Looking on Indigo Flycatcher (Eumys indigo) Hunting Behaviour: Time, Ecology, and Habitat Preference

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ABSTRACT

Hunting is the main support of life for the insectivores bird of the world. Through an understanding of Indigo Flycatcher behavior character, we compiled new information for the daily behavior of Indigo Flycatcher and Muscicapidae family in general. The study was conducted at 3 periods to interpret the effect of different seasons conditions: the first period (rainy season, 1 – 30 January), the second period (dry season, 1-30 June), the third period (transition season, 1 – 30 November). The research station covers 3 research points (A=edge of the forest, b = garbage dump, c = dense forest. A canonical correspondence (CCA) was used to understand the significance of the interaction between the abiotic factors and season. Based on the observations, the transition of the season became the most preferred moment for Indigo Flycatcher. Indigo flycatcher hunts in a group, both singular and mixed. Point B is the most common location of Indigo Flycatcher hunting activity.

Keywords: Behaviour, Hunting, Indigo Flycatcher, Insectivores, Season

Introduction

In animal behaviour, hunting is one of the crucial activities that can sustain population sustainability. Variation in bird hunting technique is always related to morphological structure and taxonomy [1]. In some species of flycatcher, hunting hirearki directly affects the distribution of resources, such as food and mate [2]. Hunting is the main support of life for the insectivores bird of the world. Hunting, conducted within a group, is characteristic of the process of getting food [3]. Insectivores have developed various forms of communication and collaboration [4]. Indigo Flycatcher (Eumys indigo) provides a good example in a study of group collaboration in hunting.

Many species of flycatcher have specified shapes through convergent evolution [5, 6]. These body shapes make it ideal and effective in groups or individual hunt. In this study, we observed Indigo Flycatcher hunting behavior that occurred in TAHURA R. Soerjo, East Java. This highland area became one of the attractive habitats for Indigo Flycatcher [5]. Observations of hunting behavior will reveal the quality of the environment, population, and taxonomy [7, 8]. Through an understanding of Indigo Flycatcher behavior character, we compiled new information for the daily behavior of Indigo Flycatcher and Muscicapidae family in general.

Material and Methods

Study area

The research was conducted in the protection area of R. Soerjo Forest Park, located in East Java, Indonesia. The research station covers 3 research points with a radius of 20 meters of the rainforest at an altitude of 1,000 – 1,500 masl (Figure 1). Point A is the edge of the forest, near the parking area. Point B is a garbage dump, which located on the edge of the forest. Point C is part of the forest with a tight Dipterocarpaceae canopy cover. The study was conducted at 3 periods to interpret the
effect of different seasons conditions: the first period (rainy season, 1 – 30 January), the second period (dry season, 1 – 30 June), the third period (transition season, 1 – 30 November).

Behavioral observations

The observation was done in three times on every observation day: morning (06.00 – 08.00 am), noon (09.00 – 11.00 am) and afternoon (15.00 – 16.00 pm). Observers take the same point for observation (360°-shaped observation). All Indigo Flycatcher hunting activities were observed. Other visible behaviors are also noted. The insectivorous birds present were also observed and recorded in their behavior, especially those with direct links to the Indigo Flycatcher. The observations were performed by NIKON aculon binoculars and canon 1100 D + 75-300 mm canon lens DSLR camera for documentation.

Observation classification of hunting activities include: 1) Perch activities, covering special activities before or after hunting, 2) Hunting activities (foraging/hunting), including flying style, preycatching style, or other activities observed simultaneously with this activity, 3) Feeding activities, including the style of eating (direct or chopping), giving it to other birds, or the addition of other unrecorded diets, such as fruit or flowers.

Observation results were included in the table and tabulated. Each classification of observed activity is denoted by a number (each 1) to project a preference form in the chosen habitat then these data were analyzed descriptively.

Statistical analysis

We used a canonical correspondence (CCA) to understand the significance of the interaction between the abiotic factors and season. It should be noted that although we treat each individual observation as independent data, the birds are not individually marked, so double visits by the same individual can make a slightly erroneous assumption.

Results and Discussion

Visits and behavior

Based on the observations, the transition of the season became the most preferred moment for
Indigo Flycatcher (Figure 2). There were 50 main activity, which dominated by hunting, that observed in this season. However, this behavior became less observed during the dry season (43 times). The rainy season is a very unsupportive season, i.e. 36 times observed behavior.

The transitional season is a unique time when many birds begin their ‘seen’ activities, especially the nurturing of a new generation. Conversely, the rainy season becomes a period when most birds use it by the reproduction process [9]. In addition, the lack of sunlight also reduces the ability of sunbath activity. Birds, however, still require sunlight intake to optimize the body’s metabolic system, so this behavior occurs in minimal sun conditions also [10]. Sunbathing has many benefits for birds, such as reducing lice [11], the addition of vitamin D to bone, egg, and feather growth [12] and part of socio-group behaviour [13]. Rainy season and bad weather for days will trigger birds to bask in large amounts when the sun first appeared [14]. The dry season is a time when many birds are observed on the edge of the forest. Some of the water sources in the forest dry out due to minimal rainfall, thus impacting on the availability of feed and feeding areas. However, this is not expected to the significant impact on the behaviour.

The high intensity of hunting in the transitional season is a preparation for the reproduction process that will occur in the following rainy season. An indigo flycatcher is responsible for nurturing chicks for the first 1-2 months. In addition, it takes great energy on the natural processes of mating, such as mating attraction (call or dance) and nesting. Parenting is an inheritance process of hunting tactics from parent to the chicks [15].

**Location preference**

Point B is the most common location of Indigo Flycatcher activity, compared to the other two sites (Figure 2). Point B is a figure of an interesting location for the Indigo Flycatcher to hunt, where the garbage invites many insects. In addition, the vegetation around of garbage dumpster provided perchance for Indigo Flycatcher. Perch is a very important support for insectivore birds to monitor, supervise, improve competitiveness in groups [16], socialize [13], and eat [17].

Activities observed at point A or C are quite small. Point A is a form of sharp vegetation gradi-
Figure 3. The relationship between the presence of birds at study sites and seasons. Abiotic factors in the biplot chart show the condition of the season at the study.
A group of Indigo Flycatcher can consist of 2 to 12 individuals. The hunting process begins by a bird (as a pioneer) fly to the observation site. This movement is always accompanied by short whistles, and this bird will soon be followed by other birds. Another group at point C moves between the high canopy (approximately 15 – 20 meters), while at point B moves from the canopy (10 – 15 meters), toward the perch on the shrubs (2 – 3 meters). All group members will perch on twigs, then move to other trees. The mixed groups at points A and B are potential competitors. The hunting method is widely applied at point C, where hunting is more arboreal. Both movements: hovering and direct strike, are applied. Gleaning is widely applied by arboreal birds, such as nuthatch (Sittidae) and woodpeckers (Picidae). Some of these birds have small, pointy beaks to catch without scraping, while the woodpecker has a medium beak to scrape and disassemble the insect’s nest [5, 23].

Hunting behavior in mixed groups is often observed at point C, where movement and hunting always occur rapidly and sustainably. The exploration process not only applied on a tree but keep moving to other trees. The mixed groups at points B and A have fewer species members and are generally composed only by insectivores and omni-vores, such as Little-pied Flycatcher, Grey-headed Flycatcher, and Sooty-headed Bulbul. This evidence made competition exists as an identic ecological role and utilize the same resources.

| Species                        | A   | B   | C       | Insectivore | Frugivore | Nectarivore |
|-------------------------------|-----|-----|---------|-------------|-----------|-------------|
| Leafbird Chloropsis sp.       | -   | +   | +       | √           | √         | √           |
| Sooty-headed Bulbul Pycnonotus aurigaster | +   | +   | +       | √           | √         | √           |
| Walik Kepala-ungu Ptilinopus porphyreus | -   | +   | +       | _           | √         | _           |
| Manguk Loreng Sitta azurea    | -   | +   | +       | √           | _         | _           |
| Sepah Gunung Pericrocetus miniatus | +   | +   | +       | √           | _         | _           |
| Kepudang-sungu Gunung Coracina larvata | +   | +   | +       | √           | _         | _           |
| Sikatan Kepala-abu Calicicapra ceylonensis | -   | +   | -       | _           | _         | _           |
| Sikatan Belang Ficedula westermanni | -   | +   | +       | √           | _         | _           |
| Cingcoang Coklat Brachypteryx leucophrys | -   | +   | +       | √           | _         | _           |
| Pelanduk Semak Malacocincla sepiaria | -   | +   | +       | √           | _         | _           |
| Ceret Gunung Cettia vulcania | -   | +   | +       | _           | √         | _           |
| Julang Emas Rhyticeros undulatus | -   | +   | -       | _           | √         | _           |
| Anis Sisik Zoothera dauma      | -   | +   | +       | _           | _         | _           |
| Caladi Ulam Dendrocopos macei | +   | +   | +       | _           | _         | _           |

Gleaning method is widely applied at point C, where hunting is more arboreal. Both movements: hovering and direct strike, are applied. Gleaning is widely applied by arboreal birds, such as nuthatch (Sittidae) and woodpeckers (Picidae). Some of these birds have small, pointy beaks to catch without scraping, while the woodpecker has a medium beak to scrape and disassemble the insect’s nest [5, 23].
ecological time. Competition is observed at points B and C, where songs are interrupted or provocative. Sunda Cuckoo-shrike becomes the main competitor for arboreal hunting, which is seen in Point C. Another arboreal insectivorous, Blue Nuthatch, is rarely seen. This species is a jungle explorer and hunts in a single independent group [5].

The other ecological roles species, Pink-headed Fruit-dove and Leafbird, do not have a specific relationship to Indigo Flycatcher. The relationship of both is relatively high when forming a mixed group. Fulvous-breasted Woodpecker which is a single insectivore, does not have the potential to be a competitor. The reason is a different tactic.

**Conclusion**

The transition is the best time for Indigo Flycatcher to hunt. The garbage dump is the location most visited by the Indigo Flycatcher. Morning becomes the best time for location A, which becomes semi-open area, while afternoon becomes the best activity time for location C. The sailing and gleaning are the most used hunting method by Indigo Flycatcher.

**Acknowledgment**

We thank all of Tahura R. Soeryo rangers and local people that help on fieldwork. We thank to staff of Tahura R. Soeryo and all members of Foresters for research permit and advices.

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