Study of pecking behavior of birds at selected sites of Peshawar City, KPK, Pakistan.

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Abstract

The current study was intended to know different aspects of the foraging behavior of birds in three different sites situated at Peshawar. The first site (S1) was Pakistan forest Institute Peshawar, the second site (S2) was Agriculture University Peshawar and third site (S3) was Bacha Khan International Airport Premises. The studies were conducted during September 2022 for a week at morning and evening times. A total of 9, 8 and 3 bird species were observed in the above mentioned three fields, that is, S1, S2 and S3, respectively. Different patterns of birds pecking rate were recorded correlation revealed a significant ($p < 0.01$) association between search time and number of pecks of birds in all three fields.

Keywords: Birds, foraging behavior, pecking rate, Peshawar, Correlation.

1. Introduction

Birds (Class Aves) are endothermic vertebrates that exhibit a variety of behaviors [1]. About seven hundred and sixty-seven species of birds been reported in Pakistan [2]. All birds exhibit foraging behavior for survival in the ecosystem [3] and this indicates how they are able to change their habits during their search for food. To a large extent, their behaviors determined by the type of food available. Different types of techniques and strategies may be applied by them to acquire the same food depending upon the situation [4]. A foraging animal acting optimally should leave a patch when its intake rate in the patch equals that of the habitat as a whole [5]-[7]. The basic patch model [7] predicts that an animal only maximizes energy intake rate while foraging in a patch [5], however, developed a model that accommodates costs that could affect intake rate: such costs include energetic costs (C) and predation costs (P: how much a forager should demand, in terms of energy for risk-taking while foraging) as well as the missed opportunity cost (MOC: alternative activities forgone while foraging). In his theory, he states that an optimal forager should leave a patch when its quitting harvest rate no longer outweighs the costs incurred while foraging. H = C + P + MOC, where H is the quitting harvest rate, which can be measured using the amount of food an animal leaves in a patch after foraging (giving-up density GUD; [5]).

Several studies have related reproductive success of birds [8,[9][14] and behaviors exhibited while foraging [8][13] to overall food availability in the environment. Observed individual differences in foraging behavior may be used to assess food availability in an environment [8], so the optimal behavior of a foraging bird should reflect the nature of its habitat [13]: individuals in good habitats should act differently from those experiencing poor conditions. The risk of predation increases with feeding activity and the gains while foraging decline over time, as a patch is depleted by foraging activity [13]. An individual's behavior will therefore be affected by predation risk and will be a tradeoff between energy gain and safety [8]. Birds may perceive cover as safety, while open areas are viewed as risky [13], although cover may also conceal ground predators [10][11]. On the other hand, increased thermoregulatory costs as a result of high temperatures may result in a retreat to cover.

Birds exposed to high temperatures frequently minimize their exposure to heat and the demands of evaporative cooling by seeking shade [[18]. Foraging birds are therefore likely to retreat to cover during high temperatures to reduce excessive water loss [[16].

2. Materials and methods

This study area is constituting a wide range of habitats in the form of agriculture fields, Building and lush green lawns. It also includes botanical garden and rose garden which is a home to a diverse range of bird species.

The area was divided into three study sites to investigate the foraging behavior of birds. The first site (S1) was Pakistan forest Institute Peshawar, the second site (S2) was Agriculture University Peshawar, and third site (S3) was Bacha Khan International Airport Premises. Bird stay observed was directly proportional to the availability of food which in turns increase birds sitting time.

Other tools used for observation included a stopwatch, digital camera, notebook and field guides. The search time for each bird was calculated using the following equation. Birds search time = birds departure time – birds arrival time. All times were noted in seconds (sec).

Statistics

Correlation was set significant at the level of 0.05 (2-tailed). The analysis was performed using IBM SPSS statistics (version 20) and Microsoft Excel 2019.

3. Results and Discussion

At S1, a total of 9 bird species were observed foraging, while at S2 and S3, 8 and 5 species were recorded, respectively. The overall frequency of visiting birds was highest (151) for S1 in the morning and it was the lowest (47) in the evening for the three selected fields. Considering S2, more birds visited it in the evening as compared to morning. Considering S3, birds visited the field more frequently in the morning time. The rate of pecking by birds can be related to the frequency of visiting birds. The highest mean pecking rate was observed as 20.4 for S1 in the morning time, while the minimum meanvalue was 8.5 in the evening. However, for S2, the mean pecking rate was almost the same at both morning and evening times. At S1, search time was comparatively lower than all other fields at both times of observation. The highest search time (188.57 sec) was observed at S2, while the lowest time, that is, 50.79 sec was observed at S1 in the morning. Clear differences were found between the duration of search time at morning and evening for the first two fields, while at S3 the duration of search time was almost the same at both times of the day.

Figure 1: Corvus brachyrhynchos observed at Site A

Table 1: Observed Bird Diversity at The Three Sites

Fields	Scientific name of Birds Observed
S1 (Pakistan forest Institution Peshawar)	Passer domesticus
	Corvus splendens
	Pycnonotus cafer
	Acridotheres tristis
	Columba livia
	Upupa epops
	Streptopelia senegalensis
	Saxicoloides fulicata
	Turdoides caudatus
S2 (Agriculture University Peshawar)	Turdoides striatus
	Dicrurus macrocercus
	Streptopelia senegalensis
	Acridotheres tristis
	Passer domesticus
	Prinia crinigera
	Corvus splendens
	Upupa epops
S3 (Bacha Khan International Airport)	Corvus splendens
	Passer domesticus
	Upupa epops
	Acridotheres tristis
	Columba livia

Table 2: Search time and number of pecks by birds

Fields	Time of Observation	Search Time vs. No. of Pecks(r_s)	Significance (p)
S1	Morning	0.702**	<0.01
	Evening	0.477**	<0.01
S2	Morning	0.699**	<0.01
	Evening	0.837**	<0.01
S3	Morning	0.895**	<0.01
	Evening	0.854**	<0.01

**Correlation is significant at the 0.01 level (2-tailed)

Figure 2: Spilopelia senegalensis observed at Site B

Figure 3: Upupidae observed at Site B

Figure 4: Acridotheres tristis observed at Site B

4. Conclusions

Bird stay observed was directly proportional to the availability of food which in turns increase birds sitting time. There was also a direct relationship between search time and number of pecks by birds. The data collected from all the three fields indicated the presence of a significant ($p < 0.01$) correlation between search time and number of pecks. S1 Pakistan forest Institution Peshawar, S2 Agriculture University Peshawar, S3 Bacha Khan International Airport is a stable ecosystem that houses a wide diversity of birds. In S1, S2 and S3 a total of 9, 8 and 5 bird species respectively. In summary, our investigation demonstrated that the foraging behavior of birds is not constant; indeed, they depict a diversified feeding behavior that depends on the nature of the microhabitat, predation risk and the abundance of vegetation. More food, dense vegetation and less predation risk are responsible for a longer span of stay time that leads to an increased pecking rate

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