

**PRELIMINARY OBSERVATIONS ON THE ECOLOGY OF  
HARRIERS (*CIRCUS* SP.) ROOSTING AT HESSARGHATA,  
NORTH BANGALORE IN KARNATAKA, SOUTH INDIA  
WITH SPECIAL REFERENCE TO EURASIAN MARSH HARRIER  
(*CIRCUS AERUGINOSUS*)**

ASHOK VERMA\*

### Introduction

Harriers (*Circus* sp.) are migratory diurnal raptors found widespread across India (Ali and Ripley, 1983; Grimmett *et al.*, 1998). They are open country raptors preferring grasslands, wetlands, fallow lands and crop fields especially paddy fields. There are six species of harriers occurring in India in winter namely Pallid (*Circus macrourus*), Hen (*C. cyaneus*), Montagu's (*C. pygargus*), Pied (*C. melanoleucos*), Eurasian Marsh (*C. aeruginosus*) and Eastern Marsh (*C. spilonotus*) harriers (Simmons, 2000). Harriers start arriving in India by early August, remaining till April however most of them migrate back by March (Verma, 2002b). They probably migrate to India from Central Asia evidenced by an individual harrier banded at Keoladeo National Park, Rajasthan which was found in Kazakh, SSR (Ali and Ripley, 1983) however there is extremely little information about their exact origin to the country. One of the peculiar characteristics of harriers is their communal roosting in their wintering grounds (Newton, 1979; Cramp and Simmons, 1980). They roost on the ground mostly in vegetations like grasses, reeds, crop fields and also on floating aquatic vegetation like water

hyacinth *Eicchornia crassipes* and occasionally on bare grounds in adverse conditions. Among other peculiarities of harriers are their being polygyny in nature, long distance foraging, and acute hearing capacity like owls (Simmons, 2000; Rice, 1982).

India is known as the largest wintering ground for harriers in the world where over 3,000 harriers have been recorded roosting at Blackbuck National Park, Velavadar, Gujarat (Clarke *et al.*, 1998). Harrier roosts so far recorded in the country include Rollapadu Wildlife Sanctuary (Rahmani and Manakadan, 1987) and Alwal (Ganesh and Kanniah, 2000) and ICRISAT grassland (personal observation) in Andhra Pradesh, Velavadar National Park (Clarke *et al.*, 1998) in Gujarat, Keoladeo National Park (Verma, 2002a) and Tal Chhaper Wildlife Sanctuary (pers. obs) in Rajasthan, Akola grassland (Verma, 2005) in Maharashtra and Hessarghata grassland in Karnataka (present obs.). All these sites are known to hold mixed flocks of harrier species. Two sites identified recently in 2003-2004 at Mumbai in Maharashtra and at Madiwala Lake, Bangalore in Karnataka (pers. obs) are exclusive roosts of Eurasian Marsh Harriers.

---

\* Wildlife Institute of India, Chandrabani, Dehra Dun (Uttaranchal)

### Methods and Study Area

Information on the existence of grasslands and reed beds in the past and present were collected through literature, especially journals and gazetteers and by consulting local birdwatchers and authorities in the University on the related subjects. Selected sites with potential harrier roost habitats were then surveyed for harrier roosts. At each site, observations lasted till sunset when harriers start congregating for roosting. Similarly, the present roost was located. Two harriers which flew past one such potential roost habitat were followed for two consecutive days (30 - 31 December 2004) thus enabling the exact location of a congregation of harriers in a fodder grassland near Hessarghata Lake, Hessarghata.

Observations on roosting harriers were carried out about two hours before sunset till they roosted in the evening and one hour before sunrise till their departure from the roost. Vantage points were selected for carrying out roosting observations so as to scan the whole area. For estimating roosting population, harriers were counted in flights arriving towards roost (Bildstein, 1979; Fuller and Mosher, 1981; Verma, 2005). Books by Ali and Ripley (1983) and Grimmett *et al.* (1998) were referred for species identification. Information on age and sex class of harriers was collected while counting them in flight and when perched in open on ground prior to roosting.

The quadrat method (Muller-Dombois and Ellenberg, 1974) was used to sample roost habitat. A total of 25 plots of 1m x 1m were laid down randomly both at roost and non-roost site to collect information

on grass height. Information was also collected on grass phenology, distance of roost from road, water body, and nearest tree.

Fresh pellets were collected from the individual roosts of harriers in the morning after harriers had left for foraging which were later dried up and dissected to segregate remains of prey species consumed by harriers. A pellet is a compact solid mass of undigested parts of prey species i.e. bones, teeth, feathers, hair or fur, scales and also chitin consumed by harriers which do not pass through anus to form excreta instead they are retained in the stomach to be specific gizzard for a period, and egested through mouth before resuming foraging.

The study area was located at Hessarghata (13° 09' N and 77° 28' E, elevation 862m) *ca.* 30 km North of Bangalore in southern Karnataka (South India). It was a grassland of about a square kilometre forming harriers' roost habitat. The area belonged to the Central Cattle Breeding Farm (also known as Indo-Danish Farm), Hessarghata. The grassland was also being maintained as fodder seed bank. It was situated away from human habitations and was about half a kilometre from a lake called 'Hessarghata Lake'. There were number of such water bodies located around the roost which probably attracted prey base to the harriers roosting especially for Eurasian Marsh harriers. The main crops of the area included paddy (*Oryza sativa*) and ragi (*Eleusine coracana*). Other arid crops grown in the region were avare (*Dolichos lablab*), groundnut (*Arachis hypogea*) and horse gram (*Dolichos biflorus*). The climate is tropical dry type having temperature between 20°C to 32°C in summer and 14°C

to 24°C in winter. The present study on roosting harriers took place from 1-6 January and 26-27 February 2005.

### Results and Discussion

**Roost habitat :** It was about a square kilometre open patch of grassland surrounded by trees. About half a kilometre towards the East was a lake called 'Hessarghata Lake' frequented by water birds. Also lying to its North around 100 m was a tar road being used by trespassers and vehicles. In fact, this grassland was being maintained for fodder production for cattle breeding at the farm and as fodder seed bank. The dominant grass species grown at the farm was *Chloris gayana* variety *Callide kotembora* (commonly called Rhodes grass) (> 95%) which provided roosting habitat for harriers. Of ca. 1 km<sup>2</sup> fodder grassland, 25% formed the roosting habitat having intact grassland, 40% had already been harvested and remaining was under irrigation.

Prior to roosting, harriers pre roosted on bare ground or on the harvested fields lying close to the roost site however few both Marsh (n=5) and Pallid (n=1) harriers pre roosted on trees (15- 25 m) also. The pellets collected from individual roost sites showed that harriers were roosting right close to the road unaffected by the trespassers and vehicles passing through.

Habitat sampling carried out in January showed that harriers used a dry grassland patch of 1.13 m (SD 0.37m) height spread over an area of 0.15 km<sup>2</sup> supporting 111 roosting harriers. During February the roost was shifted to another patch of grassland. The grass phenology did not affect harriers' habitat selection as

this time the harriers roosted in a green patch of grassland. They showed a preference towards taller grassland (0.57m, SD 25) again when compared with non roosting grassland patch (0.18 m, SD 10.6). The tall grasslands probably protected them from wind and predators. The distance of roost from nearest tree was recorded to be ca. 100 m. Trees in the roost site could attract avian predators like Owls which are known to hunt harriers and other smaller raptors (Weller *et al.*, 1955).

**Roost composition and harrier population:** Over 100 harriers of four species namely Eurasian Marsh (*Circus aeruginosus*), Montagu's (*C. pygargus*), Pallid (*C. macrourus*) and Hen (*C. cyaneus*) harriers roosted. The Eurasian Marsh harrier was the dominant species (Table 1). During January, an individual Hen harrier was also recorded roosting.

The roost counts made for six days in January showed a stable roosting population, however a decline was noted in February (Table 1). The maximum roosting population was recorded to be 111 in January which declined to 58 in February.

**Roost population structure :** The roost was dominated by adult harriers (69%, n=111). Further, males dominated the roost (42%) followed by juveniles (31%) and females (27%). In February, the roost was represented by two harrier species only. They were Eurasian Marsh (96%) and Montagu's harriers. Male Eurasian Marsh harriers showed an increase in numbers (50%) over females. In February also, the adult population was more (55%, n=76) than juveniles (Table 2). The decline in female population could be due to drying

Table 1

*Harrier roost counts made during January and February 2005 at Hessarghata.*

Harriers	01 Jan.	02 Jan.	03 Jan.	04 Jan.	05 Jan.	06 Jan.	26 Feb.	27 Feb.
Roosting population	94	97	96	98	97	111	79	58
Roost composition	-	77% MH, 15% MN, 7% PL	-	-	-	69% MH, 17% MN, 13% PL, 0.9% HH	96% MH, 4% MN	97% MH, 3% MN

MH= Eurasian Marsh Harrier, MN= Montagu's Harrier, PL= Pallid Harrier, HH= Hen Harrier

Table 2

*Roost composition and population structure of harriers at Hessarghata Roost, Bangalore during January/February 2005.*

Harrier Species	Male		Female		Juvenile		Unidentified		Total	
	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb
Eurasian Marsh harrier	30 (39%)	38 (50%)	18 (23%)	4 (5%)	29 (38%)	25 (33%)	-	9 (12%)	77 (69%)	76 (96%)
Montagu's harrier	10 (53%)	2 (67%)	6 (32%)	1 (33%)	3 (16%)	-	-	-	19 (17%)	3 (4%)
Pallid harrier	7 (50%)	-	5 (36%)	-	2 (14%)	-	-	-	14 (13%)	-
Hen harrier	-	-	1	-	-	-	-	-	1 (0.9%)	-
Total	47	40	30	5	34	25	-	-	111	79

up of water bodies in the region and hence waterfowls which are known to form their major diet (Verma, 2002b).

*Winter diet composition* : In all, 26 pellets were collected. The results from the pellets showed that the winter diet of harriers consisted of a wide spectrum of prey items

i.e. grasshoppers, reptiles, birds, rodents and eggs (Table 3). Birds were the major prey item followed by rodents and reptiles. In January, harriers preyed on wider variety of prey items than February (Table 3). Grasshoppers appeared in the diet during January only. The Common garden lizard (*Calotes versicolor*) was the

**Table 3**

*Diet composition of harriers recorded from the pellets collected at the Hessarghata Roost, Bangalore during January/February 2005.*

Pellet composition	No. of pellets 02 Jan	No. of pellets 27 Feb
Only birds	5 (29%)	4 (44%)
Only rodents	4 (24%)	3 (33%)
Only reptiles	2 (12%)	1 (11%)
Only grasshoppers	1 (6%)	-
Eggs and others	-	1 (11%)
Birds and rodents	1 (6%)	-
Birds and grasshoppers	1 (6%)	-
Rodents and grasshoppers	2 (12%)	-
Rodents, grasshoppers and reptiles	1 (6%)	-
<b>Total</b>	<b>17</b>	<b>9</b>

main reptilian diet of harriers recorded during these two months.

**Roosting behaviour :** Harriers showed a spectacular roosting behaviour. Prior to final roosting, they congregated in open ground or harvested fields close to the roost site. They spent time in resting, preening and occasionally on vocalization. It was just after sunset when almost all harriers had gathered they vacated their pre roosting sites moving towards roost in ones and twos. They searched the area intensively flying low number of times over the roost. While observing harriers early morning on 2nd January (5:30 am till 10:00 am) it was found that the first harrier got up about 15 minutes before sunrise at 6:20 am (sunrise; 6:35am) and thereafter within twenty minutes almost all had left the area in a quick succession dispersing in all

directions, mainly towards North and South, except two which flew off after sunrise at 6:50 am. All seemed to be heading in predetermined routes to their respective foraging sites except one which perched nearby on harvested field and later resumed foraging over the roost site and its adjoining areas around lake. It was later joined by another juvenile Eurasian Marsh harrier at around 9:00 am. In the evening, harriers started congregating by 3:30 pm with few harriers (n=4) in the beginning and reaching a peak just after sunset to 111 as recorded on 6th January. Eurasian Marsh harriers were the first to settle down into the grass for roosting (about 10 minutes before other harrier species) and Montagu's the last. All had roosted by 6:30 pm. It was noted that most of the harriers arrived after sunset in quick succession to the roost. The harriers arriving after the final roost were observed roosting on the periphery of the main roost gathering. However, one male Montagu's harrier having arrived late by 6:40 pm returned without roosting. On 26<sup>th</sup> February, due to total harvesting of the grass from the roost, the harriers had shifted from the previous roost to 100 m further in another similar grass species patch. This time the behaviour was different. They were quite vocal and got split in two groups roosting ca. 100 m apart. They showed much restlessness and reshuffling took place number of times between the two sites. All could roost finally by 6:50 pm. Similarly, roosting behaviour was shown by Eurasian Marsh harriers at Keoladeo National Park, Bharatpur in eastern Rajasthan (Verma, 2006).

### Conservation measures

Harriers being top avian predators

are reliable indicators of the health of the plains. The conservation of harriers at Hasserghata must receive priority also for following reasons :

1. The roost supports a fairly large gathering of wintering harriers and it forms a first published record for the region.
2. It is located in the southern limit of wintering distribution of harriers in India.
3. It supports a globally threatened species *i.e.* Pallid harrier (BirdLife International, 2000).
4. It is an example of how wildlife conservation can go hand in hand in man managed ecosystem.

To ensure survival of harriers, it is recommended that about one-fourth of this fodder grassland should be kept intact for roosting harriers till they depart for their breeding grounds. Alternatively, if the grassland has to be harvested, it should

only be carried out after another similar extent of grass patch becomes mature and tall enough to provide a protecting cover to harriers.

An immediate long term study should be taken up to understand harriers' ecological requirements and to better understand how these species respond to the factors affecting their population trends so as to ensure their long term survival in the region.

As harriers roost communally, they provide easy access to counting and assess their reproductive success, which is otherwise difficult in their breeding grounds where they scatter in wider and possibly in inaccessible areas (BirdLife International, 2003). Communal roosts are also easy source for pellet collection to obtain information about their winter diet and shifts in their diet which will be indirect indications of changes in our environment.

### Acknowledgements

The author thanks the Centre for Wildlife Studies and WCS – India Program, Bangalore, Natural Research Ltd. and Rufford Foundation, UK for supporting this harrier study in South India under which this observation was made. Thanks are also due to Dr. Vinod Mallik, University of Agricultural Sciences (Bangalore), Dr. Vinod Bhat, Department of Animal Husbandry and Dairying and Embryology Technology, and Dr. Ramesh (Hessarghata), Drs. T. Ganesh, R. Ganesan, Soubadra Dévi, ATREE, (Bangalore) for their cooperation and advice during the study. Grateful thanks are due to Dr. V.B. Mathur, Wildlife Institute of India, Dehra Dun for interest and encouragement. The Central Cattle Breeding Farm/Central Fodder Seed Production Farm, Hessarghata, (Bangalore) is gratefully acknowledged for permission to carry out research in their premises and for providing logistics, especially to Dr. Omkarappa and Mr. Narayanappa for their kind help.

### SUMMARY

**Harriers are widespread winter migratory raptors to India. A communal roost comprising of over 100 harriers was recorded at Hessarghata, North Bangalore (Karnataka) in South India during January 2005. Of six species of harriers reported wintering in India, four were**

found roosting here including globally threatened Pallid harrier. Eurasian Marsh harrier was the most dominant species at the roost. They took shelter in a fodder grassland patch belonging to a Cattle Breeding Farm every evening and deserted the area by early morning around sunrise. The pellets of harriers collected from the roost showed birds and rodents as their major prey in South Indian wintering ground. The paper also discusses about their population structure, winter diet, and roosting behaviour and suggests measures for their conservation.

हेसारघाटा, उत्तरी बैंगलोर, कर्णाटक, दक्षिणी भारत में बसेरा लेती पत्रियों (*सिर्कस* की जातियां) की पारिस्थिकी के बारे में, युरेशिआई दलदल पत्री (*सिर्कस एरूगिनासस*) के विशेष सन्दर्भ में,  
कुछ प्रारम्भिक पर्यवेक्षण

अशोक वर्मा

सारांश

पत्री भारत वर्ष में दूर-दूर तक फैले सर्दियों में प्रजनन करने वाले शिकारी पक्षी हैं। इनका एक सामुदायिक बसेरा, जिसमें 100 से ज्यादा पक्षी थे दक्षिणी भारत में हेसारघाटा उत्तरी बैंगलोर (कर्णाटक) में जनवरी 2005 में आलेखित किया गया। भारतवर्ष में आकर शीतकाल बिताती पत्रियों की छह जातियों में चार जातियां यहां अपना बसेरा बनाती देखी गई जिसमें विश्वतः विलुप्ति खतरे में आई सूचित पैलिड हैरियर (या पत्री) जाति भी थी। बसेरे में सर्वाधिक बाहुल्य यूरेशियाई दलदल हेरियर (या पत्री) का था। वे प्रत्येक संध्या को आकर एक मवेशी प्रजनन फार्म के चारा घास वाले टुकड़े में आश्रय लेते और दिन निकलने के आसपास सवेरे-सवेरे उसे छोड़कर निकल जाते। पत्रियों की बिष्ठा गुलिकाओं में जो बसेरे से इकट्ठा की गई उनके दक्षिणी भारत में शीतकाल बिताने वाली भूमियों में किए मुख्य शिकारों में पक्षी और जमीन में बिल बनाकर रहने वाले जानवर दिखाई पड़े। अभिपत्र में उनकी संख्या की संरचना, शीतकालीन भोजन, बसेरा लेने का व्यवहार विवेचित किए गए हैं तथा उनके संरक्षण उपाय भी सुझाए गए हैं।

### References

- Ali, S. and S.D. Ripley (1983). *Handbook of the Birds of India and Pakistan* Compact Edition. Oxford University Press, New Delhi.
- Bildstein, K.L. (1979). Fluctuations in the numbers of Northern harriers (*Circus cyaneus hudsonius*) at communal roosts in South-central Ohio. *Raptor Res.*, **13**: 40-46.
- BirdLife International (2000). *Threatened birds of the world*. BirdLife International, Lynx Edicions, Barcelona and Cambridge, UK. pp. 852.
- BirdLife International (2003). *International Action Plan for the Pallid harrier (Circus macrourus)*. Document prepared by BirdLife International on behalf of the European Commission. Strasbourg, 1-4 December.
- Clarke, R., V. Prakash, W.S. Clark, N. Ramesh and D. Scott (1998). World record count of roosting harriers (*Circus*) in Blackbuck National Park, Velavadar, Gujarat, North-West India. *Forktail*, **14**:70-71.
- Cramp, S. and K.E.L. Simmons (1980). *Handbook of the birds of Europe, the Middle East and North Africa. The birds of western Palearctic* Volume II, Hawks to Bustards. Oxford University Press, London.
- Fuller, M.R. and J.A. Mosher (1981). Methods of detecting and counting raptors: a review. *Estimating numbers of terrestrial birds* (C.J. Ralph and J.M. Scott, eds.). *Stud. Avian Biol.* **6** ; 235-246
- Ganesh, T. and P. Kanniah (2000). Roost counts of harriers *Circus* spanning seven winters in Andhra Pradesh, India. *Forktail* **16**:1-3.
- Grimmett, R., C. Inskipp and T. Inskipp (1998). *Birds of the Indian Subcontinent*. Helm, London.

- Muller-Dombois, D. and H. Ellenberg (1974). *Aims and methods of vegetation ecology*. John Wiley and Sons, New York, NY. 547 pp.
- Newton, I. (1979). *Population ecology of raptors*. T & A D Poyser Ltd., England.
- Rahmani, A.R. and R. Manakadan (1987). A large roost of Harriers in Andhra Pradesh. *J. Bom. nat. His. Soc.* **83** (Suppl.): 203.
- Rice, W.R. (1982). Acoustical location by the Marsh hawk: adaptation to concealed prey. *Auk*, **99** : 403-413.
- Simmons, R.E. (2000). *Harriers of the World: Their behaviour and ecology*. Oxford Ornithology Series (C.M. Perrins, ed.). Oxford.
- Verma, A. (2002a). A large congregation of Eurasian Marsh harrier in Keoladeo National Park, India. *Forktail*, **18**: 150-151.
- Verma, A. (2002b). Wintering ecology of Marsh harrier. *Ph.D. Dissertation*. Mumbai University, Mumbai.
- Verma, A. (2005). Winter ecology of Harriers roosting at Akola, Maharashtra, India. *Zoos' Print Journal*, **20** (8):1943-1947.
- Verma, A. (2006). Communal roosting behaviour of Eurasian Marsh Harriers in India. *Intl. Hawkwatcher*, **11** : 3-8.
- Weller, M.W., I.C. Adams, Jr. and B.J. Rose (1955). Winter roosts of Marsh Hawks and Short-eared Owls in Central Missouri. *The Wilson Bulletin*, **67** (3): 189-193.
-



