
Diversity of macroalgae and benthic diatoms in the area of the Golden Jubilee Thong Pha Phum Project, Thong Pha Phum District, Kanchanaburi Province, Thailand

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A study on the diversity of macroalgae and benthic diatoms in the area of Thong Pha Phum Project, Thong Pha Phum District, Kanchanaburi Province was carried out from November 2001 – January 2003. Samples were collected from 7 sites which covered the project area. Sixty-one species of macroalgae were found and classified into 4 divisions. The majority of them were green algae e.g. *Zygnema* spp., *Spirogyra* spp. and *Stigeoclonium* spp. in Division Chlorophyta; red algae e.g. *Batrachospermum* spp. and *Audouinella* spp. in Division Rhodophyta; and blue green algae e.g. *Nostochopsis lobatus* Wood and *Phormidium* spp. in Division Cyanophyta. One hundred and sixty two species of benthic diatoms were found and classified in Division Bacillariophyta. Most of them were pennate diatoms e.g. *Achnanthes* spp., *Frustulia* spp., *Navicula* spp. and *Gomphonema* spp. Fifty-six species were new records for Thailand, of which eleven species were macroalgae and forty-five species were benthic diatoms. Some physical and chemical factors were investigated for evaluating water quality. It was found that the water quality based on trophic level in the undisturbed area could be classified into oligotrophic-mesotrophic status. In the disturbed area, the water quality was in mesotrophic - eutrophic status.

Bryophyte diversity at Thong Pha Phum National Park, Kanchanaburi Province

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Surveys and collections of bryophyte specimens in Thong Pha Phum National Park were carried out from July 2004 to October 2005 from 4 sites: 1) hill evergreen forest 2) disturbed areas from mining around E-Tong village, 3) hot springs and the surrounding areas, 4) freshwater springs. A total of 400 specimens was collected. They were determined into 117 species within 80 genera and 40 families. There were 69 species of mosses, 45 species of liverworts (4 species of thalloid liverworts and 41 species of leafy liverworts) and 3 species of hornworts. It was found that hill evergreen forest had the highest number of species, freshwater springs was second, and hot springs and the surrounding areas had the lowest number of species. Nine species of bryophytes namely *Aneura pinguis* (L.) Dumort., *Asterella khasyana* (Griff.) Pandé et al., *Cyathodium cavernarum* Kunze, *Dicranolejeunea javanica* Steph., *Fissidens flaccidus* Mitt., *Folioceros udarii* A.K. Asthana & S.C.Srivast., *Notothylas javanicus* (Sande Lac.) Gottsche, *Schiffneriolejeunea tumida* (Nees) Gradst. var. *tumida*, and *Weissia controversa* Harv. are new records. Furthermore, *Dicranolejeunea* (Spruce) Schiffn. is a newly recorded genus for Thailand.

Pteridophyte flora of Thong Pha Phum National Park, Kanchanaburi Province

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A total of 26 families, 69 genera, and 171 species were recorded from Thong Pha Phum National Park, Kanchanaburi Province. Among these, 23 families, 65 genera, and 155 species were ferns, while 3 families, 4 genera and 16 species were fern allies. Among the fern allies, Selaginellaceae had the highest number of species, i.e. 12. Three families of ferns, namely Polypodiaceae, Thelypteridaceae, and Dryopteridaceae were among the common families. Polypodiaceae included 37 species, while Thelypteridaceae and Dryopteridaceae included 25 and 16 species, respectively. According to habitat, it was found that there were 96 species of terrestrial plants, 57 species of epiphytes, 23 species of lithophytes and 2 species of aquatic plants. In addition, 6 species of ferns and fern allies were found in more than one habitat. It was found that 5 species and 1 variety are new records for Thailand, i.e. *Adiantum philippense* L. var. *subjunonicum* H. Christ, *Arachniodes coniiifolia* (Moore) Ching, *Belvisia spicata* (L.f.) Mirbel ex Copel., *Loxogramme centicola* M.G. Price, *Polystichum pseudotsus-simense* Ching and *Polystichum scariosum* (Roxb.) C. Morton. It is important to note that three new records, namely *Arachniodes coniiifolia*, *Polystichum pseudotsus-simense*, and *Polystichum scariosum* are found only once and in rather small numbers. These species may be extirpated from the country soon if their present habitats continue to be disturbed. Among the 175 taxa, 9 species can not be determined due to the lack of fertile structures as well as of keys to species. It seems likely that 3 out of the 9 unknown species are probably newly recorded taxa for Thailand or new to science, viz. 1 species of *Cyathea* and 2 species of *Pteris* and are worth further investigating.

Pteridophyte diversity along a gradient of disturbance within mines in Thong Pha Phum District, Kanchanaburi Province

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The diversity of pteridophyte in Thong Pha Phum District, Kanchanaburi Province was conducted along a gradient of disturbance within mines, from July 2002 to March 2003. Twelve plots of 5 x 20 meters have been established in each three study sites, i.e. abandoned mines, remnants of the forest in mine area and natural forests. Species richness, species diversity and species evenness indices were estimated using Menhinick's, Shannon-Weiner's and evenness indices, respectively. Species similarity was investigated using Jaccard's coefficient. Other physical environments related to pteridophyte diversity were examined, including light intensity and leaf temperature. It was found that species richness and species diversity of abandoned mines were lower than those of remnants of the forest in mine area and natural forests, while species evenness was the highest of all. Low Jaccard's coefficient was observed, indicating the difference of species composition between each sites. Light intensity and leaf temperature showed negative significant correlation with Menhinick's index, but was positively significantly correlated with evenness index. One hundred and eighty-four specimens of pteridophytes were collected from the 36 sampling plots and were identified to 65 species, 1 subspecies, 5 varieties, in 40 genera, within 20 families. Among these 8 species, 2 genera, 2 families are fern allies. It was found that *Cheilanthes tenuifolia* (Burm. f.) Sw., *Sphenomeris chinensis* (L.) Maxon var. *divaricata* (H. Christ) K.U. Kramer and *Lycopodiella cernua* (L.) Pic. Serm. were found only in abandoned mines and tend to be indicator species for disturbed areas. Two terrestrial ferns, namely *Lindsaea ensifolia* Sw. and *Pteris biaurita* L. were commonly found in all study sites.

Diversity of ferns and fern allies in natural forest and along the natural gas pipeline in Thong Pha Phum District, Kanchanaburi Province

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The diversity of ferns and fern allies has been assessed along the natural gas pipeline in Thong Pha Phum District, Kanchanaburi Province from October 2001 to August 2002. A total of twenty-four sampling plots of 20 m X 20 m (4, 5 X 20 m subplots inside) have been established from KP 0 to KP 33. The diversity of ferns and fern allies in disturbed (along gas pipeline) and undisturbed (natural forest) areas was determined by counting the individuals in each subplot. Species richness and species diversity were estimated using Margalef and Shannon-Weiner diversity indices, respectively. Species similarity was also investigated using Jaccard's coefficient. Other physical factors related to pteridophyte diversity were examined. Species richness and species diversity of natural forests were higher than those along the natural gas pipeline with the only exceptions being at KP 6 and KP 9. Low or nil values of Jaccard's coefficient was observed indicating different species of pteridophytes in natural forests compared with those found along the gas pipeline. Margalef and Shannon diversity indices were positive and significantly correlated with %soil water content, but a negative significant correlation was observed with light intensity (%PAR). Canonical discriminant analysis was employed to reveal differences of physical environmental factors between the disturbed and undisturbed areas. It was found that soil pH and light intensity (%PAR) were the two most important factors in this regard. Ninety pteridophyte specimens were collected from the 24 sampling plots. They were identified and classified into 46 species, in 31 genera within 17 families. Of these, 3 species, 3 genera and 2 families are fern allies.

Family Annonaceae in Thong Pha Phum National Park, Kanchanaburi Province

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There were 40 species in 18 genera of Annonaceae collected from the Western Forest Complex of Thailand. Among them, 12 annonaceous species were found at Thong Pha Phum National Park: *Anaxagorea javanica* Blume, *Anomianthus dulcis* (Dunal) J. Sinclair, *Artabotrys siamensis* Miq., *Cananga odorata* Bail. ex King var. *fruticosa*, *Goniothalamus griffithii* Hook.f.& Thoms., *Meiogyne virgata* Miq., *Miliusa longiflora* (Hook.f.&Thomson) Baillon ex Finet & Gagnep., *Miliusa velutina* (Dunal) Hook.f. & Thoms., *Mitrephora maingayi* Hook. f. & Thoms., *Orophea brandisii* Hook.f. & Thoms., *Polyalthia viridis* Craib, and *Polyalthia kanchanaburiana* S. Khumchompoo & A. Thongpukdee. One new record for Thailand, *Miliusa longiflora* (Hook. f. & Thomson) Baillon ex. Finet & Gagnep, and one new species, *Polyalthia kanchanaburiana* S. Khumchompoo & A. Thongpukdee, were determined. A large number of species of Annonaceae may be possibly distributed in the complex.

Systematic studies of the Leguminosae - Caesalpinioideae in Thong Pha Phum Forest, Kanchanaburi Province

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Systematic study of the Leguminosae-Caesalpinioideae in Thong Pha Phum Forest, Kanchanaburi Province are focused on morphological characters, ecology, distribution, diversity of species and habitats and to produce taxonomic keys. This study was conducted by surveying and collecting plants from various vegetation types in Thong Pha Phum Forest. Photographs including morphological and ecological data were recorded for each plant species. Specimens were identified using morphological characters and compared with identified specimens deposited at the Forest Herbarium, National parks, Wildlife and Plant Conservation Department, and the Siridhorn Herbarium, Department of Agriculture. Keys to genera and species with full descriptions supported by line drawings were provided. After surveying in the area for a period of twelve months, plant specimens comprising 12 genera and 31 species were found as follows: *Azalia* (1 species), *Bauhinia* (11 species), *Caesalpinia* (5 species), *Cassia* (1 species), *Chaemaecrista* (1 species), *Cynometra* (1 species), *Gymnocladus* (1 species), *Peltophorum* (1 species), *Pterolobium* (1 species), *Saraca* (1 species), *Senna* (6 species), and *Sindora* (1 species). A species recognized as a new record was *Cynometra beddomei* Prain. *Bauhinia glauca* subsp. *tenuiflora* (Watt. ex C.B. Clarke) K. & S.S. Larsen, *B. nervosa* (Wall. ex Benth) Baker, *Caesalpinia andamandica* (Prain) Hattink, *Pterolobium integrum* Craib, and *Saraca cauliflora* Baker are new locality records.

Systematic studies of Rubiaceae in Thong Pha Phum Forest, Kanchanaburi Province, Thailand

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Systematic studies of Rubiaceae in Thong Pha Phum Forest, Kanchanaburi Province, were conducted by surveying and collecting specimens from May 2003 to April 2005. This study focused on morphological characters, ecology and distribution. One hundred and five specimens were collected. Based on examining plant specimens, 43 species, 2 subspecies and 2 varieties of 28 genera were found consisting of 17 species of herbaceous plants, 7 genera (7 species) of trees, 11 genera (16 species, 2 subspecies) of shrubs and 4 genera (3 species, 2 varieties) of climbers. *Morinda* specimens were both shrubs and climbers, whilst *Wendlandia* were both trees and shrubs. This group was distinguished by the presence and absence of thorns and hooks. There were 5 genera (4 species and 2 varieties) of plants with thorns and hooks, and 15 genera (22 species and 2 subspecies) without thorns and hooks. 10 species and 2 varieties are recognized to be new locality records in this study.

Taxonomic study of grasses (Family Gramineae) in Western Thong Pha Phum, Thong Pha Phum District, Kanchanaburi Province

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A taxonomic study of grasses (Family Gramineae) in Western Thong Pha Phum, Thong Pha Phum District, Kanchanaburi Province, was conducted. As a first step, data on grasses were compiled from both literature and herbarium specimens kept in the Forest Herbarium, National Parks, Wildlife and Plant Conservation Department (BKF) and Bangkok Herbarium of the Department of Agriculture (BK). Then additional field surveys and plant collections in Western Thong Pha Phum were conducted. Morphological and ecological data of plants were recorded and photographs were taken. All plant specimens were identified by consulting literature and comparing with specimens named in both herbaria. Nomenclatural problems were solved. From the study of grasses found in Western Thong Pha Phum, keys for 5 subfamilies, 40 genera and 66 species were constructed. Full descriptions and ecologies of species, supported by line drawings and photographs of grasses were provided. In this study *Paspalum canarae* (Steud.) Veldkamp var. *fimbriatum* (Bor) Veldkamp was recognized as a new record for Thailand.

Taxonomic studies of bamboo (Poaceae): genus *Bambusa* Schreber, *Dendrocalamus* Nees and *Gigantochloa* Kurz in Western Forest Complex

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Taxonomic studies of three genera of bamboo (Bambusoideae: Poaceae) in the Western Forest Complex have been carried out. Classical herbarium techniques were used in this project. A key to species and species descriptions will be provided. 11 bamboo species are reported. Three species of *Bambusa* Schreber are *B. bambos* (L.) Voss, *B. tulda* Roxb. and *B. vulgaris* Schrad. ex H. Wendl. However, *B. vulgaris* Schrad. ex H. Wendl. is not a native species of this study area. It has been introduced as an ornamental plant. Five species of *Dendrocalamus* Nees are *D. brandisii* (Munro) Kurz, *D. copelandii* (Gamble ex Brandis) N.H. Xia & C.M.A. Stapleton, *D. membranaceus* Munro, *D. strictus* (Roxb.) Nees and *Dendrocalamus* sp.1. Three species of *Gigantochloa* Kurz are reported, namely *G. albociliata* (Munro) Munro, *G. auriculata* Kurz, and *G. macrostachya* Kurz. Two of these species are newly recorded for Thailand as follows: *D. copelandii* (Gamble ex Brandis) N.H. Xia & C.M.A. Stapleton, which occurred on limestone mountains, and *G. macrostachya* Kurz. in Tak province.

Systematic studies of Zingiberaceae in Thong Pha Phum Forest, Kanchanaburi Province

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Systematic studies of the Zingiberaceae were conducted from May 2003 to May 2005, in order to enumerate species diversity, characteristics, habits, ecological habitats and uses. A database resulting from this research will be used for management and maintenance of biological resources. Surveying and collecting specimens in several plant communities from 200-950 m altitude were undertaken. All collected specimens were identified by comparing with the specimens deposited at the Sirindhorn Herbarium of the Department of Agriculture (BK) and the Bangkok Forest Herbarium of the Royal Forest Department (BKF). Keys to genera and species were constructed. Genus and species descriptions were also provided. Fertile specimens were examined and identified, with 10 genera and 36 species found as follows: *Alpinia*, *Amomum*, *Boesenbergia*, *Curcuma*, *Elettariopsis*, *Etingera*, *Globba*, *Hedychium*, *Kaempferia* and *Zingiber*. The genera most commonly found were *Curcuma* (7 species), *Globba* (6 species), *Boesenbergia* (6 species), *Zingiber* (5 species) and *Kaempferia* (4 species). A species recognized as an endemic species was found, namely *Boesenbergia siamensis* (Gagnep.) P. Sirirugsa. *Alpinia galanga* var. *pyramidata* (Blume) K. Schumann, *Amomum koenigii* J.F. Gmelin, *Curcuma oligantha* Trimen, *Globba macrocarpa* Gagnep., *G. schomburgkii* var. *schomburgkii* and *Zingiber newmanii* I. Theilade & J. Mood are new locality records.

Diversity of vascular plants at springs in Moo Ban Tha Ma Dua, Thong Pha Phum District, Kanchanaburi Province

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Springs in Moo Ban Tha Ma Dua are a unique habitat to which water is supplied from underground streams that spring up above ground nearly all year round. The vegetation is still in prime condition and no botanical inventory has yet been made. Thus, the present study has the objective to investigate vascular plants in this area. A survey and collection of vascular plants was carried out from October 2001 to September 2002. In total, 221 specimens accounting for 110 species, 3 subspecies and 7 varieties, were identified, belonging to 93 genera and 47 families. Of all, 17 were ferns and 93 were flowering plants. Among fern families, Polypodiaceae was the richest in number of species, i.e. 5 species in 4 genera. Among flowering plants, Orchidaceae was the richest in number of species, i.e. 23 species in 18 genera. The second richest families were Rubiaceae and Fabaceae with 5 species in 5 genera each, and Asclepiadaceae with 5 species in 2 genera. In another 14 families, 2-4 species were found in each while in the remaining 29 families, only 1 species was found in each. The common species of vascular plants in this area were *Pandanus unicornatus* St. John, *Lasia spinosa* (L.) Thw., *Glochidion littorale* Blume, *Calamus* sp., *Salacca* sp. and *Boesenbergia siamensis* (Gagnep.) P. Sirirugsa, an endemic species to thailand, was also found in the area.

Diversity of vascular plants in spring water swamp areas of Thong Pha Phum District, Kanchanaburi Province

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A Taxonomic survey of vascular plants was carried out in three spring water swamp areas in Thong Pha Phum District namely Pong Phu Ron, Phu Poo Rachinee, and Phu Chumchon Ban Tha Maduea from December 2001 to November 2003. A total of 493 specimens were collected. They were identified into 273 species, 205 genera and 87 families. These can be categorized into pteridophytes and flowering plants. Among these, 24 species in 17 genera and 12 families are pteridophytes, of which Polypodiaceae is the richest family of 8 species. The remaining species were angiosperms which comprised 170 species of the dicots, and 79 species of the monocots. Among the flowering plants, Orchidaceae was the richest family with 56 species. The second was Labiatae with 11 species in 6 genera while the third was Leguminosae-Caesalpinioideae with 10 species in 5 genera. In addition, six endemic species to Thailand were recorded, i.e., *Ardisia ficifolia* K.Larsen & C.M.Hu, *Ardisia confusa* K.Larsen & C.M.Hu, *Morinda scabrida* Craib, *Boesenbergia siamensis* (Gagnep.) P.Sirirugsa, *Aristolochia kerrii* Craib and *Magnolia siamensis*, *Dandy* var. *siamensis*; the latter two species are very rare. The other 4 species, viz. *Clematis smilacifolia* Wall., *Malleola penangiana* (Hook.f.) J.J.Sm. & Schltr., *Phalaenopsis parishii* Rchb.f., and *Renanthera coccinea* Lour. were also rarely found in this natural habitat. Moreover, there are a number of species which are said to be threatened in Thailand. They are *Acer oblongum* Wall. ex DC., *Mitrephora keithii* Ridl., *Aristolochia kerrii* Craib, *Thottea sumatrana* (Merr.) Ding Hou, *Epithema carnosum* Benth., *Chiloschista lunifera* (Rchb.f.) J.J.Sm., *Cleisostoma aspersum* (Rchb.f.) Garay, *Phalaenopsis parishii* Rchb.f., *Renanthera coccinea* Lour., *Calamus arborescens* Griff. and *Tacca chantrieri* Andre.

Sustainable utilization of vascular plants and rural technology transfer in West Thong Pha Phum

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The first year of a project on the development of the sustainable utilization of vascular plants and rural technology transfer in West Thong Pha Phum was undertaken by collecting data on vascular plants found in West Thong Pha Phum by BRT researchers. Twenty species were evaluated for their ornamental potentials, namely *Mitrephora keithii*, *Anaxagorea luzonensis*, *Asplenium nidus* var. *nidus*, *Donax grandis*, *Tacca chantrieri*, *Gardenia sootepensis*, *Melastoma malabathricum* subsp. *malabathricum*, *Dracaena loureiri*, *Tamilnadia uliginosa*, *Trevesia palmata*, *Caryota maxima*, *Angiopteris evecta*, *Magnolia liliifera*, *Schima wallichii*, *Magnolia liliifera* var. *liliifera*, *Paphiopedilum parishii*, *Clerodendrum wallichii*, *Dillenia parviflora*, *Dendrobium puchellum* and *Dendrobium scabrilingue*. Five species, *Gardenia sootepensis*, *Tamilnadia uliginosa*, *Magnolia liliifera* var. *liliifera*, *Asplenium nidus* and *Dendrobium scabrilingue* were propagated and cultivated for conservation and sustainable uses, demonstration plants and rural technology transfer to the West Thong Pha Phum area.

The diversity of stoneflies (Order Plecoptera) and black flies (Order Diptera: Family Simuliidae) in Thong Pha Phum Forest

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The study of the diversity of stoneflies and black flies from lotic habitats at Thong Pha Phum forest was divided into 3 disturbed areas, Pong Pu Ron, Ban Lam Pilok and Ban Prajammai, and 2 undisturbed areas, Ban Patsaduklang and Mae Nam Noi. Specimens were collected once a month in Year 1 from March 2002 to February 2003. Stonefly nymphs of 9 species were identified as follows: *Etrocorema* sp.^{P1}, *Neoperla fallax*^{P2}, *N. gordonae*^{P3}, *Phanoperla* sp.^{P4}, *Kamimuria* sp.^{P5}, Subfamily Perlinae^{P6}, *Cryptoperla* sp.^{P7}, *Amphinemura* sp.^{P8} and *Indonemoura* sp.^{P9}. In disturbed areas 7 species were found namely as species P1, P2, P3, P5, P6, P7 and P8, while in undisturbed areas 8 species were found namely as species P1, P2, P3, P4, P5, P6, P7 and P9. For 17 species of black flies, larvae and pupae reared to adults were identified as *Simulium (Gomphostilbia) decuplum*^{S1}, *S. (G.) dentistylum*^{S2}, *S. (G.) duolongum*^{S3}, *S. (G.) parahiyangum*^{S4}, *S. (G.) siamense*^{S5}, *S. (G.) asakoae*^{S6}, *S. (G.) sheilae*^{S7}, *S. (G.) burtoni*^{S8}, *S. (G.) chumpornense*^{S9}, *S. (G.) novemarticulatum*^{S10}, *S. (Nevermannia) aureohirtum*^{S11}, *S. (Simulium) nodosum*^{S12}, *S. (S.) nakhonense*^{S13}, *S. (S.) quinquestriatum*^{S14}, *S. (S.) tani*^{S15}, *Simulium* sp. 1^{S16} and *Simulium* sp. 2^{S17}. In disturbed areas 13 species of black flies were identified as species S3, S4, S5, S8, S9, S10, S11, S12, S13, S14, S15, S16 and S17, while in undisturbed areas 15 species were identified as species S1, S2, S4, S5, S6, S7, S8, S9, S10, S12, S13, S14, S15, S16 and S17.

Diversity of aquatic insects in some stream of Thong Pha Phum National Park, Kanchanaburi Province, Thailand

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A study was conducted on the diversity of aquatic insects in the area of Thong Pha Phum National Park at Thong Pha Phum District, Kanchanaburi Province, Thailand. Sampling was done 4 times from November 2001 to January 2003. Biological and physico-chemical properties of water were collected and measured from 10 sites. The aquatic insects were collected by using a Surber sampler and pond net. 11 orders, 91 families and 197 species (morphospecies) were identified. The greatest number of aquatic insects (8 orders, 58 families and 100 species) were found from Huai Khayeng III in the summer. The dominant family that was found in almost every study site was Baetidae, order Ephemeroptera. Diversity indices were significantly different among seasons ($p \leq 0.01$). A statistics program, the ordination method of multivariate analysis (MVSP), was used to assess the water quality of each study site by using physico-chemical and biological data. The dendrogram, from cluster analysis showed two groups of study sites. The first group indicated the study sites that were undisturbed from residential areas, which was related to altitude. The second group indicated study sites that were disturbed from residential areas, which was related to alkalinity, conductivity, temperature, and pH.

Effect of local land use on benthic macroinvertebrates in headwater streams, Western Thailand

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Stream benthic macroinvertebrates were investigated at fifteen sites in each season within the Huai Khayeng and Huai Team streams at Thong Pha Phum District, Kanchanaburi Province, from December 2001 to May 2002. Benthos were collected using a Surber sampler and selected physico-chemical variables were measured *in situ*. All sampling sites were surrounded by different land uses (forested, agricultural and residential sites). The physico-chemical water quality data set of each sampled site was analyzed assessed by the ordination method of multivariate analysis. It showed that sampling sites were clustered into two groups: (i) the forested areas and sites far away from agriculture (ii) the agricultural and residential areas which were more disturbed. The latter group had high EC and TDS. The benthic community corresponded to water quality and land used and sampling sites could be discriminated into three groups: (i) the forested site (ii) the agricultural sites and (iii) the residential sites. The agricultural sites had lower taxa richness of sensitive groups (Ephemeroptera, Plecoptera and Trichoptera - EPT), but the percentage of tolerant chironomids was higher. The use of the multivariate approach for biological assessment more clearly illuminated the change of community structure along the environmental change gradient than did species richness and biotic indices.

Fairy shrimps in Huay Khayeng, Thong Pha Phum, Kanchanaburi Province

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Fairy shrimps live in ephemeral or temporary pools of rainwater, e.g. ponds, canals, rice field ditches, roadside ditches, grassy vernal ponds and woodland pools. They produce resting eggs or cysts, which are capable of withstanding unusual heat or cold and prolonged desiccation. During summer the resting eggs become dried in the bottom mud. Fairy shrimps are known to be a new type of live food in aquaculture because they are readily ingested, easily digested, having high essential growth factors and non-affected water quality. Additionally they reach high individual biomass, have high reproductive ability and rapid growth. Fairy shrimp might also be used as ornamental animals, for aquatic toxicity testing and for treatment of waste from animal farms and agro-industries. Among three species of fairy shrimps found in Thailand, only *Streptocephalus sirindhornae* Sanoamuang, Murugan, Weekers & Dumont, 2000 and *Branchinella thailandensis* Sanoamuang, Saengphan & Murugan, 2002 are recorded as candidate species for the mass culture studies and aquaculture practices. These two species were not only found widely distributed on the flat plains of central, northern and northeastern Thailand but also on the high altitude mountain range in Huay Khayeng, Thong Pha Phum, Kanchanaburi Province. Although a proportion of temporary pools found fairy shrimps in Huay Khayeng was low when compared to in the lower area like in Muang district, Kanchanaburi due to the slope of landscape between mountains, the fairy shrimps were found distributed in all villages of Huay Khayeng. This existence may allow villagers in Huay Khayeng and nearby having their own stock of fairy shrimp for starting fairy shrimp culture.

Laboratory studies on the longevity, fecundity and reproduction of *Ceriodaphnia cornuta* Sars

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Seven neonates of *Ceriodaphnia cornuta* Sars were reared individually in each of 100 ml plastic vessels containing 50 ml of dechlorinated tap water at a room temperature of 21 to 40°C and fed with *Chlorella* sp. at concentrations of 50,000–100,000 cells ml⁻¹ every three days. The animals in culture vessels were examined 2 times a day to record fecundity, time to first reproduction, numbers of clutches, clutch size and longevity. Average time to first reproduction was 4.28±0.95 days. Average time between clutches was 26.52±2.02 hours and the maximum number of clutches was 22, the highest average number of offspring per brood was 11.85±1.86 and average total offspring was 98.14±14.49 neonates per female. The largest broods were the fifth to twelfth, depending on the individual. One female lived 18.0±4.54 days and during that time produced 15.85±3.62 broods. Neonates of *C. cornuta* of less than 24 hours old had an average body length of 0.46±0.20 mm and body width of 0.36±0.12 mm.

***Hirsutella thompsonii* Fisher collected from Thong Pha Phum Forest and effect of fungal metabolite on Tobacco Cutworm, *Spodoptera litura* (Fabricius)**

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A total of 209 specimens of four-legged mites belonging to the families Eriophyidae and Diptilomiopidae and 5 specimens of spider mites from Tetranychidae infected with pathogenic fungi were collected from Amphoe Thong Pha Phum, Kanchanaburi Province, during November 2001 to November 2002. Out of all the specimens cultivated and isolated, 114 were identified as *Hirsutella thompsonii*. The 114 isolates of *H. thompsonii* developed well on malt extract agar (MEA) with an average growth rate of 0.06 to 0.23 cm per day at 27 ± 1 °C, $65\pm 3\%$ R.H. Some isolates produced a water droplet, a clear zone and a synnemata. *H. thompsonii* produced flask-shaped phialide perpendicular to the mycelia. The distance between phialides ranged from 8.15-20.20 μm . Conidia were lemon-shaped with a rough surface. Fungal isolate #2220 produced the highest number of conidia and CFU (191.68×10^4 conidia/cm² and 181.70×10^4 CFU/cm²) on MEA plates. After growing in MEB (pH 6.5) for 4 days, *H. thompsonii* fungus #2459 produced the most dry weight of fungal biomass at 0.93 g/50 ml MEB and made the pH of the MEB equal to 8.9. Crude filtrates of all isolates except #2259 contained toxic metabolites inducing abnormal development of 4th instar cutworm larvae, *Spodoptera litura* (Fabricius). The toxic metabolites were found to cause mortality in the larval stages, incomplete pupation, incomplete adult emergence and abnormal adults. Toxic metabolites of 63 fungal isolates caused more than 50% abnormality in the cutworm with isolate #2444 causing 100% abnormality. Abnormalities of the cutworm larvae were increased when the concentration of crude filtrate was increased by protein precipitation with 90% saturated ammonium sulphate.

Diversity of Olethreutinae (Lepidoptera: Tortricidae) in Thong Pha Phum National Park, Kanchanaburi Province, Thailand

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Species diversity of Olethreutinae (Lepidoptera: Tortricidae) in Thong Pha Phum National Park, Kanchanaburi Province, Thailand, in 32 sites representing 3 habitat types of hill evergreen forest, dry evergreen forest and mixed deciduous forest was investigated. More than 700 specimens were collected by blacklight trap technique of 145 nights during 2001-2004. The 249 morphotypes were classified and divided into 6 tribes namely Bactrini, Enarmoniini, Eucosmini, Gatesclarkeani, Grapholitini and Olethreutini. Of these, 109 species in 62 genera can be identified, of which 54 species are new records for Thailand. In addition 35 genera are still unidentified, with 53 samples that can not be identified in both generic and specific levels. *Eucoenogenes bicucullus* Pinkaew & Chandrapatya & Brown, 2005 and *E. vaneae* Pinkaew & Chandrapatya & Brown, 2005 are previously described as new to science and *E. munda* (Diakonoff) was rearranged.

Diversity of araneid spiders (Araneae: Araneidae) and some their ecology in Western Thong Pha Phum Project Area, Kanchanaburi Province

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Species diversity of araneid spiders in Western Thong Pha Phum Project Area, Kanchanaburi Province, western Thailand between 2002-2005. A total of 251 specimens were belonging to 45 species and 19 genera 4 subfamilies (Argiopinae, Gasteracanthinae, Cyrtarachninae and Araneinae) and species richness are 10, 8, 2, and 25 species, respectively. The *Gasteracantha hasselti* C.L. Koch, 1838 is the most abundance species. I investigate the effect land use on araneid spiders richness are agriculture and village area, deciduous forest, dry dipterocarp forest, evergreen forest, and swamp area and species richness are 19, 29, 7, 14, and 3 species, respectively. Web level of araneids from 0.2 m. to more than 10 m. high that were categorized; below 0.6, 0.6-3.0, and more than 3.0 m. high and species richness are 21, 23, and 2 species, respectively. The most species richness were found spider web level between 0.6-3.0 m. high (66.62 %).

Biology of stingless bees (Apidae: *Trigona* spp., *Hypotrigona* spp.) in Golden Jubilee Thong Pha Phum Project, Thong Pha Phum District, Kanchanaburi Province

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A biological study of stingless bees (*Trigona* spp. and *Hypotrigona* spp.) in the Golden Jubilee Thong Pha Phum Project, from January 2004 to January 2006 found 126 nests of stingless bees. The bees were identified and were put into 2 genera and 8 species of which two species are anticipated as being new ones. The bees were *Trigona thoracica* Smith, *T. apicalis* Smith, *T. melanoleuca* Cockerell, *T. terminata* Smith, *T. collina* Smith, *T. iridipennis* Smith, *T. pagdeni* Schwarz, *Hypotrigona scintillans* variety 1, *H. scintillans* variety 2, *H. scintillans* variety 3. The stingless bees which preferred to nest in hollow tree trunks always chose plants in the *Ficus* group. They were Banyan (*Ficus* sp.), Banyan (*Ficus religiosa* Bl.) and Bodh (*Ficus gibbosa* Bl.). *T. collina*, which nests in soil close to termite hills, mostly chose locations to build nests around the western sides of tree bases. The arrangements of brood cells inside nests were as follows: horizontal comb builders such as *T. apicalis*, *T. terminata*, and *T. pagdeni*; and cluster builders such as *T. collina*, *T. iridipennis*, *H. scintillans* variety 2 and *H. scintillans* variety 3. The life cycles of *T. apicalis*, *T. collina*, and *T. pagdeni* from eggs to adults lasted 35, 39, and 48 days, respectively. The stingless bees spent most time in pollen collecting from 09.00-11.00, in nectar collecting from 08.00-12.00, and in resin collecting from 14.00-17.00. Temperature and body size of the bees had a positive correlation but frequency of rainfall showed a negative correlation with the distance of flight for garbage dumping outside the nest.

**Biodiversity and mass rearing of stingless bees
(*Trigona* spp.) for lychee pollination in the Golden Jubilee
Thong Pha Phum Project, Thong Pha Phum District,
Kanchanaburi Province**

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A diversity study of stingless bees resulted in 2 genera and 125 nests being found in the forest area of Huai Khayeng Subdistrict, Thong Pha Phum District, Kanchanaburi Province. Eleven species of these bees were identified as follows: *Trigona apicalis* Smith, *T. melanoleuca* Cockerell, *T. collina* Smith, *T. terminata* Smith, *T. ventralis* Smith, *T. iridipennis* Smith, *T. thoracica* Smith, *T. pagdeni* Smith, *Hypotrigona scintillans* Cockerell, *H. scintillans* var.2 and *H. scintillans* var.3. Four species namely *Trigona apicalis*, *T. collina*, *T. terminata*, and *T. pagdeni*, were observed to be suitable for colonization with high efficiency in lychee pollination. Summer was the right season for colonization with the optimum ranges of temperature for these four species being between 28 and 32°C. A lychee pollination study in February revealed that stingless bees preferred visiting lychee inflorescences on the east side of 4 year old lychee trees from morning till noon, followed by the south side and the west side. The least foraging was found on the north side. From the afternoon to evening, bees of nearly equal numbers dispersed to visit the inflorescences in all directions. Placing one nest in each corner of a 400 x 500 square meter plot was found to give the best efficiency for pollination by stingless bees as well as increasing yields of lychee. The next best thing was to place 4 nests in the same long row in the middle of the plot. Arranging 4 nests in groups in the middle of the plot gave the worst result.

The diversity of stingless bees (Apidae: *Trigona* spp. and *Hypotrigona* spp.) and their resin and gum collecting behaviors from nature in The Golden Jubilee Thong Pha Phum Project, Thong Pha Phum District, Kanchanaburi Province, Thailand

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All studies were conducted from April 2004 to March 2005 in the lower mixed deciduous forest, dry upper mixed deciduous forest, deciduous dipterocarp forest and dry evergreen forest at the Golden Jubilee Thong Pha Phum Project, Thong Pha Phum District, Kanchanaburi Province. The results showed that 2 genera (*Trigona* spp. and *Hypotrigona* spp.) and sixteen species of stingless bees were found in this area; namely *Trigona apicalis* Smith, *T. melanoleuca* Cockerell, *T. peninsularis* Smith, *T. canifrons* Smith, *T. thoracica* Smith, *T. terminata* Smith, *T. ventralis* Smith, *T. flavibasis* Cockerell, *T. iridipennis* variety 1, *T. iridipennis* variety 2, *T. iridipennis* variety 3, *T. iridipennis* variety 4, *Hypotrigona scintillans*, *H. pendleburyi*, and *H. klossi*. The last species was a new record in Thailand. Resin and gum collecting behavior was observed within a year from 20 colonies of 7 species. *T. apicalis* could be found in 4 types of forest. The diversity of *Trigona* spp. and their resin and gum collecting behavior mostly depended on environmental factors. The behavior showed differences in collecting from different alternative plants, and during different times and seasons. They preferred to collect the resin and gum from plants in 16 families such as Anacardiaceae, Dipterocarpaceae, Euphorbiaceae, Meliaceae, Hypericaceae, and Moraceae. During the rainy season, the foragers collected resin and gum all day; however the collecting behavior changed during the dry season to collection only in the afternoon until late in the day. *T. apicalis* collected resin and gum to make the largest number of propolis compared with the other bee species. Nest structures with walls had the highest resin. The propolis extracted from the nest structure could inhibit *Cladosporium cladosporioides* and *Sclerotium rolfsii*.



**Nest site selection and life cycle of the red dwarf honey
bee *Apis florea* and the black dwarf honey bee *Apis
andreniformis* in Huai Khayeng Sub-District,
Thong Pha Phum District, Kanchanaburi Province**

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Nest site selection of the red dwarf honey bee, *Apis florea*, and the black dwarf honey bee, *Apis andreniformis*, will be studied in Huai Khayeng sub-district, Thong Pha Phum district, Kanchanaburi province. To investigate the nesting positions on trees in each species, the following factors will be studied: branch diameter of host trees, relative position of the nest in the host tree canopy, direction of the nest, shelter of the nest, height of the nest above the ground, size of the nest, physical and biological factors, architecture of the nest. Life cycles of workers, drones, and queens of *A. florea* and *A. andreniformis* will be compared. This research may be used as basic information for community villagers to understand the important aspects of bee biology in order to reserve and make decisions for conservation of natural resources in the future and to encourage sustainable resource utilization.

Ants on Huai Khayeng, Thong Pha Phum District, Kanchanaburi Province, Thailand

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The species diversity of ants was studied at Huai Khayeng, Thong Pha Phum District, Kanchanaburi Province, from January to December 2004. The objective focused on species diversity. Ants were collected in 4 forest types; 1) dry evergreen forest, 2) lower mixed deciduous forest, 3) dry upper mixed deciduous forest, and 4) disturbed mixed deciduous forest. A total of 202 ants species belonging to 56 genera and 9 subfamilies were found. The highest and lowest number of species occurred in the dry evergreen forest and the lower mixed deciduous forest, respectively. Nine ant species were highly adapted to environmental changes. So, they showed regular distributions through the year and all forest types. Two clusters analyse of forest types and ant dispersion resulted in 3 groups related to activities and habitat. Two species can edibility.

Patterns of diversity and habitat relationships of terrestrial mollusc communities in the Thong Pha Phum forest area

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Twenty-four indigenous terrestrial mollusc species were recorded from the Thong Pha Phum forest area along with three alien species, *Achatina fulica*, *Lamellaxis gracile* and *Succinea* sp. Only three species were endemic, the two carnivorous snails *Atopos* sp. and *Discartemon* sp., and a diplommatinid microsnail, *Diplommatina* sp. *Cryptozonia siamensis* occurred in large quantity in all numbers areas while a tree snail species, *Amphidromus glaucolarynx*, occurred in almost all areas in small numbers. Land snails preferred limestone habitats of neutral pH to a little basic. However, there were some species found in all habitats, such as *C. siamensis* and *Atopos* sp. Richness ranged from two or three indigenous species in home gardens and swamp areas to twenty-four species in a floristically rich limestone forest. Shell-shape distributions were essentially bimodal, with communities dominated by snail species with discoidal shells.

Ecological studies on river fishes in Central Thailand

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This report presents in abbreviated format some of the results of our ecological studies on river fishes in Thong Pha Phum and, in some cases, elsewhere in central Thailand. Seasonal changes in fish populations in Khayeng River varied inversely with discharge with maximum numerical abundance occurring during the dry season. Low populations during the rainy season when discharge is high were related to migrations from the study areas that were associated with feeding and reproduction. These results along with those for other rivers in central Thailand are more fully reported in Beamish et al. (2006a). Important habitat or environmental characteristics were identified for fishes found in Thong Pha Phum and elsewhere in central Thailand along with species distribution and population estimates, the latter by the depletion method. Species richness and numerical abundance were dominated by cyprinids followed by silurids and balitorids. Habitat factors of importance to species distribution and abundance are discussed. The results of these studies are described more fully in Beamish et al. (2006b), Beamish and Sa-ardrit (2006b), Beamish and Sa-ardrit (in review) and Beamish and Sa-ardrit (manuscript). Species coexistence was examined and related to resource sharing, facilitated through morphological adaptations and ontogeny. Morphological adaptations associated mainly with the mouth and digestive system direct species to forage on different dietary items with adaptations to body and fin morphology enhancing maneuverability or swimming performance both variously associated with prey capture and predator avoidance. These results are described in Ward-Campbell et al., (2005) and Ward-Campbell and Beamish (in revision). Morphological constraints direct some species such as *Channa gaucha* to exploit different food resources during ontogeny and these results are described more fully in Ward-Campbell and Beamish (2005).

Species diversity of amphibian in Thong Pha Phum District, Kanchanaburi Province

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Amphibian surveys were carried out in 3 types of habitat: natural habitat, human settlement habitat, and swamp at Thong Pha Phum, Kanchanaburi Province. A total of 37 species of amphibian were found. Thirty-two species were previously reported and other 5 species were first found in this areas. Two species were consumed locally as food, *Limnonectes blythii* and *Hoplobatrachus rugulosus*. *Limnonectes blythii* was caught from the natural habitat and *Hoplobatrachus rugulosus* was found rearing in household level farming. Swamp is the key habitat of some species. Twenty-three species amphibians were found inhabiting 5 swamps: Forest Industry Organization Swamp, Phu Tha Maduea, Phu Nong Pling, Phu Pu Rachinee and Pong Phu Ron.

Species diversity, distribution and habitat characteristic of skinks in Western Thong Pha Phum, Kanchanaburi Province

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Species diversity, distribution and habitat characteristic of skinks in the swamp forest in Western Thong Pha Phum, Kanchanaburi Province, were studied each month during December 2006 to June 2007. Five study sites were chosen: Hot springs, Phu Tha Maduea, Phu Nong Ping, Phu Pu Rachinee and the swamp forest in Thong Pha Phum plantation of the Forest Industry Organization. Using the line transect method and pitfall traps, five skink species were recorded including *Riopa bowringii*, *Sphenomorphus maculatus*, *Mabuya multifasciata*, *Mabuya macularia*, and *Lygosoma quadrupes*. Phu Nong Ping had a higher taxa richness than did either Phu Pu Rachinee or the swamp forest in Thong Pha Phum plantation. *Sphenomorphus maculatus* was the most abundant in all study sites, whereas *Lygosoma quadrupes* was found only in Phu Nong Ping. The skinks lived mostly underground, hidden beneath logs, rocks, or among bamboo leaves and twigs.

Status of small carnivore in PTT Forest Reserve, Thong Pha Phum District, Kanchanaburi Province: A guideline for local community involvement in wildlife management

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The status of small carnivores in a small reserve called “PTT Forest Reserves” in Western Thailand was studied, to determine the effectiveness of a small protected area in wildlife conservation. At least 17 wild mammal species were present in this protected area including 10 carnivore species. The wildlife community in this area is dominated by viverrid species. Large Indian Civet was the most abundant, followed by Small Indian Civet and Common Palm Civet. A negative correlation between abundance of Large Indian Civet and distance to the forest edge showed the preference of this species for the edge area ($r = -0.682$, $p = 0.043$). There was a variety of human activities in this protected area and some activities were related with distance to the human community such as non-timber forest product collecting and domestic animals, which tended to have high frequencies near villages ($r = -0.831$, $p = 0.006$ and $r = -0.685$, $p = 0.042$ respectively). Even though much research has been conducted in community land near protected areas it has not contributed positively to wildlife conservation. High levels of human (activities) and wildlife community dominated by viverrid species is an indicator of wildlife disturbance. So, conservation planning in this small protected area should aim at wildlife and at decreasing disturbing activities in the area, by partnership with local agencies, local people and local government and by making a roadmap to wildlife conservation in this area.

Participatory research and community dialogue as important tools for alleviating human-elephant conflict in Huai Khayeng, Thong Pha Phum, Kanchanaburi, Western Thailand

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Participatory research and community dialogue have been developed as important tools for alleviating human-elephant conflict in Huai Khayeng, Thong Pha Phum, Kanchanaburi, Western Thailand. The study found that 75 % of crop raiding by elephants (n = 122) occurs between 6 p.m. to midnight. Elephant behaviors responding to stimuli were used as baseline data to formulate community plans. Community dialogues, carried out 6 times using the data from field participatory research, have helped local leaders and the national park manager make decisions to solve human-elephant conflicts in the most intensive raided villages at Pak Lum Piloc village (32 raiding nights) and Huai Khayeng village (26 raiding nights). The assistance was set up by supplying financial support to buy repelling tools such as spotlights and firecrackers, and setting human-elephant conflict as a priority issue. Community dialogue also help to strengthen collaboration among villages by exchanging and adjusting the repelling methods and organizing urgent gatherings for repelling experienced elephants. Community plans help villagers repel elephants unharmed. For a long-term solution, community dialogue, participatory research and evaluation of field research data will ensure best practice for coexistence humans and elephants.

Non-cropped vegetation in relation to insects and soil mites found in two farming systems and a forest edge in Thong Pha Phum, Kanchanaburi

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The composition of plants, insects, and soil mites in non-cropped areas were compared between an organically certified farm, a chemically intensive farm, and the forest edge adjacent to the two farms. Plants were identified from non-cropped vegetation and percent coverage estimated within 1x1 m² quadrats. Insects were sampled from the non-cropped vegetation by using sweep nets, and soil mites and soil insects were separated from soil samples by using Berlese's funnels. The dominant plant species varied from area to area. Ya-Ca or Cogon grass (*Imperata cylindrica*) was most prevalent in the organically certified farm especially in an open canopy area while Kok-Dok-Khew or Kyllinga (*Cyperus brevifolius*) was ubiquitous in the chemically intensive farm. In the forest edge, Sab-Seu or Siam weed (*Chromolaena odorata*) was the dominant species. Besides the differences in management practices between the three areas, the high diversity indices of above ground insects and soil mites found in the forest edge suggests that *C. odorata* might be a potential reservoir for beneficial insects, especially parasitoids. Data analyses to determine seasonal variation is in progress.

Development of sentinel systems for pesticide contamination in agricultural areas of the Thong Pha Phum region

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Agriculture is an important activity in the Thong Pha Phum region. Cultivation of field crops, rice and horticulture require an extensive use of pesticides to control pests and weeds. These pesticides may contaminate the natural environment and affect the health of organisms in the area including humans. The current research project aims to develop sentinel systems for pesticide contamination, which include 1) a database of pesticide use in the Thong Pha Phum region and 2) the biological responses of the sentinel animal species. Questionnaire surveys on pesticide use were conducted with farmers from Tambon Lintin and Tambon Huay Khayeng of Thong Pha Phum District, and field surveys for potential sentinel species were conducted in natural habitats overlapping the agricultural areas. The surveys show that methomyl, methyl parathion, glyphosate and paraquatdichloride are major pesticides used in the study area. These pesticides vary greatly in their toxicity, potential contamination and accumulation in the ecosystem. The results also suggest a possibility that farmers in the area may use large quantities of one or more pesticides at the same time, leading to contamination of the environment with pesticides. Information on pesticide use will be developed into a database and used to categorize pesticides that need to be monitored. In addition, several species of freshwater snails have been selected as potential sentinel species. The biological response of these sentinel species together with the database of pesticide use could be of importance for risk assessment of pesticide contamination in natural ecosystems as well as human settlements.

Assessment of appropriate tourism programs for Huai Khayeng, Thong Pha Phum District, Kanchanaburi Province

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Huai Khayeng is located in Thong Pha Phum District, Kanchanaburi Province. The Huai Khayeng community was relocated from the plains area due to the construction of Vachiralongkorn Dam which has resulted in them changing their lifestyle from natural product consumption to the use of natural and cultural attractions for tourism. In the past few years, Huai Khayeng was managed for tourism programs by various people. However, it was not successful. In order to survive, the tourism programs are in need of revision. Thus, the objectives of this research are to (1) study the causes of failures in tourism management programs in Huai Khayeng, (2) to evaluate the prior tourism management programs and marketing factors of Huai Khayeng, (3) to recommend proper tourism management programs for Huai Khayeng. Research methodology comprises meetings of focus groups, the use of questionnaires and interviews of stakeholders in the tourism business. The study results will be useful for the community for revising and improving tourism management and increasing the efficiency of tourism management to suit both natural resources and the community.

Management of conservation forest under the 72 Phunsa Maharat Thong Pha Phum Forest Project as a buffer zone for Thong Pha Phum National Park

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The objectives of the study are: (1) to analyze the socio-economic status of surrounding communities, their existing uses of resources from the conservation forest, and their opinions regarding management of the forest as a buffer zone; (2) to analyze the potential management of the conservation forest under the 72 Phunsa Maharat Thong Pha Phum Forest project as a buffer zone that is acceptable to all concerned parties, and (3) to analyze the economic viability of management of the forest as a buffer zone. The participatory rapid appraisal (PRA) method was applied for the proposed management plan and the cost benefit analysis (CBA) method was applied for its economic viability. The results showed that the community collects non-timber forest products mainly for consumption, while some products are sold for earning income. Forest utilization may not be sustained as there are no reforestation and rehabilitation programs. Being conservation forest under the 72 Phunsa Maharat Thong Pha Phum Forest project, the area is a resource for conducting research in biological diversity. This helps the community to gain knowledge and understanding of the significance of biological diversity and forest resource conservation. This study provides preliminary data for buffer zone management in the 72 Phunsa Maharat Thong Pha Phum Forest project. Buffer zone management strategies will be discussed by proposing strategies acceptable to all concerned parties including government and private agencies. Analysis of the economic cost for management of the conservation forest under the 72 Phunsa Maharat Thong Pha Phum Forest project as a National Park buffer zone will also be conducted.

A study of local peoples' knowledge on non-timber product utilization and transformation to local production

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Thailand has a rich flora with a wide variety of plants. Non-timber forest products have been used since ancient times for consumption and selling. The aim of this study is to improve the relationships between humans and nature at Thong Pha Phum plantation, Kanchanaburi Province, because ethnic people are very knowledgeable about non-timber forest product utilization. Data collection was designed to investigate local opinions and knowledge on using non-timber forest products and their transformation to local products with economic value, and the dependence of local people on forest resources, by using questionnaires for data collection. Moreover, there are plans to explore non-timber forest product species diversity. Chi-square is a statistical technique used in data analysis and statistical significance is set at 0.05. There are three study areas located in Tumbon Huay Khayeng, Thong Pha Phum District, Kanchanaburi province at three villages, Ban Tha Madeau, Ban Raipa and Ban Rai. Each village is a representative of Thai, Karen and Burmese communities, respectively. It is hoped that the results of this study will be used as fundamental data for making decisions about economic possibilities for developing projects in the governmental and private sectors, as well as using the results of the study as a guide for policy determination in Thong Pha Phum plantation management and for use of non-timber forest products effectively and sustainably.

Dialogue as a tool for approaching community tacit knowledge: lessons from Huay Khayeng

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The article is to show how dialogue is applied for working with multi-stakeholders from different socio-cultural background in Huay Khayeng, for example, Karen, immigrants, exogenous, local elites and scientists. It is to understand how they identify their situation in the local area. The initial results show that differences in identification of the situation among multi-stakeholders are too obvious. People from different groups see themselves extremely different from each other. There is no coherence of thought among people in this locality. This article suggests that the dialogue process for thinking together must be developed to facilitate people from different backgrounds to come and share their meanings. By doing so, the level of consciousness can be lifted up and a new definition of the local situation consequently will emerge.