Chapter 6
CONCLUSIONS AND RECOMMENDATIONS

The communities of soil-inhabiting arthropods in the surrounding area of Mae Moh Power Plant, Lampang Province was studied in order to know their potential use as bioindicators for assessment of soil contamination by heavy metals. The study was carried out during the rainy season from July to October 1998. Twelve study sites were selected, *i.e.* six (N1-N6) north of and six (S1-S6) south of the power plant.

The results indicate that species richness and diversity indices of the soil-inhabiting arthropods at the more contaminated study sites decreased following increases of heavy metals (As, Co, Cr, Ni) concentrations in soils. This supports the idea that heavy metal contamination in soils might cause severe negative effects on terrestrial organisms, including soil arthropods, and determines the diversity of their communities. Heavy metal contamination has reduced the stability of soil arthropod habitats. Statistical correlation and multiple regression analysis indicate that there is no significant correlation between the number of individuals of order Coleoptera, Diptera, Hemiptera and Lepidoptera with soil physicochemical parameters (soil pH, soil organic matter, soil moisture content, and soil field capacity). In contrast, significant correlations were shown between As concentrations and the total number of individuals of Lepidoptera, Co concentration and total number of individuals of Diptera, and Ni concentration with the number of individuals of Coleoptera and Lepidoptera.

Higher similarity coefficients (Sorensen's index) and/or lower distance coefficients (Chord distance) between study sites having relatively equal heavy metal contamination meant that contamination has changed the diversity and composition of

the species in the communities which is indicated by the relatively higher number of shared species. Confirmation of cluster analysis among the study sites based on heavy metal concentrations with similarity and distance coefficients has strengthened this conclusion. Study sites having higher similarity coefficient and/or lower distance coefficients were closely grouped.

Chemical analysis of soil samples collected from 12 sites in the surrounding area of the power plant showed different amounts of heavy metal contamination. Concentrations of As, Co and Ni were higher than normal soil concentrations with maximum concentrations of 48.14, 54.43 and 19.78 mg/kg, respectively. Assessment based on heavy metal concentrations is very limited due to natural variations and lack of reliable background levels. The concentrations of heavy metals changed significantly during the observation period and the fluctuations were related to other soil physicochemical parameters, especially soil pH and organic matter.

The overall results of this study strongly suggest that soil-inhabiting arthropod communities can be used as bioindicators for assessment of soil contamination by heavy metals and can be applied to complement the existing physicochemical monitoring program. It is suggested, however, to complete the physicochemical data especially concentrations of other heavy metals in soil and extend the study for whole year to include the dry and cool seasons. The identification of the soil-arthropod specimens down to the species is also recommended in order to get a more precise interpretation of arthropod diversity. This will be a major taxonomic effort.