

CHAPTER 3

MATERIALS AND METHODS

3.1 EQUIPMENT USED

Various equipment was used to obtain information on locations, description, size, elevation, weather, vegetation of the study sites.

1. Altimeter (m)
2. Compass and Global Positioning System (GPS)
3. Dial caliper
4. Digital balance
5. Measuring tapes (cm)
6. Spring balances, PESOLA, (10 and 30 grams)
7. Metal ruler (cm)
8. Tally counter
9. Thermometer ($^{\circ}\text{C}$)
10. Binoculars
11. Digital camera
12. Telescope
13. Video and sound recorder (details on p. 37)
14. Bird bags
15. Colour rings
16. Mist nets

3.2 DATA COLLECTION TECHNIQUES

3.2.1 General behaviours and territory establishment

Asian Paradise Flycatchers were observed along trails (Figures 3.1-3.4) in the forest from 0800-1200 hrs. and 1400-1800 hrs. almost every day before the breeding season (August-February). When birds were sighted or heard, the location and behaviour were recorded. The territories of males were determined by direct observation from daily surveys before pairing. At the time of sighting, all look-outs, song posts, and places where the bird starts its flying call or perched were noted. Bird locations were plotted on a map to determine territory boundaries. Individuals were identified by variation in their plumage and conspicuous long central tail feathers.

3.2.2 Capture, marking, and measurements of the Asian Paradise Flycatcher

Adult birds were captured by using mist nets which were placed near the area of bird perching from the previous day's survey or placed near the expected area of visiting. Captured birds were colour-ringed for individual identification and were measured for bill length, unflattened wing, tarsus, tail, and body weight. The length of the bill, unflattened wing, and tarsus were measured by using a dial calliper to the second decimal place. Tail length was taken as the length of the longer of two central feathers by using a measuring tape (Figures 3.5-3.9). The body weights were measured by using digital and spring balances.

3.2.3 Behaviour and breeding activity

Behavioural Observation

a) Habituation

The Asian Paradise Flycatcher became habituated to me by using blinds. The blinds were made 1-2 days before use. During the first few hours of observation

the observed bird flew out the nest when I was inside the blind and came back few minutes later.

b) Focal sampling method

The focal sampling method was adapted from Martin and Bateson (1986) and Ngonjun (2001). The data were recorded every five minutes in the morning (0600 – 1000 hrs.), around mid - day (1000 -1400 hrs.), and in the afternoon (1400 – 1800 hrs.) almost every day during the breeding season (March - July).

The breeding activities of the Asian Paradise Flycatcher were divided into three parts:

1. Nest–building period

The Asian Paradise Flycatcher and its nests were observed along the trails in the forest from 0800-1200 hrs. and 1400-1800 hrs. almost every day during the breeding season. The nest building period was determined by observations of nests under construction. Data on nest-building patterns, nest-building period, and nesting materials were noted. In order to get valid information and with minimal disturbance on the birds' activities, observation blinds were used for observing behaviour. Two types of observation blinds were used in this study *i.e.* natural material and artificial material blinds. If nest construction was under way, a blind was built as the nest was near completion in order to minimize disturbance.

a) Natural material blinds

The blinds were built on the ground from bamboo and vegetation from the herb, *Etilingera littoralis* (Kon.) Gise. (Zingiberaceae). The blinds had dimensions of 1.5 m x 1.5 m x 1.5 m. Bamboo poles were driven into the ground and tied with thin bamboo strips to make a square shape. Foliage of *Etilingera littoralis* was used as

roofing material and to densely cover the walls, excluding a small hole for the entrance. The inside of the roof was lined with a plastic sheet to prevent rain from entering. The floor was lined with a plastic sheet. In the wall opposite the nest a little hole was made for a telescope and video camera. The blinds were built quickly and could be used for several weeks. They also withstood wind and rain, particularly once dried leaves of *Etlingera littoralis* were put on the blind. The blind were placed 10 m away from the nest site and parallel to the birds' regular flight approach pathways to the nests (Figures 3.10 – 3.11). Blinds were also directed toward the light at higher locations above the nest sites (Ngoenjun and Sitasuwan, 2010).

b) Artificial material blinds

These blinds were made from nylon with dimensions of 1.5 m x 1.5 m x 1.5 m. The walls had small windows for ventilation except at the entrance. The wall opposite the nest had a small hole for a telescope and video camera. These blinds were placed 10 m away from the nest site (Figure 3.12).

Nest measurements

Measurements of nests were taken after the nestling fledging or nests were abandoned, which included nest height above the ground, two measurements of the external diameter (width and length), and two measurements of the internal diameter (width and length or depth of cup). Additional measurements included type of nest material and nest material proportions.

2. Incubation

Notes on the date of egg laying, hatching and observing the time at which mating is involved in incubation and to assess the percentage of hatching success. The

eggs were measured for length and width with a dial caliper to the second decimal place. The eggs were weighed by digital and spring balances (10 g).

3. Nestling period

I recorded the frequency of feeding visits between males and females, the frequency of brooding, the frequency of nest attendance, and the percentage of breeding success, including measuring the nestlings the same way as adults, but excluding tail length. The nestlings were measured almost every day until fledging.

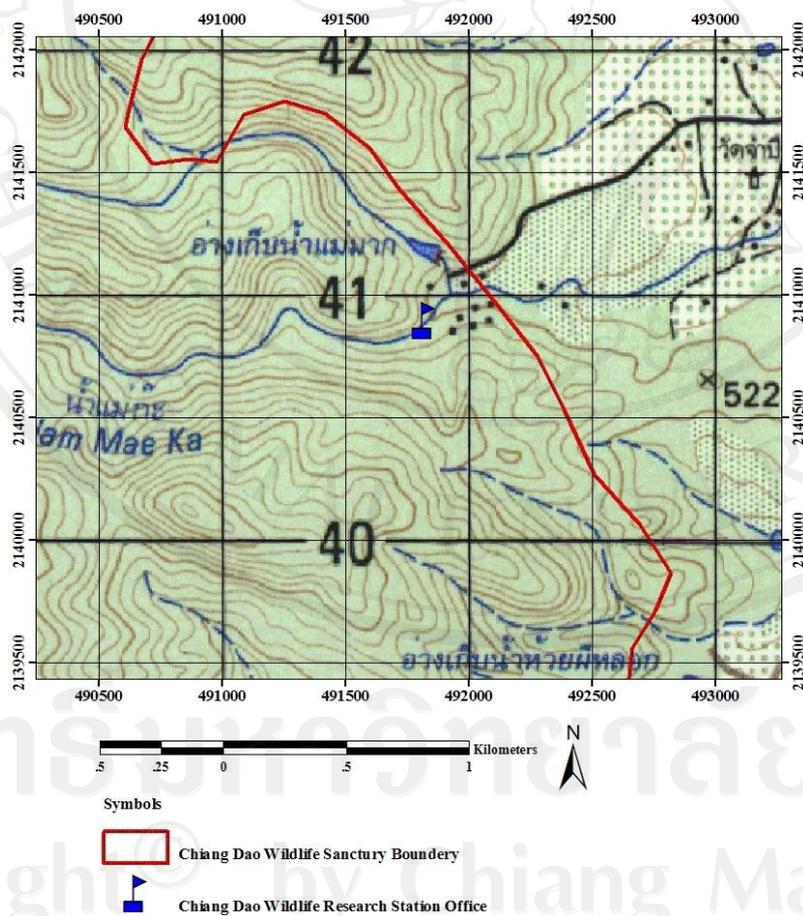


Figure 3.1 Topographic map of Chiang Dao Wildlife Research Station.

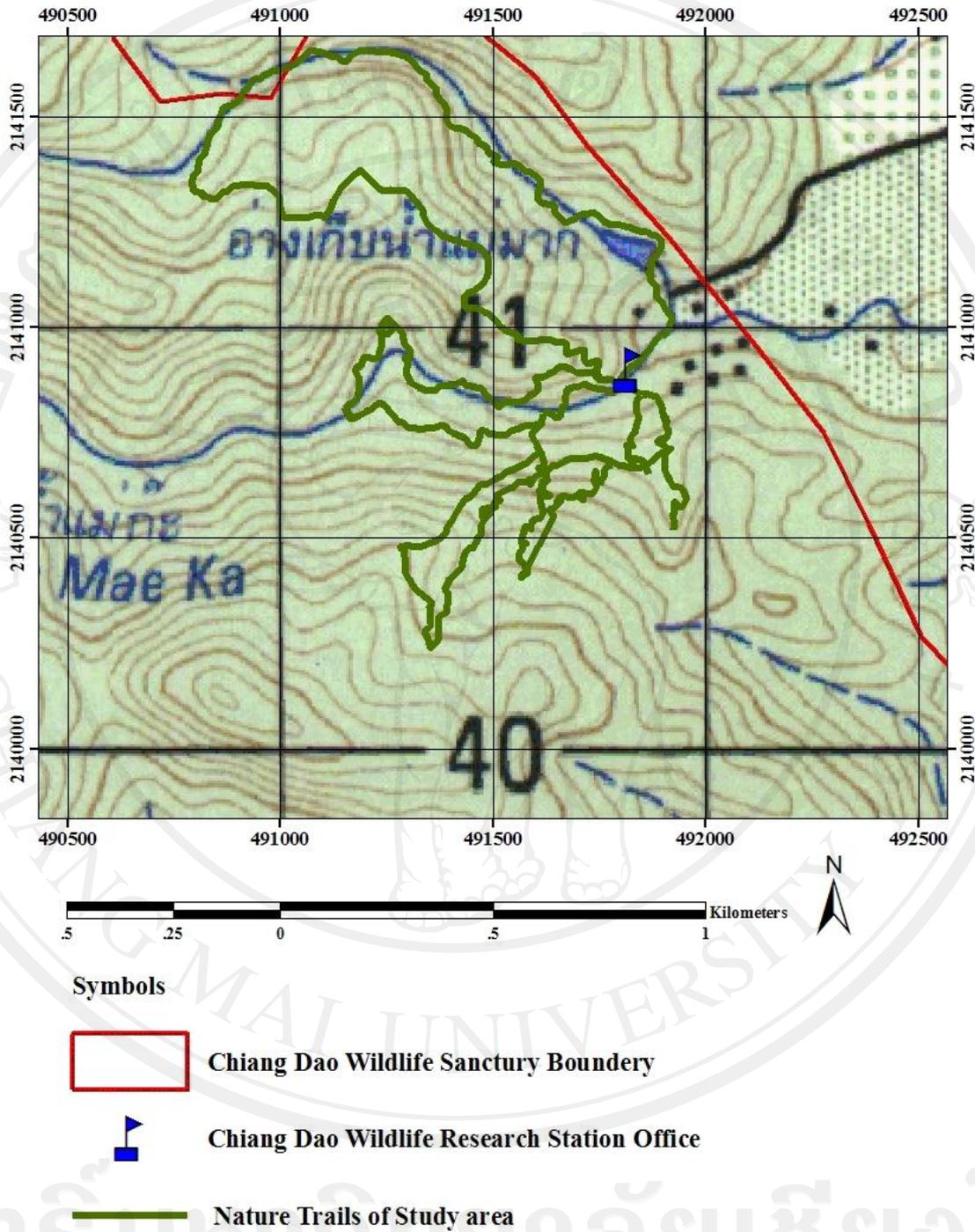


Figure 3.2 Topographic map of Chiang Dao Wildlife Research Station shown the study trails.

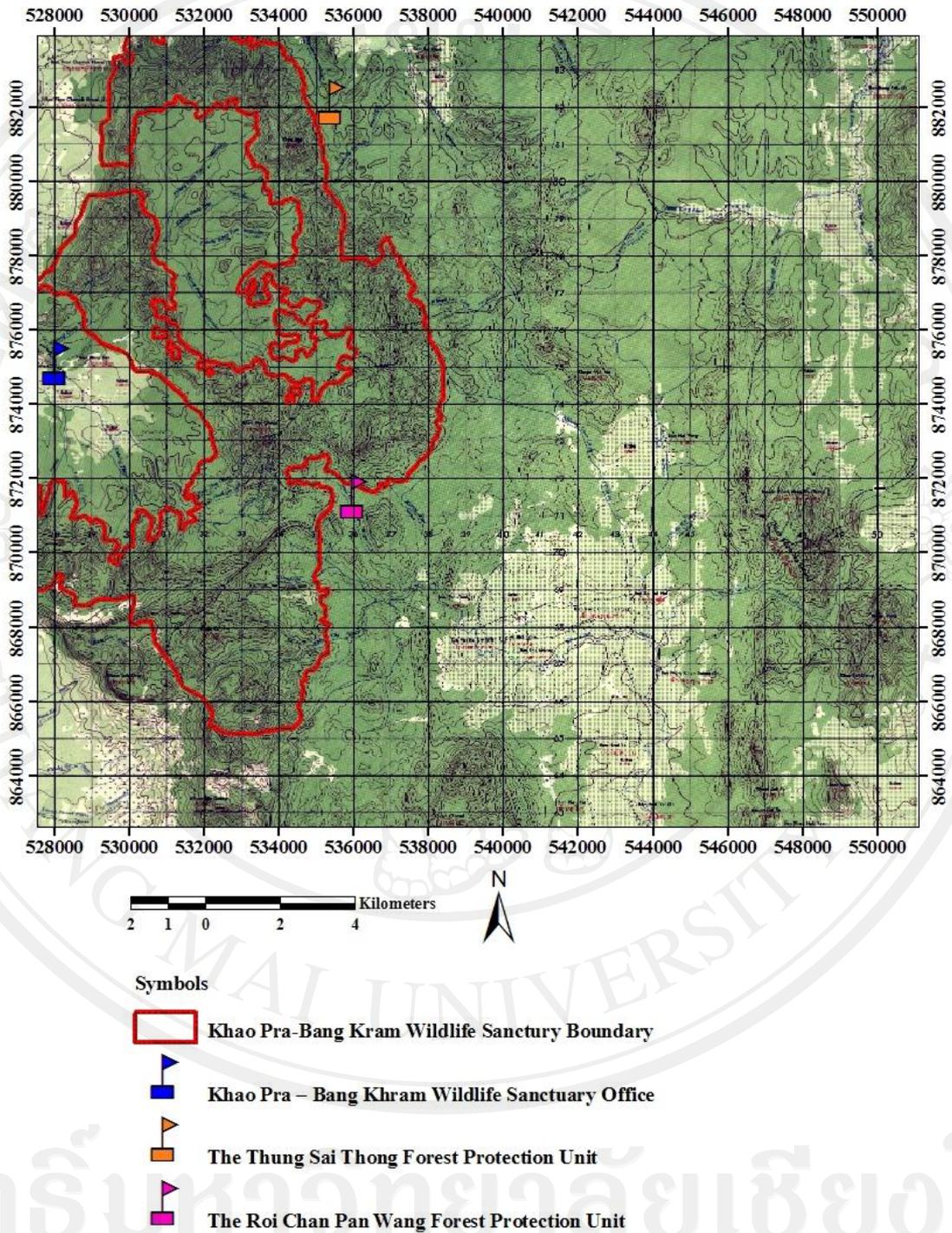
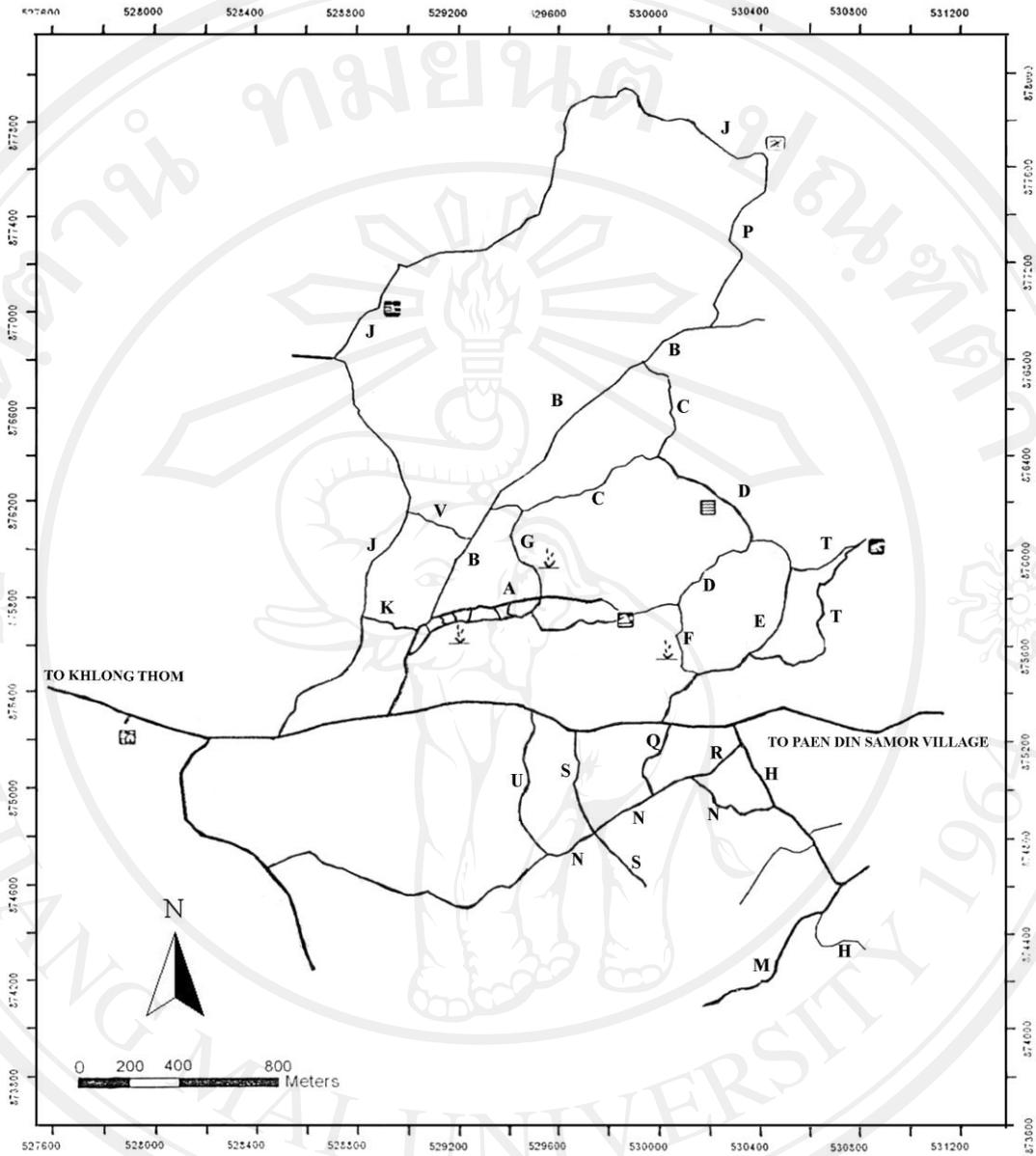


Figure 3.3 Topographic map of Khao Pra – Bang Kham Wildlife Sanctuary, Krabi and Trang Provinces.



SYMBOL

- | | |
|---------------------------------|--------------------|
| Wildlife Sanctuary Headquarters | Emerald Pool |
| Swamp Forest | Blue Pool |
| Irrigation Dam | TON TIEO Waterfall |
| Cave | |

Figure 3.4 A nature trail in Thung Tiao (Emerald Pool area) at Khao Pra-Bang Kham Wildlife Sanctuary, Krabi Province. Source: Khao Pra-Bang Kram Wildlife Sanctuary Information Center; Natural trails in Thung Tiao.



Figure 3.5 A coloured ring for male individual identification before the breeding season at Chiang Dao Wildlife Research Station.



Figure 3.6 Measuring bill length of a mature adult at Chiang Dao Wildlife Research Station.

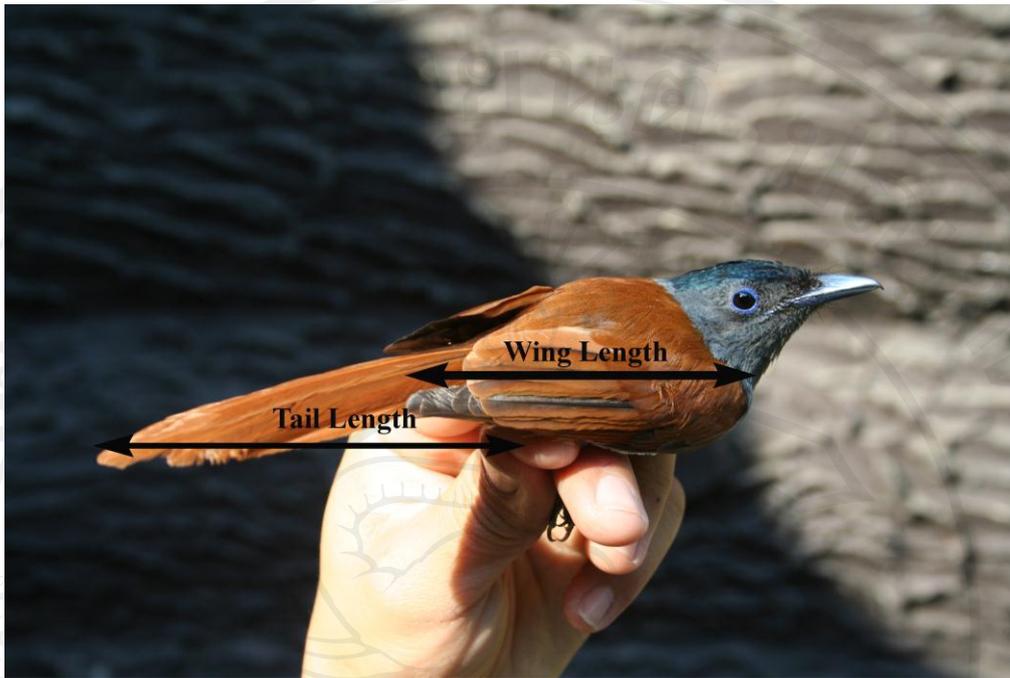


Figure 3.7 Measurement of wing and tail lengths for mature birds. Chiang Dao Wildlife Research Station.



Figure 3.8 Measurement of tail length in a male. Chiang Dao Wildlife Research Station.



Figure 3.9 Measurement of tarsus length before the breeding season at Chiang Dao Wildlife Research Station.



Figure 3.10 A blind made from natural materials from *Etlingera littoralis* (Kon.) Gise. (Zingiberaceae) during the breeding season at Chiang Dao Wildlife Research Station.



Figure 3.11 An natural materials blind blends in well with the birds' habitat during breeding season at Chiang Dao Wildlife Research Station.



Figure 3.12 An artificial materials blind during the breeding season at Khao Pra-Bang Khram Wildlife Sanctuary, Krabi Province.

3.2.4 Vocal communication.

Sounds of the Asian Paradise Flycatcher were recorded on a HHP Portradisc MDP 500 (Mini Disc) and EDIROL by Roland R-09 recorder (SD Card). The recorders were equipped with a dynamic microphone, Telinga PRO 4B and a parabolic reflector. Sounds were recorded at random in the morning (0600 – 1000), around mid-day (1000–1400), and in the evening (1400–1800) and behaviour was also be recorded at the same time.

3.2.5 Ecology of nest tree and nest sites

a) Ecology of nest trees

The nest support species was measured after the nestlings fledged or disappeared before fledging. Measurements included nest support height, number of branch forks at the nest site, stem diameter of nest support (at ground, nest, 130 cm above ground), elevation and habitat of nest support, and also identified species of nest support plants.

b) Ecology of nest sites

Nest sites were selected by random and a sample plot of 10 x 10 m, centred at the nest support plants were established. The number of trees around the nest with three categories of diameter at breast height (dbh) (130 cm above the ground): 1-5, 5-30, and >30 cm in some cases stem height was less than 130 cm so the diameter was measured at ground level, total stem height, height at the first branch and crown cover. At each nest site trees were measured, additional random plots placed 25 m from nest support stem were surveyed for the same variables, to compare and determine with nest sites the habitat or nest stem factors that are likely to affect the choice of nesting habitat.

c) Plant Identification

The nest plant species were collected, dried, and identified by J. F. Maxwell, in the CMU Herbarium, Department of Biology, Chiang Mai University.

3.3 DATA ANALYSIS

The data was analyzed at the Department of Biology, Faculty of Science, Chiang Mai University and included:

3.3.1 Behavioural Observations

Microsoft Excel and SPSS were used to analyze behavioural data such as growth curves of nestlings, parental care activity, and variation effected by sex and nestling age.

3.3.2 Vocal Communications

Communication sounds were recorded, analyzed, and presented as sonograms, using the sound analysis computer, Avisoft-SASLab Program.

Sonograph elements were classified by shape and complexity. The vocal meanings were determined by relative behaviour and response to playback.

3.3.3 Ecology of nest support plants and nest sites

Microsoft Excel was used to complete and analyze the botanical data such as nest support species, number of tree categories of diameter at breast height (dbh).

Table 3.1 Data categories recorded during each focal observation.

Category	Definition
Date	Date of observation
Number	Number of data sheets for each day for the same nest
Species	Asian Paradise Flycatcher (<i>Terpsiphone paradisi</i>)
Number of Nest	Number of nest observed
Location	Study sites (Chiang Dao Wildlife Research Station, Chiang Mai Province; Thung Tiao, the Thung Sai Thong Forest Protection Unit, Krabi Province; and the Roi Chan Pan Wang Forest Protection Unit, Trang Province)
Habitat	Forest type
Time	Time of observation, referring to Thai Standard Time (GMT+7)
Subject Age/Sex	Age and sex of observed individual (Table 3.2)
Subject Identity	Identity of observed individual
Activity	Activity or behaviour of observed individual (Table 3.3)
Bird Position	1. At nest 2. At branch of nest tree near the nest
Age/Sex of nearest neighbour	Age and sex of the individual nearest to the observed individual (the nearest neighbour)
Identity of nearest neighbour	Identity of the nearest neighbour
Distance between subject and nearest neighbour distance	Distance from the observed individual to the nearest neighbour
Temperature	Temperature during observation was measured every hour

Table 3.2 Age/Sex categories used in this study (adapted from Mizuta, 1998).

Category	Distinguishing Criteria
Rufous-plumaged adult male with long tail (RL)	Conspicuous broad blue eye rings and bill, predominantly bright rufous upper parts, glossy black crown with grey on the throat and sides of head, and a greatly elongated central pair of tail feathers extending up to 25 cm beyond the rest of tail (Figure 1.4)
White-plumaged adult male with long tail (WL)	Conspicuous broad blue eye rings and bill, predominantly white with a glossy black head and throat with black shaft streaks on the wing and tail feathers. A greatly elongated central pair of tail feathers extending up to 25 cm beyond the rest of tail (Figure 1.5)
Rufous-plumaged adult male with short tail (RS)	Resemblance to Rufous-Plumaged adult male with long tail, but lacking long tail streamers (Figure 1.6)
Female	Resemblance to Rufous-plumaged adult male with short tail, but its eye rings and bill are not as bright as those of males (Figure 1.7)

Table 3.3 Activity categories used in this study.

Category	Definition
Brooding	The subject kept the nestlings under its body and transferred heat from its body to the nestlings Low Brooding: The subject brooded with close contact to the nestlings High Brooding: The subject brooded unattached to the nestlings
Feeding	The subject was feeding or its mate was putting food into their mouths 1) Insects 2) Nestling's feces
Feeding to the nestlings	The subject put insects in nestling mouths
Incubation	The subject was sitting on its eggs and transferred heat from its body to the eggs
Turn the eggs	The subject quickly moved its beak to touch eggs so that they faced in a different direction in order to get complete warmth
Peck the nest	The subject quickly moved its beak to touch the bottom of nest to make it smooth
Preen	The subject was cleaning itself and preening made its feathers smooth with the bill. The location of preening: 1) Belly 2) Breast 3) Flank 4) Tail 5) Wing
Perch	The subject perched on a branch at its nest
Yawn	The subject opened its mouth wide