

STUDY SITE DESCRIPTION

Since different forest types with different degrees of disturbance were sought in this study, a survey was done on the west side of Doi Lohn, at Mae Kampong Village, Mae On Branch District, Chiang Mai Province during March-April 1996. After the survey, four areas, viz. deciduous, dipterocarp-oak forest (DOF, 600-700 m elevation); deciduous, degraded hardwood (teak) with bamboo forest (BB/DF 600-700 m elevation); primary, evergreen, seasonal, hardwood forest (EGF, 1050-1125 m elevation), and a riverine area (elevations 650-1165 m) were selected as sampling sites (Figure 1). Each study area was approximately 1-2 km².

In the forest sites, three sub-sites were selected. Selection was based on the degree of disturbance. Areas where only a few trees were left were categorized as extremely disturbed sites. Those where tree density was higher than the first group were categorized as partially disturbed sites, and those where tree density was the highest were categorized as less disturbed sites. In the DOF, the extremely disturbed, partially disturbed, and less disturbed subsites were termed DOFX, DOFM, and DOFL, respectively. Similarly, the extremely disturbed, half disturbed, and less disturbed subsites in the BB/DF were termed BB/DFX, BB/DFM, and BB/DFL, respectively. Finally, the extremely disturbed, partially disturbed, and less disturbed subsites in EGF were named as EGFX, EGFM, and EGFL, respectively. Other signs of disturbance such as the presence of tree stumps, charcoal remains, weeds, fields, and cultivated plants (i.e. banana, fruit trees, etc.) were also considered.

For the riverine sites (RR), three sub-sites were also chosen based on the habitat. Thus, one site was located in the BB/DF at 600-650 m above sea level, the second site was in the village area, 1000-1050 m, and the third site was at a waterfall at 1100-1165 asl. These different acronyms are used throughout this thesis.

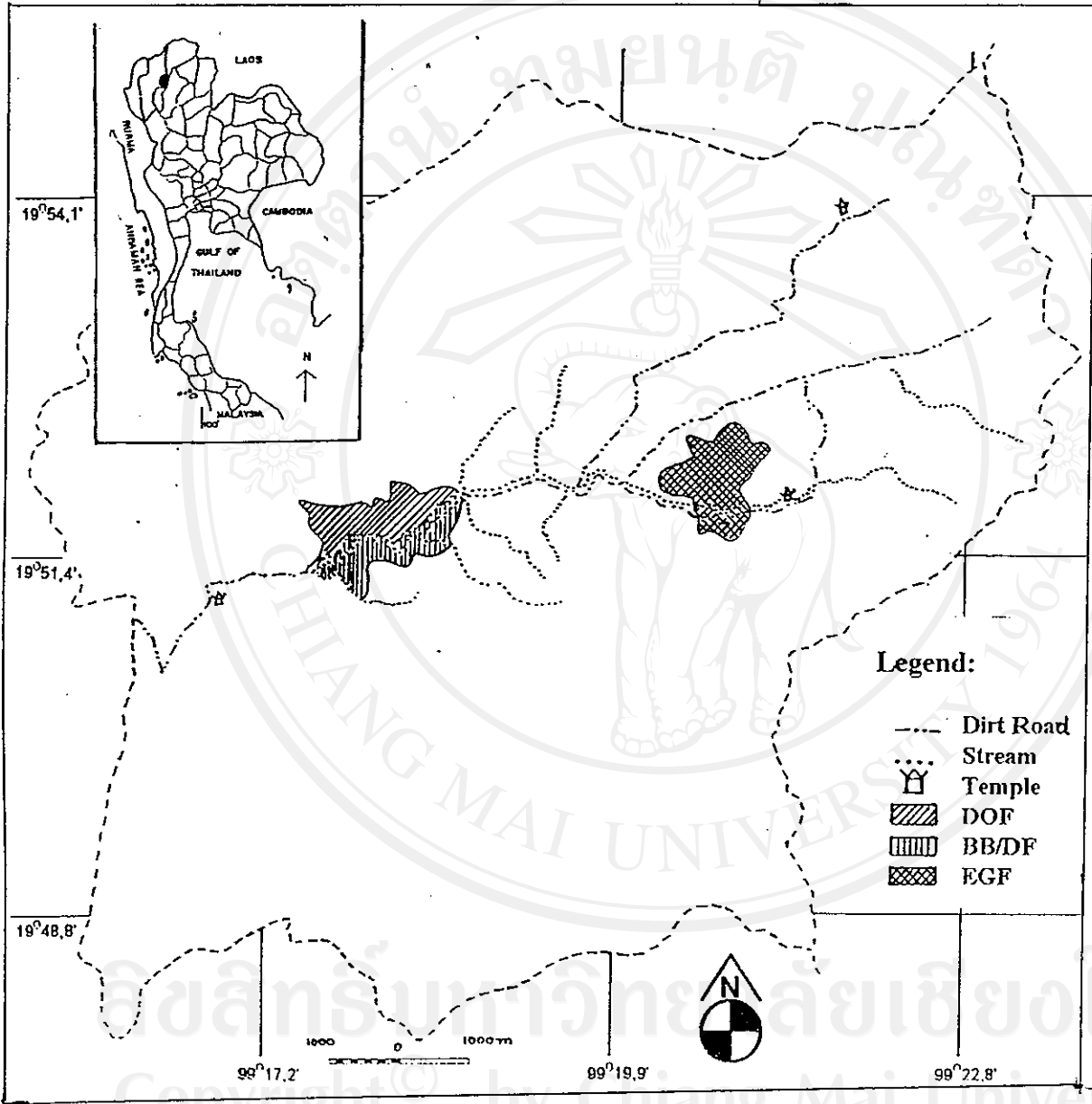


Figure 1. Map of the study area showing the different study sites.

The study sites were within the newly proposed Mae Dah Kry National Park in Mae On Branch District, Chiang Mai Province from 600-1160 m altitude. The research area lay between c. 19°21'-20°19' north latitude and c. 99°29'-41' east longitude which is c. 3-6 km² (Figure 1). Two of the four study sites were located in the DOF and BB/DF areas which were heavily logged and had been continuously damaged by fire, cutting, and erosion for decades. The DOF was a secondary, fire-climax forest which was originally BB/DF (Maxwell, *et al.*, 1995). The present BB/DF is a very degraded remnant of primary forest (Maxwell, 1996, personal communication). The third site lay within the EGF forest at Mae Kampong Village and the fourth site, which is a RR habitat was in Nam Mae Lai (stream) below the village and Nam Mae Kampong (stream) above the village.

The bedrock in the study site was Triassic granite which is approximately 200 million years old (Javanaphet, 1969).

Located on the east side of Chiang Mai Valley, the mean monthly temperature in the Chiang Mai Valley ranges from 20 °C in November to nearly 30 °C in April (Maxwell, 1988). The months of December to May are usually devoid of rain, while August is the peak month with an average of 45 cm. The cool-dry season usually starts in October and ends in February; whereas the hot-dry season is from March to May; and the rainy period is from about June to the end of September. Maxwell (1988) stated that there is a decrease of 0.6 °C in temperature for every 100 m increase of elevation, while rainfall is higher as elevation increases.

Copyright © by Chiang Mai University
All rights reserved

Deciduous Dipterocarp-Oak Association (DOF)

Maxwell (1988, 1996) stated that this forest type is named after the dominant trees present in the area, thus, DOF is termed as such since many of the trees present in the area belong to the Dipterocarpaceae and Fagaceae families.

Since Mae Dah Kry National Park is adjacent to the west side of Jae Sawn National Park, their vegetations are quiet similar (Maxwell, 1997, personal communication). Deciduous tree species in the family Dipterocarpaceae include: *Dipterocarpus obtusifolius* Teijsm. ex Miq. var. *obtusifolius*, *D. tuberculatus* Roxb. var. *tuberculatus*, *Shorea obtusa* Wall. ex Bl., and *S. siamensis* Miq. var. *siamensis*; *Quercus kerrii* Craib var. *kerrii* and *Q. kingiana* Craib (Fagaceae); *Tristaniopsis burmanica* (Griffs.) Wils. & Wat. var. *rufescens* (Hance) Parn. & Lug. (Myrtaceae); *Anneslea fragrans* Wall. (Theaceae); *Aporosa villosa* (Lindl.) Baill. and *A. wallichii* Hk. f. (Euphorbiaceae); *Buchanania lanzan* Spreng. (Anacardiaceae); and *Dalbergia fusca* Pierre (Leguminosae, Papilionoideae) were common in the DOFM and DOFL subsites. The marked differences between these two subsites were higher tree density, more larger trees, and few to no logged trees in the DOFL (Figure 2), whereas, the prevailing condition of the DOFM was the opposite of the DOFL subsite (Figure 3). However, the condition of the DOFX subsite was remarkably different from the other subsites since there were only very few remaining trees, very thick ground flora of mostly grasses and *Mimosa diplotrica* C. Wright ex Sauv. var. *diplotrica* (Leguminosae, Mimosoideae), and lots of planted *Musa* cultivars (Musaceae) (Figure 4). Also, the ground flora was heavily grazed by feral cows and water buffalo, especially during the rainy season.



Figure 2. DOFL showing dense regenerating growth (700 m, 14 Aug. 1996).



Figure 3. DOFM. Note the recently cut *Dipterocarpus obtusifolius* var. *obtusifolius* and abundant *Mimosa diplotrica* var. *diplotrica* which is an indicator of primary succession due to fire (650 m, 14 Aug. 1996).



Figure 4. DOFX showing recent clearing and cutting of the forest for cultivation (640 m, 14 Aug. 1996).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Deciduous, Degraded, Hardwood (Teak) with Bamboo (BB/DF)

Similarly, the BB/DF is termed as such because the original deciduous hardwood forest (formerly dominated by *Tectona grandis* L. f., Verbenaceae) has been so severely degraded and is now dominated with bamboos (Graminae, Bambusoideae) such as *Dendrocalamus membranaceus* Munro, *D. nudus* Pilg., and *Bambusa tulda* Roxb. (Maxwell, *et al.*, 1996). The few remaining trees in this forest were small individuals and coppices of *Tectonia grandis*, *Terminalia bellirica* (Gaertn.) Roxb. and *T. mucronata* Craib & Hutch., (Combretaceae); *Spondias pinnata* (L.f.) Kurz (Anacardiaceae); and *Alstonia scholaris* (L.) R. Br. var. *scholaris* (Apocynaceae). The only differences between BB/DFM and BB/DFL subsites were lesser tree density, evidenced by recently logged trees, and higher density of bamboo in the former than in the latter (Figures 5 and 6). The condition of the BB/DFX, was obviously different from the other two subsites since the ground flora was weedy, e.g. *M. diplotrica* var. *diplotrica* (Leguminosae, Mimosoideae) and *Eupatorium odoratum* L. (Compositae) were very high, the area was devoid of canopy cover, and the ground flora was grazed (Figure 7).

Primary, Evergreen, Seasonal, Hardwood Forest (EGF)

As in the previous forest types, EGF is named as such because most of the vegetation is primary and evergreen. In the study area, some common evergreen canopy trees were *Sapium baccatum* Roxb. (Euphorbiaceae); *Artocarpus lanceolata* Trec. (Moraceae); *Phoebe cathia* (D. Don) Kosterm. (Lauraceae); *Schima wallichii*



Figure 5. BB/DFM with an *in situ* sawing site (650 m, 14 Aug. 1996).



Figure 6. BB/DFL showing the fire damaged ground flora and some remnants of *Tectona grandis* L.f. and other original species mixed with bamboo (670 m, 14 Aug. 1996).



Figure 7. BB/DFX showing recently cut trees for agriculture (640 m, 14 Aug. 1996).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

(DC.) Korth. (Theaceae), and many species of Fagaceae e.g. *Castanopsis acuminatissima* (Bl.) A. DC., *C. diversifolia* (Kurz) King ex Hk.f., *C. tribuloides* (Sm.) A. DC., and *Lithocarpus elegans* (Bl.) Hatus. ex Soep.

The canopy cover of the EGFX and EGFM subsites varied from 50% or less due to established tea plantations in Mae Kampong Village. *Camellia sinensis* (L.) O.K. var. *assamica* (Mast.) Kita. (Theaceae, tea) is a native evergreen treelet which requires about 50% shade to produce optimum yields (Maxwell, *et al.*, 1996). The conditions of EGFX and EGFM were more or less similar except that in the EGFX, the dirt road through Mae Kampong Village crossed the area, thus more trees were cut for construction and fuel, resulting in frequent landslides (Figure 8). Figure 9 shows the EGFM which was less disturbed compared to the EGFX subsite. The EGFL subsite was really different from EGFX and EGFM in the sense that tree density was the highest, thus canopy cover was also the highest, ground flora was sparse, and was above the tea plantations (Figure 10). However, EGFL was still degraded, although not as degraded as the other two subsites, due to the village nearby. Also, it is difficult to go beyond this place due to the very poor road and distance limitations

Riverine Area (RR)

Two different streams were included in the RR sampling area. First was Mae Lai Stream where the RR/BDF was located at 600 m. This subsite had a wider stream bed, faster water flow, more water volume due to the many tributary streams from the upper catchment valley area, and there were several deep pools (Figure 11). Along the stream, there were deciduous trees such as *Ficus racemosa* L. var. *racemosa* (Moraceae) and *Protium serratum* (Wall. ex Colobr.) Engl. and a rheophytic



Figure 8. EGFX showing a landslide along the dirt road through Mae Kampong Village bordering a tea plantation (1050 m, 14 Nov. 1996).



Figure 9. EGFM showing a tea plantation (1100, 14 Nov. 1996).



Figure 10. EGFL at 1,125 m elevation. Note the uniform regrowth of trees, about 20 years old (14 Nov. 1996).



Figure 11. RR/BDF showing one of the many deep pools in the area (600 m, 14 April 1996).

evergreen shrub, *F. squamosa* Roxb. (Moraceae) were common among other evergreen vegetation e.g. *Buchanania arborescens* (Bl.) Bl. (Anacardiaceae) and *Eugenia megacarpa* Craib (Myrtaceae). Bamboo was also common in this area.

The RR/VL subsite was located in the upper part of Mae Kampong Village (Figure 12), in Mae Kampong Stream. The stream in this subsite was narrower, waterflow was slower, and water volume was less than in the RR/BDF. Most vegetation along the banks were evergreen and there were fewer trees since the area had been disturbed by villagers.

The RR/WF subsite was also in Mae Kampong Stream, in the upper part, above the village area where there were several waterfalls. The source of drinking water for the village is in this part, thus water pipes were found in the upper part of this sampling area. The waterflow was slow except in the waterfalls while the stream was narrow and very shallow (10-20 cm deep). Many evergreen trees found in this area were up to 25 m tall since it has never been logged.



Figure 12. RR/VL. Note *Musa acuminata* Colla (Musaceae), a native banana, along Mae Kampong stream (1010 m, 14 Nov. 1996).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved