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Comparative study of diet of Indian eagle owl *Bubo bengalensis* from two distinct habitats

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Abstract

A comparative study was carried out on the diet of the Indian Eagle Owl *Bubo bengalensis* from two habitats, forest habitat of Melghat Tiger Reserve, and Agricultural area near Amravati City, Maharashtra, India during April 2012 and April 2013. Regurgitated pellets of this owl were analysed to understand the dietary composition and find out the variation in its food habits. The diet mainly comprised small mammals such as *Suncus murinus* (36.84%), *Millardia meltada* (31.50%) and *Bandicoota bengalensis* in forest habitat whereas *Tatera indica* (50%) and *Mus species* (40%), (showed to be acting as biological pest controller) in agricultural habitat. Shannon's index was found to be more in forest habitat (2.42) than in agricultural habitat (1.61) indicating more generalized food habits.

Keywords: *Bubo bengalensis*, Melghat Tiger Reserve Owl pellets, Owl prey.

1. Introduction

The Genus *Bubo* contains some of the world's largest species of owls. Most if not all of which are tertiary consumers and excellent indicators of ecosystems they inhabit. The Indian Eagle Owl *Bubo bengalensis* is also known as the Indian Great Horned Owl, Bengal Eagle Owl, Rock Horned Owl and Rock Eagle Owl, and till recently considered a subspecies of *Bubo bubo* [1].

It is resident and occurs in outer Himalayan foothills of North Pakistan and Indus Valley, Outer ranges of South Kashmir (around Srinagar), along outer Himalayas and adjacent plains east to Nepal, Bihar and Southwest West Bengal throughout Peninsula; lowlands mostly below 1500m, occasionally to 2400m. It is reported local in rocky low hills and ravines, also in semi desert, Deciduous, disturbed or secondary woodlands, and even orchard or near villages [2]. This nocturnal predator and endemic resident is not presently included in any of the threatened categories of the IUCN Red Data Book (2010). The Indian Eagle-Owl has received scant attention in the past [1, 3-5], and its population status is unknown [6].

Owl pellets are accumulations of the undigested portions of prey which are regurgitated and ejected through the mouth in compact units. Owl pellet analysis serves two primary purposes. Foremost, pellet analysis serves as a nondestructive means of diet determination [7, 8]. Obtained diet information can include prey species eaten [9-15], preferences of prey species [16-18] and estimates of contributions of prey biomass. Owl pellet analysis also is a useful method for gaining additional insight into small mammal communities and distribution [19-21].

Published reports on this bird are limited to descriptions of calls and diet [22-25]. Study areas reported till now, are human habitations [1, 25] and agricultural croplands [26], however no comparative study has been done to evaluate the prey preferences of these owls in two different habitats viz. Agricultural habitat and Forest habitat. Hence this study tries to evaluate comparatively the changes in prey preferences in above mentioned habitats.

2. Materials and Methods

The present study was carried out in Melghat Tiger Reserve (MTR), Amravati, Maharashtra which lies between 21°29.96'N and 077°12.338'E coordinates. MTR is located at southern offshoot of Satpura hill range in Central India also called as Gawilgarh hill range in Maharashtra. The forest area of MTR is tropical dry deciduous, dominated with teak plantations (*Tectona grandis*). Pellets of the Indian Eagle owl of forest habitat were collected from a roosting site (G.P.S. Location – 21°36.758' N, 077°06.812' E) which was a cliff in the

Bhanvar Nala near Chourakund in Melghat Tiger Reserve during summer 2011 (March to May) and summer 2012 (March to May).

Pellets of the Agricultural habitat owl were collected from a roost site (G.P.S. Location – 20°96.595' N, 077°78.607' E) during March 2014 which is a cliff created by a stone crusher industries in Rahatgaon which is 6 KM from Amravati city (GPS location-20°57.13'N, 077°45.13'E), the roost is surrounded by a cropland area which also has human inhabitations nearby.

Total 46 Pellets were collected, bagged and kept in an oven at 70° for 24 h in order to kill infesting insects and then stored. Later, the pellets were subjected to NaOH treatment and the osseous and chitinous pellet contents were separated and then washed for further identification [27]. Different food remnants like bones, feathers and insect parts were cleaned under a dissecting microscope from a disentangled content of owl pellets.

The diet composition of the Indian Eagle owl was studied by the analysis of materials found in the pellets. The skull, cranial bones and the dentary bones were used to identify the small mammals upto the species level. The identity of small mammals was further confirmed by one of the author (SST). The Insect identification was carried out with the help of their chitinous remnants found in the pellets of this owl in our own laboratory [28-31].

Magurran (1988) [32] was followed to assess and compare the diversity in the diet of two owl species by using Species richness (S), Shannon's index (H) and Evenness index (E).

RESULTS –The Length and Width of pellets were measured using Vernier Caliper. The pellet (n=20) of the Indian eagle owl was found to be 4.40±0.37 cm in length and 2.6±0.19 cm in width from forest habitat while 4.15±0.65 cm in length and width 2.7±0.2 cm in width from agricultural habitat. The average dry weight of the pellet was found to be 5.48±1.96 grams from forest habitat 5.82±2.66 grams from agricultural habitat. The regurgitated pellet consisted of hair, small pieces of vertebrate bones. However some of this material was so crushed that it was very difficult to identify the taxa to which they belonged. Vertebrate bones found in the Owl pellet, formed the basis of identification of small mammals. The following taxa of small mammals viz. *Rattus species*, *Rattus rattus*, *Millardia meltada*, *Mus booduga gray*, *Suncus species*, *Suncus murinus*, *Millardia species*, *Muridae species*, *Berytelphusa species*, *Tatera indica*, *Mus species*, *Bandicota bengalensis*, *Golunda ellioti*, could be recorded. One sample each of Unknown Bird (*Aves*) and Unknown Snake (*Reptile*) were also recorded. On the basis of remnants, insects belonging to the order Coleoptera (Beetles) were recorded from the pellets.

Table 1: Comparative Picture of Prey Frequencies (%) and biomass (%) consumed by Indian eagle owl in two consecutive summer seasons from Melghat Tiger Reserve, India

Prey Items	Forest Habitat		Agricultural Habitat	
	% Relative Abundance	% Biomass	% Relative Abundance	% Biomass
<i>Rattus species</i>	5.88	12.58	-	-
<i>Rattus rattus</i>	8.82	12.58	8.33	14.39
<i>Millardia meltada</i>	35.29	13.83	16.66	7.91
<i>Musbooduga gray</i>	2.94	0.36	8.33	1.25
<i>Suncus species</i>	14.70	0.26	-	-
<i>Suncus murinus</i>	23.52	16.77	-	-
<i>Millardia species</i>	5.88	2.09	-	-
<i>Muridae species</i>	8.82	2.51	16.66	5.75
<i>Berytelphusa species</i>	5.88	1.57	-	-
<i>Tatera indica</i>	2.94	2.62	50	53.97
<i>Mus species</i>	8.82	1.13	33.33	5.18
<i>Bandicota bengalensis</i>	23.53	26.84	8.33	11.51
<i>Golunda ellioti</i>	2.94	1.25	-	-
<i>Unknown Bird</i>	2.94	0.31	-	-
<i>Unknown Snake</i>	2.94	5.24	-	-
<i>Coleoptera</i>	14.70	-	16.66	-

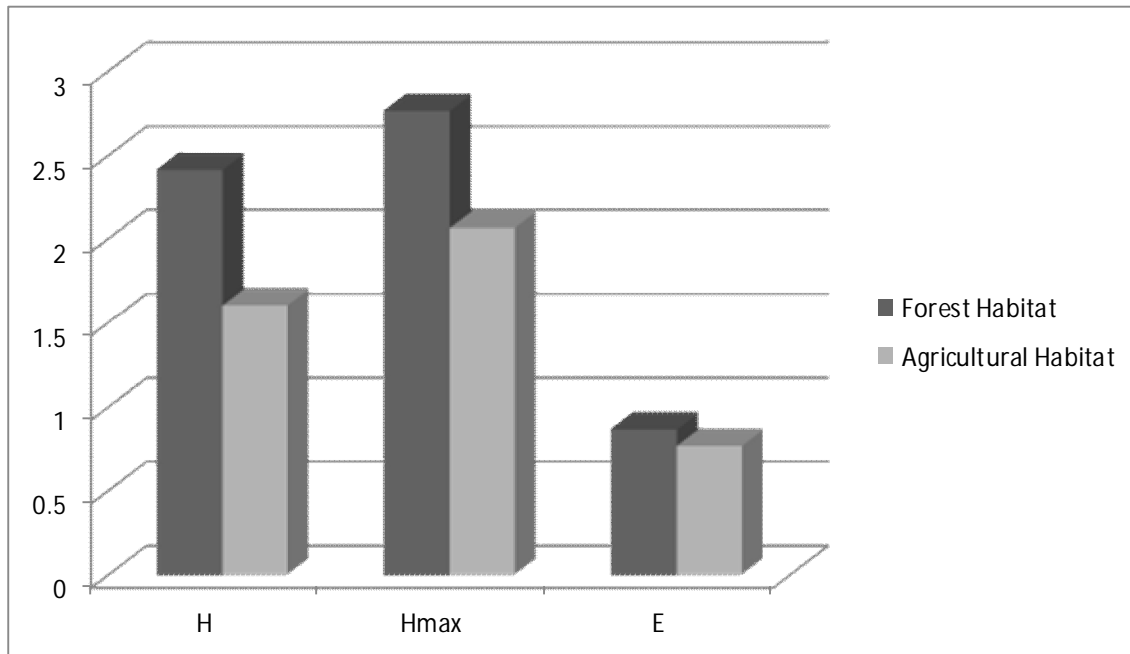


Fig 1: Comparative Prey diversity and evenness in the diet of Indian Eagle Owl in two consecutive summers.

(H –Shannon's Index, Hmax - Maximum diversity possible, E - Evenness.)

The Shannon's diversity index was found to be 2.4 in forest habitat and 1.6 in agricultural habitat, the evenness index was found 0.87 in forest habitat and 0.77 in Agricultural habitat.

3. Discussion

According to Pande and Dahanukar (2011) [26] the Indian Eagle Owl is a dietary generalist, which concurs with published literature [1,5]. Their study showed the abundance and total biomass of different groups of prey in the diet wherein the rodents were the most preferred prey followed by birds and bats. They also observed that abundance of insect prey was very high. In the present study also rodents comprised major portion (84.48%) of diet which is in corroboration with the study of Pande and Dahanukar (2011) [26]. It was observed that crabs (3.44%), birds (1.72%) and snakes (1.72%) formed very little portion of the diet. Insects (9.61%) also showed less abundance and no bat remnants were found at all in the pellets. Ramanujam (2006) [1] observed that in Forest habitat coleopterans comprised very little proportion in the owl diet (0.24%) suggesting Coleopterans the chance food, but in the present study we found coleopterans comprised sufficient portion (9.61%) of the owl diet. Pande and Dahanukar (2011) [26] recorded more insects in the Indian Eagle owl diet (25.91%) from agricultural habitat, however in the present study we found comparatively less proportion of insects in the diet (16.66%) of owls inhabiting the same habitat.

Birds and Reptiles have been listed as prey items in the diet of the Indian eagle owl [1, 25, 26] but no Crab remnants are reported in the Indian Eagle owl diet. However in the present study we found that crabs of unidentified species formed a small portion of the diet (5.88%) in the forest habitat, this may be due to presence of the roost site near water body.

From the present study it is observed that Indian Eagle owl can be considered as biological pest controller in agricultural habitat as it preys majorly upon *Tatera indica* (50%) and *Mus species* (33.33%) which are agriculturally important pests [33, 34]. Thus Indian eagle owl in the forest habitat showed more generalized hunting habits as abundance of most of the prey species was observed in its diet.

Hence it can be concluded that Indian Eagle owl is a dietary generalist relying mostly on the rodents for their food and thus serves an important role of biological pest controller in agricultural habitat. However due to greater availability of food and variations in forest habitat, it exhibited more diverse food habits in the forest habitat as compared to Agricultural habitat.

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