CHAPTER 1

INTRODUCTION

1.1 Rationale of the study

The impact of human on the extinction of the other species in the world was approximately started for 40,000 years ago. The rate of an anthropogenic extinction is comparable with all of major extinctions in the past (WCMC, 1990). The impact of the extinction conducts the reduction of natural production, occurrence and spreading of the new pests and diseases, and deterioration of the environment dynamics. The concerning on the living-things on earth is not a problem of the national scale, it's is a problem of the world scale.

The tropical region contains high diversity of flora and fauna. The primary consumers in tropical rainforests produce the relative high production to support a high diversity of the next trophic species. The great diversity of life in tropical forest was claimed that the among of the soil invertebrates found in any cubic meter of rainforest soil there will probably be at least one species never named or described by scientists (Chapman and Reiss, 1992). But nowadays, these remaining patches of tropical rainforests are intruded and exploited by the human activities.

Thailand is similar with the other devloping countries. The increasing of the population and consumption of the natural resources rate are threatening the biodiversity of the remaining organisms. The losting of biodiversity cannot be clearly assessted, because the fundamental knowledge on the biodiversity is relatively poor contrasted with the rich of the species.

The relative high diversity in Thailand should be taken a measurement for biological conservation. The suitable urgent approach for academic action is to address the remaining resources for guide the conservative actions. Because Thailand is defined as an undercollected country in flora (Parnell *et al.*, 2003) that its fauna are also replied as the same condition. Then the study of biodiversity is necessary for this country to guide the conservative actions on the remaining species. The another reason that the biodiversity knowledge in Thailand must be concerned, because this knowledge is the basic component for development of the other advance scientific subjects.

Northern of Thailand comprises with mountains and highlands around 75% of the area. These montane areas are the part of the Himalayan foothills massif and are separated from other montain ranges of tropical southeastern Asia by the low-lying plain of peninsular Thailand (Wolseley and Aquirre-Hudson, 1997). These mountains are the main contributors of natural resources including freshwater for Thailand.

The montane areas of northern Thailand cover with the healthy forest that classified as the tropical forest vegetation type (Cox and Moore, 1985). With the broad range of altitude we can categorize forest type in northern Thailand into 3 types, The first type is lowland forest, generally occurring below 800 m. The second forest type is mixed deciduous forest, located in a band between 800 to 1,200 m. Finally, at elevations over 1,200 m, the vegetation is evergreen forest. These altitudinal gradient with the variation of these montane forests are the important environmental condition influencing on the evolution, survival and divesity of fauna.

The western-most Thanon Thong Chai Range, located as the boundary between Thailand and Burma and covered the western part of northern Thailand, is

selected for the study site. On this range, there are two of the most famous and important mountains of Thailand, Doi Suthep-Pui (98°47′-98°56′E, 18°47′-18°55′N; 1,685 m) and Doi Inthanon (98°27′-98°40′E, 18°19′-18°40′; 2,565 m). These elevated areas introduce an element of temperate climate exclusively on the high altitude area. On the other hand, northern Thailand contains extensive rain forests which reach up from the equator (Whitmore, 1990). The combination of these unique geographical characteristics creates an ecotone between temperate and tropical conditions which has been important for the evolution and diversity of the resident organisms.

Although Doi Suthep-Pui and Doi Inthanon occupy the same general mountain range, they differ in their relationship to the main range. Doi Inthanon is located on the middle of the range, continuously connected to the higher than 1,000 m region. In contrast, the higher parts of Doi Suthep-Pui (above 1,000 m) are separated from the main range by surrounding valleys. This isolation causes the upper part of Doi Suthep-Pui to be relatively insular. Then we propose Doi Inthanon as a Himalaya-inlier and Suthep-Pui as a Himalaya-outlier mountain.

Doi Suthep-Pui and Doi Inthanon National Parks are the important habitat for insects. In these region, some insects directly serves people as food or products for sale in the markets. But more importantly, their indirect values are essential to both human well-being and ecosystem functions. Insects contribute non-consumption values such as scientific research, education, aesthetics and play a key role of energy transmitter in the ecosystem. They also are the gene banks that have option value in facing of an uncertain future. In an ethical context, they are a valuable inheritance for the benefit of our future descendants (modified from McNeely *et al.*, 1990). Although insects are the most abundance and diversity, they are restrictedly survive in the

specific habitats that suitable for their niche. Scientists explain that it is the result of the limiting factors that control the evolution that is causing the different level of insects diversity in each habitat. These factors are divided into two main groups, physical factors such as temperature, light, wetness and dryness and biotic factors such as competition, predation or the presence or absent of suitable food (Cox and Moore, 1985). This consequence not only causes the different level of abundance and diversity of them but also the distribution of them.

This study focus the insects living in the area called riparian zone. The definition of riparian zone is any land which adjoin, directly influence, or is influenced by a body of water (Boulton and Brock, 1999). This zone not only provides habitat and food to diverse the terrestrial organisms but also provides a food supply to freshwater ecosystems. The ecotone property of the riparian zone is hypothesized to support a high diversity of both aquatic and terrestrial insects. Diptera, Hymenoptera, Homoptera, Coleoptera, Lepidoptera are the major orders of insects that are commonly found in the canopy of tropical forests (Watt *et al.*, 1997). Moreover, the adult stage of aquatic insects such as Ephemeroptera, Odonata, Plecoptera, Trichoptera, Lepidoptera and Diptera are also commonly found (McCafferty, 1981), while other orders can be found too.

The record of some species lists with the distribution of riparian insects are revealed in this research. Analysis of the data from this study show the status of key riparian insect groups in Doi Suthep-Pui and Doi Inthanon which will be useful for conservation and management in the future.

In this study the Trichoptera (caddisflies) and Geometridae (looping moths) are examined in the species level, because the taxonomic knowledge of these insects

in Thailand are available. The caddisflies study in Thailand was intensively study since 1987 by Prof. Hans Malicky and Dr. Porntip Chantaramongkol. The study are continued until now, the taxonomic knowledge in these species is sufficient for identification them into species level. The Geometridae taxonomic knowledge was also carried out by many oversea sienctists (Inoue, 1986, 1990, 1992, 1994a, 1994b, 1996c; Sato, 1991, 1992, 1993, 1995, 1996b, 1996c; Holloway, 1993, 1996; Hashimoto, 1995; Hutacharern and Tubtim, 1995; Scoble, 1999; Stüning, 2000). Many literatures about these species are revised and applied for identification the captive looping moths. The remaining insects are also studied and enumerated in the family level. This study intend to provide the species list of the insects that these data will be useful for the long-term monitoring and conservation approach in the future.

1.2 Objectives

The main research objective is to document for the first time the biodiversity of insects in riparian forests in northern Thailand. This documentation will address the taxonomin knowledge, life-history and biogeography of selected insect taxa: Trichoptera caddisflies (aquatic herbivores, detritivores and predators), Geometridae moths (terrestrial herbivores).

From the taxonomic perspective, samples of riparian insects will be identified and enumerated. The relationships between environmental parameters and insects communities were analyzed by multivariate methods.

This study will improve knowledge about the taxonomy and distribution of riparian insects. The geographic approach is introduced in the research. Inventory of insects with their temporal and spatial distribution will be useful for conservation and

management. The literatures dealing with the insect fauna of Doi Suthep and Doi Inthanon in the past were reviewed and summarized.

Mountains are especially sensitive to changes in the surrounding environment and climate. This research generated an essential base-line for the study of long-term changes in insect diversity in Doi Suthep and Doi Inthanon in the future, and considerably enhanced the capacity of Thailand to monitor its precious natural environment.