



Occurrence Of Raptors from Irrigated and Rainfed Agricultural Landscapes of Solapur District (MS), India

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ABSTRACT

Considering biodiversity, India is one of the most biodiverse countries in the world with more than 13% of the world's total bird species in the Indian subcontinent. The specialty of India's Deccan Peninsula is the vast grasslands and savannah ecosystems with 33% EBA and 31% IBA. Solapur district is part of Deccan peninsula having its unique bird diversity. The grasslands of the district are an ideal habitat for many winter migrant raptors like harriers and falcons. However, Due to tremendous anthropogenic pressure such as agricultural intensification, changing crop patterns, over-grazing and rapid urbanization, these natural landscapes have been depleting for the past few decades which ultimately affects the population of many of the wintering birds. Present study deals with the occurrence of raptors from irrigated and rainfed agricultural parts of Solapur district. In the study, season-wise bird census was conducted in which, a total of 121 birds of prey recorded belonging to 3 orders, 3 families and 13 species.

Keywords: *Raptors, irrigated agriculture, rainfed agriculture, changing landscapes, anthropogenic pressure, Solapur district*

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Introduction

India is a mega-biodiversity country of the world with having 13% of the world's total bird species recorded till date [7, 10]. Amongst various ecosystems, grasslands are the one of the major ecosystems that spread over the largest part of Deccan peninsula. Though it is considered that the biodiversity is poor in Deccan peninsular habitats, one-third (33%) of the total 'Endemic Bird Areas' and 'Important Bird Areas' (31%) area falls in dry areas of this region. Solapur district falls under Deccan peninsula and it has its unique avian diversity [8]. Grasslands of Solapur district provides ample food and roosting sites for many wintering migratory raptors such as harriers and falcons. Due to tremendous anthropogenic pressure, these natural lands have been depleting for the past few decades which ultimately affects the population of many of the wintering birds. Being the top predator, birds of prey play an important role in ecosystem. As a biological controller they control the population of primary consumers such as rodents, insects, reptiles, birds etc., and maintain the ecological balance of ecosystems [9]. The density of predators always depends on food resources [4]. The current study deals with the observations of the birds of prey from irrigated and rainfed areas of district.

Study Area

Geographically, Solapur is located between 17.10 to 18.32 degrees north latitude and 74.42 to 76.15 degrees east longitude. The soil in the district is mainly derived from Deccan belt and is classified into three types of black soil, grey soil and red soil. Agriculture is the mainstay of the district's economy, so most of the land is under cultivation. Though the weather in the district is dry, the western part of the district is relatively dry more than the eastern part. Daily temperature ranges between 30°C to 35°C and minimum between 18°C to 21°C with the highest (47°C) temperature recorded in the month of May. The average annual rainfall is registered 510 mm.

MATERIAL AND METHODS

For present study, total of 30 sites have been selected, in Irrigated (15) and Rainfed (15) areas from Sangola, Mangalwedha, Pandharpur, Mohol and South Solapur tehsils of the district. The visual encounter method was used in bird census. The birds were counted only during favorable weather conditions. The census was avoided during high winds as it reduces the visibility and traceability of species and it was

conducted when the birds were very active between 0600 and 0900 INDIAN Standard Time. All transects were censused every season. The visual encounter survey period was 20 to 60 minutes. Identification of species was carried out by using field guides 'The Book of Indian Birds' (Ali 2012) and 'Birds of the Indian Subcontinent: India, Pakistan, Sri Lanka, Nepal, Bhutan, Bangladesh and the Maldives' (Grimmett et al., 2016). Field information such as date, time, weather, longitude latitude, height, bird number, bird distance from observer, action, gender and habitat comments were accurately recorded in the data sheet. Garmin etrex 10 GPS device was used to get accurate coordinates. The birds were spotted with the help of 8 x 40 Olympus and 10 x 50 Nikon field binoculars. Images were shot with Canon EOS 70D camera, Canon EF 55-250mm IS, Canon EF 18-135mm IS and Canon EF 400mm lens.

RESULTS

A total of 121 individuals of raptors belonged to 3 orders (Accipitriformes, falconiformes and Strigiformes) and 3 families (Accipitridae, Falconidae and Strigidae) and 13 species Common Kestrel *Falco tinnunculus* (CK), Red-headed Falcon *Falco chicquera* (RHF), Laggar Falcon *Falco jugger* (LF), Peregrine Falcon *Falco peregrinus* (PF), Black-winged Kite *Elanuscaeruleus* (BWK), Black Kite *Milvusmigrans* (BK), Oriental Honey-buzzard *Pernisptilorhynchus* (OHB), Short-toed Snake-eagle *Circaetusgallicus* (STSE), Pallid Harrier *Circus macrourus* (PH), Montagu's Harrier *Circus pygargus* (MH), Shikra, Tawny Eagle *Aquila rapax* (TE) and Spotted Owlet *Athenebrama* (SO) have been reported from irrigated and rainfed agricultural landscapes of district during the survey (**Table 1**).

Table 1: Checklist of Raptors from Irrigated and Rainfed Agricultural Landscapes of Solapur district

Sr. No.	Order	Family name	Common name	Scientific name	HC	IRC	MS	WC	Sites	Obs.	Count
1	Falconiformes	Falconidae	Common Kestrel	<i>Falco tinnunculus</i>	F	LC	M	Sch IV	10	13	22
2	Falconiformes	Falconidae	Red-headed Falcon	<i>Falco chicquera</i>	F	NT	R	Sch I	2	2	5
3	Falconiformes	Falconidae	Laggar Falcon	<i>Falco jugger</i>	O	NT	R	Sch IV	1	1	1
4	Falconiformes	Falconidae	Peregrine Falcon	<i>Falco peregrinus</i>	F	LC	LM	Sch I	1	1	1
5	Accipitriformes	Accipitridae	Black-winged Kite	<i>Elanuscaeruleus</i>	F	LC	R	Sch IV	12	13	17
6	Accipitriformes	Accipitridae	Black Kite	<i>Milvusmigrans</i>	G	LC	R	Sch IV	4	4	5
7	Accipitriformes	Accipitridae	Oriental Honey-buzzard	<i>Pernisptilorhynchus</i>	F	LC	R	Sch IV	1	1	1
8	Accipitriformes	Accipitridae	Short-toed Snake-eagle	<i>Circaetusgallicus</i>	F	LC	R	Sch IV	9	13	20
9	Accipitriformes	Accipitridae	Pallid Harrier	<i>Circus macrourus</i>	O	NT	M	Sch IV	13	16	22
10	Accipitriformes	Accipitridae	Montagu's Harrier	<i>Circus pygargus</i>	O	LC	M	Sch IV	11	15	22
11	Accipitriformes	Accipitridae	Shikra	<i>Accipiter badius</i>	G	LC	R	Sch IV	1	1	2
12	Accipitriformes	Accipitridae	Tawny Eagle	<i>Aquila rapax</i>	F	VU	R	Sch IV	1	1	1
13	Strigiformes	Strigidae	Spotted Owlet	<i>Athenebrama</i>	G	LC	R	Sch IV	1	1	2

*HC: Habitat Category, IRC: 2017 IUCN Red List category, MS: Migratory Status, WC: WPA (Wildlife Protection Act, 1972) Category; FH: Feeding Habit; Obs.: number of observations

Accipitriformes was the most dominant order (8, 62%) followed by Falconiformes (4, 31%), Strigiformes (1, 7%). Accipitridae was dominant family (8, 62%) followed by Falconidae (4, 31%), Strigidae (1, 7%). All species were carnivorous except OHB which feeds mostly on insects and larvae of honey-bees. Three species were obligatory (Laggar Falcon, Pallid Harrier and Montagu's Harrier), 3 (Black Kite, Shikra and Spotted Owlet) were generalists whereas 7 species (i.e. Common Kestrel, Red-headed Falcon, Peregrine Falcon, Black-winged Kite, Oriental Honey-buzzard, Short-toed Snake Eagle and Tawny Eagle) were facultative. RHF, PH and LF fall under near threatened category of IUCN red list, 2017, TE is the only vulnerable whereas 9 species were least concerned. PF is the only local migrant species whereas PH, MH and CK are winter migrants and remaining 9 species were resident in Indian Plains. PF and RHF are listed as Schedule-I (Sch-I) species under Wildlife Protection Act (WPA)- 1972 by Government of India while

remaining 11 species falls under Sch-IV category (**Table 1**). PH was the most occurred (13 sites) species followed by BWK (12), MH (11), CK (10), STSE (9), BK (4) and RHF (2). Remaining six species occurred only one out of 30 study sites. PH, MH, CK were the most abundant species (22) followed by STSE (20) and BWK (17) while the lowest abundance (1) was of PF, OHB, LF and TE. (**Table: 2**)

Table 2: Site-wise occurrence of raptors in irrigated and rainfed agricultural areas of Solapur district

Land	ID	Lat	Long	RHF	PF	TE	STSE	LF	OHB	CK	MH	PH	BK	Shikra	BWK	SO
RA	P1	17.33484	75.58509	-	-	-	-	-	-	✓	✓	✓	-	-	-	-
RA	P2	17.41119	75.36959	✓	-	-	-	-	-	✓	✓	-	-	-	-	-
RA	P3	17.28338	75.09772	-	✓	-	-	-	-	✓	-	-	-	-	✓	-
RA	P4	17.31153	75.33289	-	-	-	✓	-	-	✓	-	✓	-	-	✓	-
RA	P5	17.46333	75.09734	-	-	-	✓	✓	-	-	-	✓	✓	-	-	-
RA	P6	17.47881	75.3243	-	-	-	-	-	-	✓	✓	✓	-	-	✓	-
RA	P7	17.49401	75.3128	-	-	-	✓	-	-	s✓	✓	-	-	-	-	-
RA	P8	17.31952	75.3758	-	-	-	-	-	-	-	✓	✓	-	-	-	-
RA	P9	17.40855	75.47109	-	-	-	-	-	-	-	✓	-	-	-	-	-
RA	P10	17.34257	75.49153	-	-	-	-	-	-	-	-	✓	-	-	-	-
RA	P11	17.53999	75.45725	-	-	-	-	-	✓	-	✓	✓	-	✓	✓	-
RA	P12	17.53076	75.41666	-	-	-	-	-	-	-	-	-	-	-	✓	-
RA	P13	17.52595	75.3538	-	-	-	-	-	-	-	-	✓	-	-	✓	✓
RA	P14	17.46196	75.183	-	-	-	-	-	-	-	-	-	-	-	-	-
RA	P15	17.44236	75.55258	-	-	-	-	-	-	-	-	-	-	-	-	-
IA	P16	17.73944	75.6303	-	-	-	-	-	-	-	-	✓	-	-	✓	-
IA	P17	17.66451	75.72741	-	-	-	✓	-	-	-	-	-	-	-	-	-
IA	P18	17.69644	75.81397	-	-	-	-	-	-	-	✓	✓	-	-	-	-
IA	P19	17.77608	76.04808	✓	-	-	-	-	-	✓	✓	-	-	-	-	-
IA	P20	17.83294	76.03565	-	-	-	✓	-	-	✓	✓	-	✓	-	✓	-
IA	P21	17.71208	75.86717	-	-	✓	-	-	-	-	-	✓	-	-	✓	-
IA	P22	17.79303	75.74615	-	-	-	✓	-	-	✓	✓	-	-	-	-	-
IA	P23	17.65705	75.62201	-	-	-	✓	-	-	-	-	-	-	-	-	-
IA	P24	17.61523	75.69063	-	-	-	✓	-	-	✓	-	✓	-	-	-	-
IA	P25	17.67258	75.96875	-	-	-	✓	-	-	-	-	-	✓	-	-	-
IA	P26	17.60748	75.4571	-	-	-	-	-	-	-	-	-	-	-	✓	-
IA	P27	17.59651	75.63956	-	-	-	-	-	-	-	-	-	-	-	✓	-
IA	P28	17.54247	75.54539	-	-	-	-	-	-	-	-	✓	✓	-	-	-
IA	P29	17.60022	75.5905	-	-	-	-	-	-	-	-	-	-	-	✓	-
IA	P30	17.68269	75.64572	-	-	-	-	-	-	-	-	-	-	-	-	-

*RA: Rainfed Agriculture; IA: Irrigated Agriculture

DISCUSSION

The total availability of food in the rainfed landscape was found to be lower than the irrigated landscape of the study areas. It has been reported in previous studies that irrigated agricultural habitats have an abundance of insect fauna that attract many insectivorous bird species [3-6]. PH and MH are sympatric species with little difference in diet. PH is vole specialist species that mainly feed on small rodents such as field rats, mice etc., whereas MH is a bit generalist species which can feed on insects, rodents, small reptile and even on small ground nesting birds like Larks [7-9]. Both species have shown their occurrence mostly in irrigated landscape. PF, OHB, LF and TE had shown lowest occurrence during the study. PF, LF and TE mostly prefers drier habitats (Naorji & S but most of drier landscapes have been converting in cash crop cultivations and fruit orchards that have affected on the population of these species. Changing landscape negatively effect on population of prey birds was reported in South American forests where due to deforestation, population of Harpy Eagle (*Harpiharpyja*), Crested Eagle (*Morphnus guianensis*), and Orange-breasted Falcon (*Falco deiroleucus*), has declined so rapidly that these species are now listed under Near Threatened globally and extinct or endangered regionally [10]. According to the IUCN, changing landscapes due to agricultural expansions and increasing pressure of

livestock grazing on natural lands leading 83% of raptors which are listed under near threatened category, are actually under threat [11,12].

CONCLUSION

It can be concluded that rapid conversion of open landscapes in croplands and orchards is a serious threat for wintering raptors of Solapur district. There is a need to conduct a detailed study on migrant as well as resident raptors in Solapur district.

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