SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was conducted to investigate the Pteridophyte communities in the different forest types namely: DOF, BB/DF, and EGF as well as in the RR areas. In addition, the potential of Pteridophytes as bioindicators of forest conditions was investigated using a rapid assessment method.

Two sets of dichotomous keys for vegetative and fertile characters were made and the 61 Pteridophyte species were described for taxonomic importance.

The high Pteridophyte diversity in EGF and RR areas was attributed to higher shade, more moisture, and less disturbance in these places. However, in the two deciduous forests, the Pteridophyte communities were poorer due to less tree density, sparse canopy, very disturbed, seasonally very dry and arid conditions of the areas, thus only a few species of Pteridophytes can grow in these conditions.

Due to the differences in environmental conditions of the four general sampling sites, e.g. dominant vegetation, canopy cover, soil conditions, elevation, and the over all degree of disturbance, their Pteridophyte communities were quite different. This is supported by the results of comparing the similarities and differences between these areas which was done using the Sorensen's index of similarity and the Chord distance of difference.

However, the results of some soil physical and chemical parameters are dubious and did not show the expected trends that would indicate that the four areas were really different, hence were deleted. A truly reliable and professional soil laboratory is required. Nevertheless, actual observation of the areas plus results of other parameters, e.g. canopy cover, light intensity, and soil moisture indicated that the DOF and BB/DF

are very degraded and disturbed. The EGFX was also degraded while the EGFL was relatively undisturbed.

Interestingly, some Pteridophyte species were found to reflect the overall conditions of the area, thus they can be used as good bioindicators of habitat conditions. These findings are supported by the information in the CMU Herbarium Database. In addition, results of the study conducted by Ruokolainen *et al.* (1997) in Peruvian Amazonia revealed that Pteridophytes and Melastomataceae can be used as indicators of florestically different rain forest types that are edaphically defined. In my study site, specifically, the DOF can be referred to as **SROC**, the BB/DF as **SEDA**, EGFX as **DIBP**, EGFL as **BITB**, and a permanent stream at higher elevations as CLT, as far as the Pteridophyte flora is concerned.

These results are a contribution to knowledge about forest restoration, conservation, and management as well as in the zonation of forest reserves since the system used in determining the indicator species is relatively rapid. Two people can finish a 600 m long transect in a day and can also do a survey in one forest type in one day provided the transect has been laid out before. There is no need to count the individual number of each species since estimation of cover can be used. Besides, Pteridophytes are very distinct from flowering plants and easily recognized by one who is familiar with them.

The overall results of this study indicate that Pteridophyte communities vary according to differences in habitat conditions even in the same forest type, but only some species could be used as bioindicators of forest/habitat conditions. With this very important finding, a new and a fast way of assessing forest conditions can now be used.

However, more research must be done in other forests to find more species which can be used as indicator species to enable botanists and ecologists to make more recommendations as far as methodology and data analyses are concerned.

The use of Pteridophytes as bioindicators of forest conditions must be tested in other places to validate their efficiency as bioindicators. It is vital that researchers learn fern taxonomy to facilitate field work activities using this parameter.

Soil samples must be carefully analyzed to get the exact results and at the same time the soil type must be identified to have a better correlation between the prevailing physical and chemical conditions to achieve a realistic standard for the categorization of soil conditions according to the forest conditions.

Most importantly, the DOF/ **SROC** and BB/DF/ **SEDA,** should be protected since these forests are already degraded. This is urgently needed because destructive anthropogenic activities continue unabated in these forests (fire, grazing, logging, etc.). If the BB/DF is protected from anthropogenic activities, it will hopefully return to its original state, a deciduous hardwood (teak) forest (Maxwell, 1988). If this happens, wildlife will gradually return to the area thereby increasing biodiversity and restoring forest integrity leading to the restoration of watersheds and a stabilization in original hydrological and climatic conditions.

Similarly, the EGFX or **DIBP** and EGFM, which are also very disturbed, must be restored for the same reasons as above. It was observed that trees in these areas were mostly big because the villagers did not cut them since they provide shade to the tea plants. However, seedlings and small trees were rarely present in the area because the villagers cut them so the tea plantations are open and devoid of undergrowth. This poses a serious problem because it indicates that the forest is degraded since no young

trees which will replace the old ones once they die. This monoculture is not a substitute for a natural forest. Thus, forest restoration in this area is also needed as early as possible by restrictions on enlarging the tea plantations or further degrading the EGF.

The EGFL or BITB is relatively undisturbed since there are no agricultural activities going on there. This specific area must be strictly protected from any anthropogenic activities because it is a gene pool of genetic diversity plus watershed. In addition, this site would serve as a reference area if any restoration activities are to be done in the future. The same thing must be done for the RR/WF or CLT because this is the vital source of drinking water for Mae Kampong Village and to other villages at lower elevations. Although these areas are an enclaved in Mae Dah Kry National Park, the full cooperation of the villagers is needed for the ensurance of a successful forest protection program. This can be achieved through education, villagers cooperation, and strict enforcement.

Lastly, further research must be done to further explore the potential values of Pteridophytes in the ecosystems and to investigate their roles in the succession of vegetation in very degraded and eroded areas as well as the area above my study site to the summit of Doi Lohn (1800 m).