveys were conducted 46 times a year for the 4 habitats. In total 8,994 individuals of territorial birds from 160 species, 13 orders, 41 families and 108 genera were recorded. Of these, 13 species were found in 4 habitat types. They were *Megaliama asiatica, Merops leschenaulti, Hemiprocne coronata, Spilornis cheela, Pericrocotus flammeus, Dicrurus leucophaeus, Dicrurus paradiseus, Culicicapa ceylonensis, Sitta frontalis, Pycnonotus melanicterus, Pycnonotus jocosus, Pycnonotus aurigaster* and *Macronous gularis*.

Thirty-nine species were present in 3 habitats. They were *Picumnus innominatu, Sasia ochracea Hodgson, Dendrocopos canicapillus, Picus flavinucha Gould, Megaliama virens, Halcyon smyrnensis, Nyctyornis athertoni, Chrysococcyx maculates, Phaenicophaeus tristis, Aerodramus brevirostris, Glaucidium cuculoides, Accipiter badius, Chloropsis cochinchinensis, Chloropsis aurifrons, Lanius cristatus, Oriolus xanthornus, Hemipus picatus, Dicrurus aeneus, Hypothymis azurea, Aegithina tiphia, Ficedula parva, Eumyias thalassina, Ficedula*

parva, Eumyias thalassina, Cyornis banyumas, Hirundo daurica, Pycnonotus flavescens, Iole propinqua, Prinia rufescens, Zosterops palpebrosus, Orthotomus sutorius, Phylloscopus inornatu, Pellorneum tickelli, Pellorneum ruficeps, Pomatorhinus schisticeps, Stachyris rufifrons, Macronous gularis, Alcippe poioicephala, Dicaeum concolor, and *Anthretes singalensis.*

2.2.1. GL: This type of habitat was identical to lowland deciduous forest. The area was characterized by perennial water. Data were not collected during August-September due to heavy rain and flooding, so access was not possible. Sixty-five species and 2499 individuals were recorded from 10 months' survey. The very common species of resident birds, that were found all year round, were *Hemiprocne coronata, Dicrurus paradiseus, Pericrocotus flammeus, Pycnonotus aurigaster*, and *Merops leschenaultia*.

2.2.2. DF: Situated adjacent to the headquarters, deciduous forest contained 84 species and 2878 individuals. The very common species of resident birds were *Macronous gularis, Pycnonotus aurigaster, Pericrocotus flammeus, Dicrurus aeneus, Pycnonotus jocosus,* and *Pomatorhinus schisticeps.* On the other hand, the very rare species were *Corvus macrorhynchos, Microhierax caerulescens, Sasia ochracea Hodgson, Pteruthius flaviscapis, Zosterops japonicus, Nyctyornis athertoni, Chrysococcyx maculates, Melanochlora sultanae,* and *Glaucidium cuculoides*.

2.2.3. DDF: The line transect in DDF was located in the center of Salween Wildlife Sanctuary near Huai Pa Pao Sub-protection Unit. There were 77 species and 1620 individuals inhabiting this type of forest. The very common species of resident birds were *Pericrocotus flammeus, Dicrurus leucophaeus, Sitta frontalis,* and *Orthotomus sutorius.* On the contrary, the very rare species were *Dicrurus hottentottus, Harpactes oreskios, Tephrodornis pondicerianus, Pericrocotus ethologus, Oriolus tenuirostris, Pellorneum ruficeps, Anthus cervinus, Picumnus innominatus, Pellorneum tickelli, Anthretes singalensis, Cacomantis merulinus,*

Cypsiurus balasiensis, Spizaetus nipalensis, Dendrocitta formosae, and *Copsychus malabaricus.*

2.2.4. DEF: The DEF was situated near Po Sor Sub-protection Unit in the south of the Sanctuary, where 88 species and 2006 individuals were observed. The very common species of resident birds were *Megaliama virens, Dicrurus leucophaeus, Pericrocotus flammeus, Dicrurus leucophaeus, Dendrocitta formosae, Pteruthius flaviscapis,* and *Sitta frontalis.* The very rare species were *Cissa chinensis, Megaliama australis, Picus canus, Anthretes singalensis, Garrulax chinensis, Hirundo daurica, Enicurus leschenaultia, Oriolus chinensis, Corvus macrorhynchos, Corvus macrorhynchos, Turdus obscurus, Chrysococcyx maculates, Pericrocotus roseus, Chalcophaps indica, Glaucidium cuculoides, Sasia ochracea Hodgson, Streptopelia tranquebarica, Spilornis cheela, Spizaetus nipalensis,* and *Pellorneum tickelli*.

2.3. Abundance of species

The collected data were tallied, irrespective of numbers of individuals, as binary, present or absent, as shown in Appendices G to H. Then binary data of each species were summed and calculated for abundance of species in the formula of :

$$\text{abundance (\%)} = \frac{\textit{summed number of each species } x \text{ 100}}{\textit{total number of survey periods}}$$

Table 4.6 Summary of abundance of birds in 4 habitat types (from Appendix E to H). Degree of abundance was set up in order to categories diversity of birds in only Salween Wildlife Sanctuary in 2002

Types	Very Rare (VR) (1-10%)	Rare (R) (11-20%)	Uncommon (UN) (21-40%)	Moderately Common (MC) (41-60%)	Common (C) (61-90%)	Very Common (VC) (91-100%)	Total species
GL	2 (3.08%)	17 (26.15%)	26 (40.00%)	9 (13.85%)	11 (16.92%)	-	65
DF	14 (16.66%)	25 (29.07%)	17 (19.77%)	9 (10.47%)	20 (23.26%)	1 (1.19%)	84
DDF	24 (31.17%)	21 (27.27%)	15 (19.48%)	9 (11.69%)	8 (10.39%)	-	77
DEF	29 (32.95%)	13 (14.77%)	17 (19.32%)	18 (20.45%)	8 (9.09%)	3 (3.40%)	88

Note: Degree of abundance was in accordance with Khopkhet (1999)

In GL, most of the species of birds found were in the uncommon sighting, while in DF they were in the rare one. In DDF and DEF, most birds were in the very rare category. The proportion of population sighting was significantly different (Chi-square test for association, χ^2_{15} =50.43, p<0.05).

In GL, the proportion of population sightings was significantly different (Chi-square test for homogeneity, χ^2_5 =43.09, p<0.05). In total 16.92% of species were common. However, only 3.08% were very rare. The very rare species were *Cypsiurus balasiensis* and *Phodilus badius*. The common species, to mention a few, were *Merops leschenaulti, Orthotomus atrogularis,* and *Pycnonotus aurigaster* Appendix E identifies species sightings of birds in GL.

In DF, the most (29.07%) species were in the rare category and the least (10.47%) species were of moderate status. The proportion was significantly different (Chi-square test for homogeneity, χ^2_5 =25.43, p<0.05). The most very common

species was *Macronous gularis* representing 1.19% of the species found. The rare species were *Copsychus malabaricus, Hirundo daurica,* and *Chrysococcyx xanthorhynchus,* whereas the moderately sighted species were *Cyornis banyumas* and *Phylloscopus inornatus* for example. Appendix F identifies species status of birds in DF.

Relatively high numbers (31.17%) of species were present in DDF with very rare sighting, while 10.39% of other species were of common status. The proportion of species status was significantly different (Chi-square test for homogeneity, χ_5^2 =31.08, p<0.05). The rare species were *Phylloscopus coronatus, Glaucidium cuculoides, Sitta castanea* etc. The common species were *Prinia rufescens, Hemiprocne coronata,* and *Parus major* for example. Appendix G identifies species status of birds in DDF.

The proportion of very rare, rare, moderate, uncommon, common and very common species in DEF were 32.95%, 14.77%, 19.32%, 20.45%, 9.09% and 3.40%, respectively, which were significantly different (Chi-square test for homogeneity, χ_5^2 =18.25, p<0.05). The common species were, for example, *Garrulus glandarius, Iole propinqua,* and *Sitta frontalis*. The very rare species were *Anthretes singalensis, Garrulax chinensis, Hirundo daurica* etc. On the other hand, the very common were *Dicrurus leucophaeus, Dicrurus aeneus* and *Pteruthius flaviscapis*. Appendix H identifies species status of birds in DEF.