

Habitat Use of Long-Legged Buzzard *Buteo rufinus* in Miandasht Wildlife Refuge, Northeastern Iran

FATEMEH HOSSEINI-ZAVAREI^{1*}, MOHAMMAD SADEGH FARHADINIA²
& HOSSEIN ABSALAN³

1. Islamic Azad University, Science and Technology Branch, Tehran, Iran.

2. Iranian Cheetah Society (ICS), Tehran, Iran.

3. North Khorasan Provincial Office of the Department of the Environment, Bojnurd, Iran.

* Correspondence Author. Email: f_hossini806@yahoo.com

Received 26 May 2008; accepted 5 July 2008

Abstract: A study was carried out between 2003 and 2007 in Miandasht Wildlife Refuge whose area is 84,435 ha. Long-legged Buzzard *Buteo rufinus* comprised the main proportion of raptor sightings (71%). These observations came mainly from open plains (70% of direct sightings) divided thus: 41% on plains with low vegetation coverage and 29% on plains with high vegetation coverage (29%). Mountainous habitats contributed 12% and cultivated lands provided 18%. The numbers of Long-legged Buzzards observed in these four habitats was significantly different ($\chi^2=11.31$, $df=3$, $p=0.01$). A majority of Miandasht's habitat are open plains which can be a probable cause of more occurrences. However, diurnal rodents seem to comprise the main part of the species' diet, and as these are distributed mostly in open plains, it is concluded that the Long-legged Buzzards occur mainly in open plains in order to best use their keen eyesight to find prey. Nevertheless, they visit mountainous terrain in search of suitable nesting locations.

Keywords: Long-legged Buzzard, *Buteo rufinus*, habitat use, Miandasht Wildlife Refuge.

INTRODUCTION

The Eurasian subspecies of Long-Legged Buzzard *Buteo rufinus rufinus* (Cretzschmar, 1827) is an abundant raptor in Iran. The species is resident in the regions of the Alborz and Zagros Mountains and is a wintering migrant in other parts of the country (Mansoori 2001). It usually inhabits lowland arid and semi-arid steppes, desert steppes, and even desert fringes where water is available (Snow & Perrins 1998). Forsman (1998) noted that the species prefers steppes and semi-deserts and barren hills or rocks and frequently visits open and arid areas. It normally nests on the ground and even uses trees where opportunity occurs (Mansoori 2001). According to Snow & Perrins (1998), the Long-legged Buzzard also hunts over pasture but only marginally overlaps into farmlands. Wintering birds are also found around more fertile cultivated lands (Forsman 1998).

Knowledge of the ecology of different buzzard species in Iran is quite poor. Only recently, Khaleghizadeh *et al.* (2005) studied the diet of the Long-legged Buzzard in Kharturan Biosphere Reserve, near our study area. As slowly reproducing top carnivores, most raptors can be considered potentially endangered and it is highly important to preserve breeding habitat for successful raptor management and conservation (Wilkinson & Debban 1980).

The present paper discusses habitat use by the Long-legged Buzzard in Miandasht Wildlife Refuge. It is to be hoped that the results will provide a baseline of information for more research on various aspects of the species' ecology, particularly food habits which can play a significant role in developing effective conservation strategies for raptors' habitats in Iran.

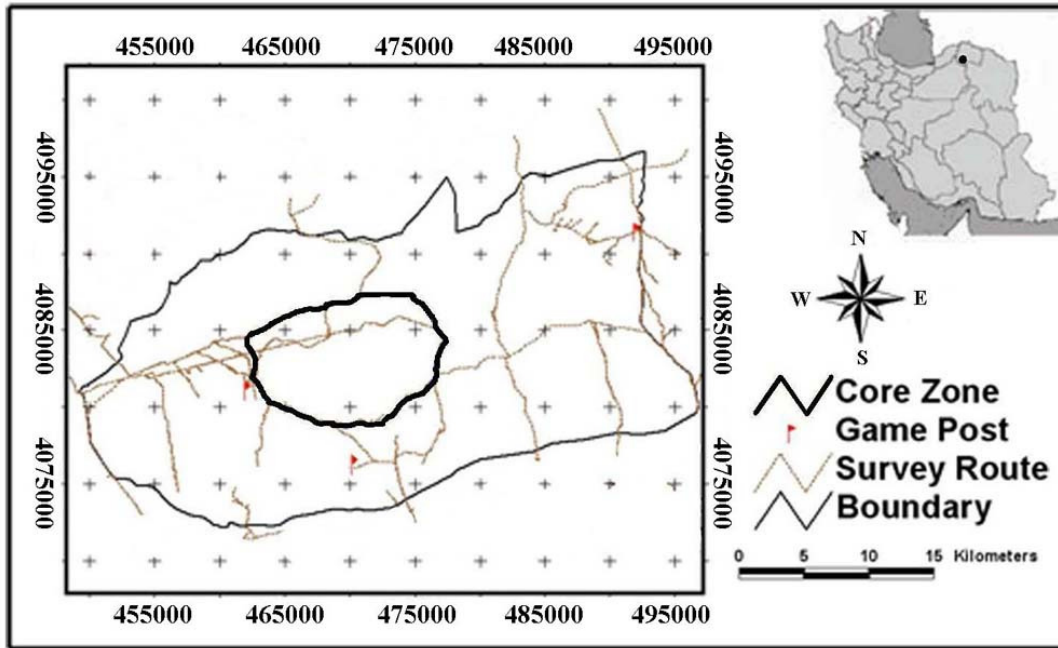


Figure1. Map of Miandasht Wildlife Refuge and its location in Iran.

STUDY AREA

Located near the city of Jajarm (36°45' to 37°05'N, 56°25' to 56°57'E) in North Khorasan Province, northeastern Iran (Fig. 1), 84,435-hectares were designated as Miandasht Wildlife Refuge in November 1973 by the Iranian Department of the Environment (DOE). The area is composed of vast expanses of flat plains where rolling hilly terrain divides it into northern and southern halves. This area is scarred by a large network of dry river beds and depressions, intermingled with clusters of small hills and plateaus. Hilly terrain inside the reserve forms a core zone dominated by scrub cover; there are some steep mountains on the southern boundary. A seasonal salty river, namely the Jajarm Kalshur, marks the northern boundary, providing a good range of habitats for wildlife. The altitude range of Miandasht is 900–1340 m, but mainly below 1000 m. The mean annual temperature of 14°C and precipitation of only 150 mm have resulted in an arid climate in the region (Darvishsefat 2006). It is highly important to emphasize that Miandasht is unique among the Iranian reserves, because more than 90% of the area has a slope of less than 1 in 10, within the

definition of flat plains. Slopes of greater than 1 in 3 are rare (M. Farhadinia, unpubl. data). The area is surrounded by a number of human settlements, mostly in south and northeast – a total of 15,000 head of livestock annually graze on the area's pastures in winter.

The reserve consists of desert ecosystems – xerophyte and halophyte species, mainly *Leguminosae*, *Salsolaceae*, *Chenopodiaceae*, and *Graminae* (Salehi 1994). Vegetation on Miandasht is dominated by Wormwood *Artemisia sieberi*, Feather Grass *Stipa* spp., and Saltwort *Salsola* spp. with scattered Saxaul Trees *Haloxylon* on sand plains and Tamarisk *Tamarix* along the dry watercourses. Meanwhile, invasive plant species such as *Peganum* spp. and *Sophora alopecuroides* are extending from southern degraded pastures toward the northern area of the reserve.

Mammal carnivores such as the critically endangered Asiatic Cheetah *Acinonyx jubatus venaticus*, Striped Hyena *Hyaena hyaena*, Grey Wolf *Canis lupus*, Caracal *Caracal caracal*, Wild Cat *Felis silvestris*, Common Fox *Vulpes vulpes* and Golden Jackal *Canis aureus* are known to exist in the area. Persian Gazelle *Gazella subgutturosa* and Wild Boar *Sus scrofa* are the

main wild ungulates occurring in the area (Farhadinia & Absalan 2004). A high density and diversity of Cape Hare *Lepus capensis* and 11 rodent species occur throughout Miandasht.

METHODS

Field surveys were carried out during a five-year period (2003–2007) in Miandasht Wildlife Refuge. There were monthly visits in the first two years (2003 and 2004) and seasonal visits in the rest of the study period. During the survey period, 12 transects crossing different habitats of the area were established along existing routes and each transect was surveyed an average of 20 times, travelling by car or motorcycle. The total length of all transects was approximately 134 km. Every kilometre GPS coordinates were taken and a digital map showing all transects was produced using the program ArcView GIS 3.2 (ESRI Inc.).

All identifiable raptors seen through binoculars within 1 km of the survey route were recorded. Also, we often tried to take photos of seen raptors using digital Canon 350D with 70–300 tele-zoom in order to ensure our identification later based on present field guides. However, we defined two more categories for raptors which environmental conditions (*e.g.* low contrast lighting, far distance, *etc.*) did not permit us to identify in the field nor later based on photos. These categories are: small unknown raptors, including kestrel, falcons, hawks, and harriers and large unknown raptors, including buzzards and eagles.

Between identifications, an average speed was maintained through the transects of 40–50 km/hr. Duplicated sightings were infrequent because the survey area was so large with little overlap between transect sightlines. However, we eradicated any probable double sightings that had occurred within very short periods of time and discounted any suspected recounts from a bird's direction of movement.

We had intended to study the species' habitat use with respect to landform parameters (slope, elevation and aspect), but we found the reserve to be sufficiently homogenous in these respects, lacking any sizeable large variation between

different areas. We therefore instead defined four categories of Long-legged Buzzard habitat, based on landscape features (vegetation structure and topographic conditions) (Table 1). As a result of preliminary surveys, it was concluded that the highest average vegetation coverage in the area is no more than 60%. Therefore, we established a limit of 30% to separate two plain habitat types based on coverage of vegetation. Cultivated lands mainly occur in outside areas, mainly close to the southern boundary.

The area's vegetation cover map has not been yet developed. Therefore, during the surveys, a 1×1 km grid was drawn in the field, centred on each observed raptor to determine the main habitat types (see Table 1). Other raptor species were also identified and their numbers recorded. The GPS geographical coordinates (position fixes) of all sighted Long-legged Buzzards were plotted on the GIS map of Miandasht Wildlife Refuge by means of ESRI ArcView GIS 3.2a software. A chi-square goodness of fit test (Zar 1999) was used to determine if the observed frequencies of habitat use differed significantly from expected frequencies using SPSS 14.0 for Windows software package.

RESULTS

During the survey period, a total of 70 bird species was identified in the Miandasht Wildlife Refuge, including 11 raptor species, of which the Long-legged Buzzard comprised the main proportion observations (62%, $n=71$) (Table 2). We were successful in identifying up to 86% of all raptors seen. We note that buzzards form the same proportion of the total of large raptors seen in Miandasht. The main bulk (66%) of *B.r. rufinus* observations were in plains habitats; 25% ($n=18$) on plains with high vegetation cover and 41% ($n=29$) on those with low vegetation cover. Mountainous habitats offered the lowest frequency of such observations at 14% ($n=10$), but 20% ($n=14$) occurred in cultivated land (Fig. 2). The numbers of observed buzzards in the four habitats differed significantly ($\chi^2=11.31$, $df=3$, $p=0.01$).

Table 1. Characteristics of the four defined study habitats in Miandasht. Since most cultivated land is located outside the area's boundary, the total area surveyed is greater than for Miandasht alone.

Habitat type	Topographic features	Extent of vegetation cover	Area (km ²)
Low cover, plains	None significant in a radius of at least 0.5km	<30%	687
High cover, plains	None significant in a radius of at least 0.5km	>30%	143
Mountainous or hilly terrain	Scattered hills, mountains or depressions within a maximum distance of 0.5km	Not a significant variable	93
Cultivated lands	None significant	Field boundaries and crops near villages	186
Total			1109

Table 2. Proportion of observations of ten raptor species in Miandasht Wildlife Refuge during the 2003–2007 period. Numbers in brackets indicate number of observations where more than one individual was observed.

Raptors	Scientific Name	Abundance of Sighting	Frequency of Sighting (%)
Short-toed Eagle	<i>Circaetus gallicus</i>	1 (0)	1
Hen Harrier	<i>Circus cyaneus</i>	2 (0)	2
Pallid Harrier	<i>Circus macrourus</i>	1 (0)	1
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	1 (1)	1
Long-legged Buzzard	<i>Buteo rufinus</i>	71 (8)	62
Steppe Eagle	<i>Aquila nipalensis</i>	2 (0)	2
Eastern Imperial Eagle	<i>Aquila heliaca</i>	2 (0)	2
Golden Eagle	<i>Aquila chrysaetos</i>	9 (0)	8
Common Kestrel	<i>Falco tinnunculus</i>	8 (2)	7
Saker Falcon	<i>Falco cherrug</i>	1 (0)	1
Eurasian Hobby	<i>Falco subbuteo</i>	1 (0)	1
Falcon, kestrel, hawk & harrier sp.		2 (0)	2
Buzzard & Eagle sp.		14 (0)	12
Total		115 (10)	100

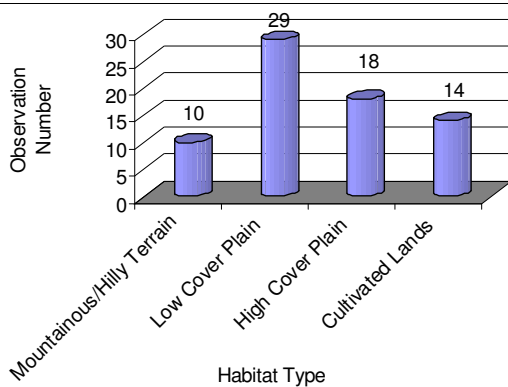


Figure 2. Relative abundance of Long-legged Buzzard *Buteo rufinus* observations in four defined study habitats in Miandasht Wildlife Refuge.



Figure 3. Rufous form of an adult Long-legged Buzzard *Buteo rufinus*, Miandasht, May 2004. © M.S. Farhadinia.

DISCUSSION

The Long-legged Buzzard (Fig. 3) appeared to be the most abundant raptor in Miandasht (Table 1), occurring throughout the areas that are composed mainly of broad plains scattered with hills. Our data indicated that they occur mostly in open plains sparsely covered with vegetation (Table 1, Fig. 2), which habitat occurs over the main proportion of the area.

Analysis of several pellets around buzzards' nests revealed that a main proportion of their diet consists of rodents and lizards. Also, on two occasions their hunting behaviour was observed in which the prey species involved was a gerbil, Libyan Jird *Meriones libycus*. The Long-legged Buzzard's prey consists of various small to middle-sized vertebrates including birds, mammals, reptiles and insects (Snow & Perrins 1998) in various proportions according to local food supply (Forsman 1998). Analysis of Long-legged Buzzard pellets collected in lower Kuma, Caucasia indicated that 69–86% the species' food comprised mammals (Cramp & Simmons 1979) and around 61.5% of the diet consisted of mammals in Kharturan, Iran (Khaleghizadeh *et al.* 2005). The association between the range of the Long-legged Buzzard and the gerbil has been noted in Turkmenistan, Sinkiang and India (Dement'ev & Gladkov 1966).

Miandasht's plains hold high diversity and density of rodents which we would assume to constitute a large proportion of the buzzard's diet. Accordingly, Long-legged Buzzard's more occurrence in open plains is probably be due to their reliance on rodents for food, but this will need to be quantified in future studies. According to R. Goljani (unpubl. data), Libyan Jird is the most frequently captured species when using Sherman live traps in Miandasht and the species is active during both day and night. It lives in colonies, selecting burrow sites under shrubs in flat sand plains, probably in order to have access to food plants, shade (in hot months) and sufficient field of view to detect predators. Such diurnal rodent preferences would enable Long-legged Buzzards to detect and hunt them more easily in plains areas with lower level of vegetation cover; the prime prey species would be

Libyan Jird and Midday Jird *Meriones meridianus*.

In Miandasht, the buzzards usually perch on shrubs or hills ridge to locate their prey by their keen eyesight. Forsman (1998) noted that the Long-legged Buzzard hunts from elevated posts, such as dead trees, pylons, telegraph poles or rocks. They sometimes perch on the ground, where their long-legged stance becomes obvious. Therefore, where there is dense or continuous vegetation, their sightlines are restricted, giving them less chance of finding any rodents. Each bird would require a larger hunting territory, a plausible reason for the lower frequency of sightings in this kind of habitat.

Highly productive cultivated lands host different kinds of rodents, particularly mice and voles which attract the buzzards to hunt from on telephone poles or tall plants. Due to lower abundance of rodent prey species in mountainous habitats, they could well look for Chukar *Alectoris chukar* that tend to concentrate near water sources in this terrain. It is likely that small reptiles form part of their diet, but the significance is as yet unknown, no studies being available. Moreover, they can find appropriate shelter in this type of habitat to roost and reproduce.

During the present survey period, we found two Long-legged Buzzard nests inside the area, each containing four young (Fig. 4). Dement'ev & Gladkov (1966) noted that the clutch size of the species is 2–5, most frequently probably 4. One nest was inside a hollow high on a tall rocky wall in the eastern mountainous terrain and the other was on top of a thick Saxaul Tree *Haloxylon* inside a sand-dominant plain area. According to Forsman (1998), they usually nest on precipitous cliff or rock overlooking open areas or in narrower gorges. In the Turkmenistan deserts, their nests are chiefly in trees or Saxaul, Tamarisk, and *Calligonum* shrubs (Dement'ev & Gladkov 1966).

Although Cinereous (Eurasian Black) Vulture *Aegypius monachus* had been recorded in 1976 in the area by Derek Scott (pers. comm.), discouragingly we failed to sight it during our surveys. The lower numbers of observations we obtained of other raptor species, especially



Figure 4. Four nestlings at the nest, May 2004, © M.S. Farhadinia.

eagles, is probably due to the overall lack of rough rocky country in the area (Snow & Perrins 1998). Golden Eagles *Aquila chrysaetos* were observed hunting Black-bellied Sandgrouse *Pterocles orientalis*, Macqueen's Bustard *Chlamydotis undulata macqueenii* and monitoring lizards *Varanus* sp. during our field surveys, but were never seen to hunt rodents in the area. It seems that due to unsuitable topography, Miandasht is not a suitable habitat for the eagles which are more dependent on extensive areas of rough rocky country than are Long-legged Buzzards which are more adapted to open habitats.

Recognition of raptors' preferences is important because alteration of preferred habitats can cause displacement of raptors and may create critical energetic demands if prey is not sufficiently abundant in nearby areas. The Long-legged Buzzard is not considered as a scarce raptor in Iran (Mansoori 2001), but we recommend more investigations on raptors' diet be undertaken to determine with certainty their main food items and to illustrate food niche separation. This would help conservationists to develop scientific and practical management plans based on prey species to conserve the raptors, especially endangered species.

Acknowledgements: We would like to thank the Iranian Department of the Environment (DOE), particularly North Khorsan Provincial Office of DOE who provided logistical and financial support for field surveys. Special thanks go to the area's game guards for their kindly companionship in field surveys. We are also grateful to Mohammad Sehhatisabet and Abolghasem Khaleghizadeh for their precise revision of this paper and useful comments.

REFERENCES

- Cramp S. & Simmons K.E.L. (Eds.). 1979. *Handbook of bird of Europe, the Middle East and North Africa. The birds of Western Palaearctic*. Vol. II. Hawks to Bustards. Oxford University press, Oxford. 695 pp.
- Darvishsefat A.S. 2006. *Atlas of Protected Areas of Iran*. Iran Department of the Environment.
- Dement'ev G.P. & Gladkov N.A. (Eds.). 1966. *Birds of the Soviet Union*, Vol. I. Israel Program for Scientific Translations Ltd., Jerusalem, 704 pp.
- Farhadinia M & Absalan H. 2004. Miandasht: New Hope for the Cheetahs in Iran, *IUCN Cat, News* 41: 25-26.
- Khaleghizadeh A., Sehhati-Sabet M.E., Javidkar M. & Adjami A. 2005. On the diet of the Long-legged Buzzard, *Buteo rufinus*, in the Turan Biosphere Reserve, Semnan, Iran. *Zoology in the Middle East* 35: 104–105.
- Forsman D. 1998. *The Raptors of Europe and the Middle East: A Handbook of Field Identification (A Volume)*. T & AD Poyser.
- Mansoori J. 2001. *A field guide to the Birds of Iran*. Zehn Aviz Publication, Tehran.
- Salehi F. 1994. *Miandasht Wildlife Refuge*, Iranian Department of the Environment, Khorasan Province, 86 pp.
- Snow D.W. & Perrins C.M. (Eds.). 1998. *The birds of the western palearctic*. Vol. I. Concise edition. Oxford University Press, Oxford, 1008 pp.
- Wilkinson G. & Debban K.R. 1980. Habitat Preferences of Wintering Diurnal Raptors in the Sacramento Valley. *Western Birds* 11: 25–34.
- Zar J.H. 1999. *Biostatistical analysis*. 4th edition. Prentice-Hall, New Jersey.

