Ecology of Eagles in Bundelkhand Region, India

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Abstract

A preliminary study on eagles in districts of Bundelkhand region (stretched between 23° 35'-26'N and 78- 82' E) has been carried out. An extensive survey was carried out (2006-2010) to know their population status and fluctuation in population, including breeding colonies in Bundelkhand region. The numbers of birds were recorded per year in different seasons, with the help of binoculars. Method was supported by photography. The most common species recorded during the study period was *Milvus migrans govinda* **(**resident species) while the rarer species were *Haliaeetus leucoryphus, Ichthyophaga ichthyaetus. Aquila helica, Ictinaetus malayensis, Aquila chrysaetos* as migratory species in Panna National Park. It was found that number of eagles also variable. It has been recorded that maximum number 1070 in 2010. Highest numbers of chicks were reported in 2009. Juveniles have more tendency of migration.
Key Words**:** Ecology, Accipitridae, biological indicators, predators, scavengers, juveniles

Introduction

Eagles are the excellent biological indicators of ecosystem health (Machange *et al*., 2005). They are the master of the sky (Grambo 1997). They kill other animals for food and are the good scavengers of nature. They are the member of the Accipitridae family (Thiollay, 1994). Eagles are powerful predators with broad wings, hooked beaks, strong legs and feet with sharp talons. Eagles have an excellent binocular vision (R. Shlaer 1972). Eagles help to control and stabilize the numbers of preys because they kill farm pests, such as rabbits, rats and grasshoppers. They help to maintain farm hygiene by catching sick animals and feeding on carrion (A. Bowland *et al.*, 1993). In this way, they are important predators which help in maintaining an ecological balance within their habitat. A robust population of eagle indicates a healthy farm environment. Eagles help to control the exotic disease toxoplasmosis by killing feral cats.

There are 236 species of eagles found in the world. There are following species of eagles found in India.

Elanus caerules, Aviceda jerdoni, Aviceda leuphotes, Pernis ptilorhyncus, Milvus migrans, Haliastur indus, Accipiter badius, Accipiter nisus, Accipiter virgatus, Buteo rufinus, Buteo buteo, Butastur teesa, Spizaetus cirrhatus, Hieraaetus jasciatus, Hieraaetus pennatus, Hieraaetus kienerii, Aquila helica, Aquila vindhiana, Aquila clanga, Aquila pomarina, Ictinaetus malayensis, Haliaeetus leucogaster, Haliaeetus leucoryphus, Ichthyophaga ichthyaetus. (S. Ali 1996).

No systematic study on the population ecology and nesting habits has been carried out on eagles in India. This is perhaps the most systematic eagle population survey carried out in the last 5 years from 2006-2010 covering wide and different geographical areas of Bundelkhand region of India. Many serious threats were recorded during the study like habitat loss, reduced food availability, climatic conditions, and anthropogenic disturbances. This study has helped to highlight the population ecology of

eagles and gather attention from concerned authorities and local people to take conservation measures.

Materials and Methods

Study Area: The study region is stretched between 23° 35'-26'N and 78- 82' E bounded by the Yamuna in the North, the Chambal in the North west, erupted ranges of the Vindhya plateau in the South East. The river network of the region comprises of various big and small rivers like, Yamuna, Chambal, Betwa, Dhasan, Son, Sindh and Kane. Bundelkhand region includes Jhansi, Lalitpur, Jalaun, Hamirpur, Banda and Mahoba in Uttar Pradesh and Sagar, Chattarpur, Tikamgarh, Panna and Damoh in Madhya Pradesh including parts of Gwalior, Datia, Shivpuri and Chanderi.

Table-1. Different Metrological Parameters of Bundelkhand Region

District	Temperature		Average Rainfall (mm)
	Max.	Min.	
Jhansi	47 °C	4 °C	900 mm
Lalitpur	46°C	4°C	1044 mm
Jalaun	41°C	8°C	862 mm
Banda	44.4°C	5.2°C	902 mm
Mahoba	48.2°C	4.1°C	864mm
Hamirpur	43°C	3°C	1050mm
Panna	45°C	3°C	1100mm
Gwalior	47 °C	4 °C	700 mm
Sagar	40.7°C	11.6 °C	1234.8 mm.
Shivpuri	42°C	3°C	875mm
Chanderi	45°C	5°C	1000mm
Damoh	35°C	13°C	800-1000mm
Chattarpur	42.3°C	7.1 °C	1068.3 mm
Datia	42.1°C	7.1 °C	793.8mm
Tikamgarh	43 °C	5 °C	1016 mm

Estimation of eagle population was done through survey and direct count method (Gaston 1975 and Erwin 1980). The method of study consisted of extended field visits from 2006-2010. Extensive random surveys of eagles were carried out in some districts of Bundelkhand region for eagle population, active nests and their monitoring was undertaken in the study area using a four wheeler for long-distances and a two wheeler for short-distances. Extensive surveys of the nesting, roosting and feeding sites of eagles were conducted. Spot surveys were conducted at feeding sites, mainly farm lands and around meat shopes and slaughter houses to determine the population estimates. The nesting and roosting colonies were surveyed from early morning 8:00 a.m. well before the eagles leave these sites and in the evening from 5:00 p.m. to dusk well after they had settled at nesting and roosting sites. Method was supported by photography. A personal survey was done in above region. Primary and secondary data were collected by personal interviews of local people living in the above areas. Villagers of different age groups especially who visited the forest regularly were interviewed. The nesting and roosting sites were thoroughly searched for dead eagles. The observations were made from the ground with the help of binocular to prevent disturbance. Information was also derived from local forest areas of the above region.

Results and Discussion

Milvus migrans govinda only species of eagles was reported in the region. *Haliaeetus leucoryphus, Ichthyophaga ichthyaetus. Aquila helica, Ictinaetus malayensis, Aquila clanga* were reported as migratory species (very few numbers) in Panna National Park.

Generally, most of the populations of *Milvus migrans govinda* were observed in the areas with permanent water bodies or nallas, agricultural fields, slaughter houses, meat shopes and municipal rubbish dumping grounds of villages, towns and cities. Their populations were also observed near safe nesting and roosting trees.

It is 55-65 cm in size. *Milvus migrans govinda* has forked tail which differenciated it from other eagles. It prefers to live near human habitation can be seen in the air gliding gracefully for long periods of time searching for food. It has dark brown colour and the plumage is actually dark brown with scattered light brown and rufous markings particularly on the head, neck and underparts. The bill is black with a yellow cere. Young birds is generally lighter than the adults. The *Milvus migrans govinda* preys on lizards, small mammals(bats, squirrel, rats etc.), small birds especially pigeon, fishes, insects especially grasshoppers and anything else which available easily. It is also a good scavengers.

It was found that number of eagles also variable. The estimated population sizes were

Table 2: Breeding and Roosting sites of *Milvus migrans govinda* in Bundelkhand Region

District	Roosting Sites	Breeding Sites
Jhansi	Jhansi (Bus stand, Rubbish dump of municipality, Allahabad bank, sipari bazaar), Babina (Rural), Basai, Khajuraha Bujurg, Khira, Raksa, Simrawari, Kutgari, Atneeva, Kandari, Bajaunia, Badagaon, Bhagwantpura, Bhojla, Lakara, Meri, Parichha, Phutera, Baruwa Sagar, Bamaur, Bangra, Katera Rural, Khisni Buzurg, Mauranipur, Samthar, Lahargird, Mankuwa, Patha, Moth, Bamaur, Gursarai, Garotha.Khilli Jhansi	Jhansi city, Khisni Buzurg, Notghat, Paricha, Mathanpura, Bhanpura, Bhagwantpura, Shankargarh, Baruwa Sagar, Moth, Khilli, Katera
Lalitpur	Lalitpur ,Devgarh, Mehroni, Narahut, Dailwara, Mazar, Bhadaura, Talbehat Miyao, Rajpura Dongra, Madawara	Lalitpur, Narahut, Dailwara, Devgarh, Mehroni, Talbehat.
Jalaun	Jalaun, Orai, Sainnagar, Sudar,Husipura, Diya, Hunarpura, Karneri, Konch, Pirona	Orai, Jalaun, Sainnagar, Sudar, Husipura, Diya, Hunarpura, Konch Madhoghar, Kuthund, Jholupur, Gopalpura, Bhimnagar, Rahouli, Sirsa Kalar, Rampur, Bichwaha, Guru ka etaura, Sekhpur Gurah
Banda	Banda, Karbi, Atara, Chitrakoot, Umarahni, Turra, Sathi, Samgara, Pindaran, Rauli Kalyanpur, Pongari, Sabada, Pauhar,	Banda, Karbi, Atara
Mahoba	Mahoba, Charkhari Kabrai, Bagraun, Dhawari, Imaliya Dang, Masoodpura, Kuwan, Kilahua, Kaithi, Kankuwan, Kashipur, Jaitpur, Mahua, Kulpahar, Rainpura, Singhaupur Baghari, Muskara	Mahoba, Charkhari
Hamirpur	Hamirpur, Surha, Shekaupur,Sarsai, Rath, Pahari Bhitari, Mehuna, Sukaura, Puraini	Hamirpur (Rath)
Panna	Raipura, Sahanagar, Pista, Sarangpur, Ramkheria	Panna, Pista
Gwalior	Eastern and Southern part	Eastern
Sagar	Sagar, Thikari, Sihora, Umra	Sagar (rural area)
Shivpuri	Eastern area	Eastern area
Chanderi	Near Bus stand	Near railway line
Damoh	Kanti, Jujhar, Hinota Kalan, Hatta Bazariya, Jabera, Kalehrakheda, Hardua Mangarh	Damoh, Kanti, Hardua
Chattarpur	Chattarpur Willa, Tatam, Sunwani, Shahgarh, Singhpur Dumara, Naugaon, Chindwara, Maharajpur, Harpalpur	Chattarpur, Harpalpur, Maharajpur
Datia	Datia , Bhander, Chirol, Kusoli, Katni, Richari, Sikri,Chirula	Datia
Tikamgarh	Tikamgarh, Baldeogarh, Palera, Prithvipur, Niwari, churara, Kudhar	Tikamgarh, churara, Kudhar

855, 615, 970, 860 and 1070 in 2006, 2007, 2008, 2009 and 2010 respectively. Maximum numbers has been recorded 1070 in 2010.

Table-3. Population status of adults *Milvus migrans govinda* (resident species) in study area

District	2006	2007	2008	2009	2010
Jhansi	120	60	140	130	120
Lalitpur	30	35	60	50	60
Jalaun	60	50	90	70	90
Banda	100	60	110	95	120
Mahoba	40	30	50	40	50
Hamirpur	20	20	30	30	60
Panna	70	50	70	40	70
Gwalior	70	65	80	70	80
Sagar	40	50	55	40	60
Shivpuri	60	50	70	80	90
Chanderi	60	50	60	70	80
Damoh	40	30	30	30	50
Chattarpur	70	30	55	60	60
Datia	20	15	30	20	30
Tikamgarh	55	20	40	35	50
Total	855	615	970	860	1070

Breeding season was reported variable according to circumstances from December to May. Some pairs laid eggs in December but the majority of eggs were reported in February. Several nesting sites have been reported in above region. It was observed their nest on *Delbergia latifolia* (Sissoo), *Mangifera indica* (Mango), *Ficus religiosa* (Peepal) and *Ficus bengalensis* (Banyan) trees. Although Most of these birds are monogamous but extra pair copulation occur frequently. Sex distinction and individual identification were based on the colour of body feathers (usually light in males and dark in females) and the plumage characters (slightly different patterns of the breast feathers, white feathers around the base of the bill or broken flight feathers), respectively. Courtship includes spectacular aerial displays of mutual soaring, diving and foot touching. Mating takes place on a perch or nest. Both the male and female take part in nest building. Their nests were reported in food abundance areas. Male brings most of the nest material and female arranges it at the nest. The nest is a bulky cup of sticks, lined with softer material and is placed in the fork of tree branch. The largest sticks were on the outer edge and the smallest in the center of the nest. Sometimes nests were decorated by bright materials such as white plastic and cotton. Nest building time was observed 10-15 days. Two-Three eggs are laid 15-20 days apart. Eggs are pinkish white in colour. During the nestling period, male brings food to the nest while female begins spends most of her time in incubation, feeding and caring for the chicks. Incubation period was reported about 35-40 days. Chicks left nests after 60-75 days.

It has been reported that 20 nests and 27 chicks in 2006, 16 nests and 22 chicks in 2007, 22

nests and 43 chicks in 2008, 42 nests and 78 chicks in 2009, 40 nests and 75chicks in 2010. Highest numbers of chicks were reported in 2009. Juveniles are light in colour and small in size. The estimated population sizes of juveniles were 188, 160, 200, 212 and 217 in 2006, 2007, 2008, 2009 and 2010 respectively. Juveniles have more tendency of migration.

Table-4. Numbers of nests and chicks of *Milvus migrans govinda* in study area

Districts	2006		2007		2008		2009		2010	
	N	C	N	C	N	C	N	C	N	C
Jhansi	40	50	45	53	64	128	70	149	75	152
Lalitpur	15	23	11	24	21	52	18	38	25	42
Jalaun	20	27	16	22	22	43	42	78	40	75
Banda	35	42	28	40	40	120	32	72	40	80
Mahoba	12	21	8	18	10	21	18	40	19	45
Hamirpur	10	18	18	38	22	35	26	48	25	45
Panna	14	26	11	20	8	23	35	50	38	65
Gwalior	17	39	8	20	12	29	40	63	35	68
Sagar	19	40	17	26	11	21	17	23	20	43
Shivpuri	33	40	30	45	25	42	30	45	32	56
Chanderi	19	24	25	40	20	30	27	39	23	40
Damoh	8	15	5	13	6	14	15	27	21	63
Chattarpur	9	21	2	5	6	16	10	15	14	35
Datia	3	4	1	3	-	-	1	2	3	7
Tikamgarh	7	16	5	11	18	38	16	25	18	47
Total	261	401	230	378	286	612	397	714	428	863

Table-5. Numbers of Juveniles of Milvus migrans govinda in study area

District	2006	2007	2008	2009	2010
Jhansi	15	12	15	20	15
Lalitpur	20	15	15	15	15
Jalaun	20	15	25	30	20
Banda	25	20	25	30	35
Mahoba	10	10	15	10	10
Hamirpur	8	6	10	10	10
Panna	15	15	20	15	15
Gwalior	10	10	12	15	15
Sagar	10	10	15	12	15
Shivpuri	10	8	6	10	12
Chanderi	8	5	5	10	10
Damoh	8	6	10	8	10
Chattarpur	12	15	10	10	15
Datia	2	3	2	5	5
Tikamgarh	15	10	15	12	15
Total	188	160	200	212	217

The disappearance of *Milvus migrans govinda* has been widely reported in region. Habitat loss and anthropogenic disturbance are the largest threats facing eagle population today. However, nest disturbance may also be a significant source of local reproductive failure and population decline in eagle species. Four years of continuous drought and acute water and power shortage ending, self sufficient agrilivelihoods has resulted in large scale migration up to 36.95%. The change in land use pattern, dependency of people on forests and scarcity of natural resources in this region has caused exploitation of dense forest. Thus deforestation and other habitat destruction is one of the serious threats to eagles.

Climatic conditions has also played important role in the conservation of eagle in above region. The Bundelkhand region is marked by extremes of temperature, reaching the mid to upper 40º centigrade during the summer months and dropping as low as 1º centigrade in winter. Deaths were reported during summer. We found a strong positive correlation between deaths of eagles and increasing ambient temperatures.

Eagles are vulnerable to electrocution when landing on powerpoles and kite flying by children. Eagles are killed for eyes too. It is believed that one can locate hidden treasure with the help of "Surma" prepared using the (sharp) eyes of eagles. Eagles are also killed for their legs and toe because of belief in superstitions.

Conclusion

Last previous decades, eagle population appeared to be thousands in number, the reasons for that were abundance of high trees for nesting and roosting and absence of electric power lines. This species is listed as near threatened because it is experiencing a moderately rapid population decline, owing mostly to changes in land-use and persecution amongst other threats. Evidence that the population is undergoing a rapid decline would probably qualify it for a higher threat category. Keeping in mind, the above problems of the population decline of eagles there is an urgent need to study in depth all the factors responsible for their population decline in region. Thus a study has been designed to study population ecology. To protect eagles in region, it is imperative that local farmers be made aware about their status. The detail study of its population dynamics, roosting and breeding in the region will facilitates us in formulating a programme for its conservation which is of serious concern now a days. All living organism have an important role to balance our ecosystem, which are interconnected to each other directly or indirectly. By vanishing of any one member of our ecosystem, the whole system

Table-6: Different migratory eagles observed (very few in numbers 2-3) in study area(Panna national park)

Scientific name	Common name	Description	Feeding habits
Haliaeetus leucoryphus	Pallas's sea eagle	Large dark brown in colour with pale golden brown head and a broad white band acroos tail.	Captures fishes, snakes, rats, crabs and even carrion.
Ichthyophaga ichthyaetus	Greyheaded fish eagle	A dark brown eagle with grey head, neck and tail white.	Captures fish from near the surface of water, birds and small mammals.
Aquila helica	Imperial eagle	Blackish brown with whitish head and neck. Tail mottled with grey and brown.	Usually scavenger feeding largely on carrion, birds and reptiles.
Ictinaetus malayensis	Black eagle	A large black eagle with narrowly grey-barred tail, bright yellow cere.	Large insects, frogs, reptiles and small birds.
Aquila clanga	Greater spotted eagle	Dark blackish brown with minute white specks on wings and body.	Largely frogs and food pirated from other birds of prey, actively hunts small birds.

may be affected. "If any one type is removed from the system, the cycle can break down and the community becomes dominated by a single species, So the conservation and care is must for all.

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