

STEPPE EAGLE: A MIGRATION HISTORY –A REVIEW

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Abstract: Eagles are important scavengers that play a vital role in clearing animal carcasses and municipal dumps. In the past decade, a sharp decline has been observed in eagle population. Intensive surveys of the study of steppe eagle were undertaken from 1923 to 2011 to determine the annual population migration in steppe eagle in and around Nepal and India. Comparative analysis of data obtained with regard to the population dynamics of the Steppe eagle in these regions has suggested that there has been a drastic decline in the population of migratory as well as resident eagle species in these regions. The finding suggests that the reason for this population fluctuation or migration is environmental condition as well as anthropogenic activities over a period of time.

Index Terms – Steppe Eagle, Migration, History, Conservation.

1.0 INTRODUCTION

Raptors are an important tool to focus conservation strategies locally, regionally, and globally (Watson, 1991). They can be used as "umbrella species" because their large home ranges and low nesting densities necessitate that any protected areas encompassing viable populations or complete communities protect sufficient habitat and populations of most, if not all, other species in the food web below them (Thiollay, 1992). Eagle is the common name for many large birds of prey of the family Accipitridae. Eagles belong to several groups of genera, not all of which are closely related. Most of the 60 species of eagle are from Eurasia and Africa (del Hoyo et al 1994). Some species of eagles found in the world are- Spotted Eagle , Steppe eagle , Tawny eagle , black eagle , Serepent eagle , fish eagle , golden eagle ,hawk eagle ,sea eagle ,booted eagle bonelli's eagle ,Imperial eagle and snake eagle . The steppe eagle (*Aquila nipalensis*) is a bird of prey. Like all eagles, it belongs to the family Accipitridae. (Ferguson-Lees, J. & Christie, D. 2001). In this study a critical review was carried out which involves taxonomy, anatomy, voice, habitat, food, hunting, breeding, reproduction, population and distribution.

1.1 TAXONOMY

From taxonomic aspect of view steppe eagle related to accipitridae family and genus is *Aquila* (Hodgson, 1833). *Aquila* closely related to *A. rapax* and *A. heliaca* (Clark 2005). There are two subspecies recognized-

- (i) *A.n. orientalis* (Cabanis; 1854) (ii) *A.n. nipalensis* (Hodgson, 1833)

1.2 ANATOMY

Anatomically steppe eagle is about 60-81 cm in length and has a wingspan of 165-190 cm. *Aquila* females weighing approximately 2300-4900 gms, are slightly larger than male weighing 2000-3500 gms (Meyburg et al 2016). Steppe eagle has dark brown upper parts and blackish flight feathers and tails. It is generally darker than *A. pomarina* but paler than *A. clanga*. It has oval nostrils, as opposed to round in *A. pomarina* and *A. clanga*. Steppe has fleshy gape reaches far below eye and iris always brown. Steppe Juvenile and immature have characteristic broad whitish band along greater underwing coverts (Meyburg et al 2016).

1.3 VOICE

The call of the steppe eagle sounds like a crow barking, but it is rather a silent bird. During the breeding season these birds are mainly observed as highly vocal. Principal call is a repeated, harsh, loud barking "Kwowl" or "Caw". Also high pitched squeals. In flight combined into a series of low barks, each one initiated by a high pitched squeal "Skee - Kwowl.....Skee - Kwowl....." overall, voice rather similar to *A.rapax* (Meyburg et al 2016).

1.4 HABITAT

As the name already says, the Steppe Eagle is a bird of open habitat like steppes, desert, semi-desert, grasslands and even agricultural areas. In the winter quarters it has also been reported to be found at garbage dumps, most commonly in India or Oman, (Mebs and Schmidt 2006).

1.5 FOOD AND HUNTING

Regarding food these birds are predominating predators, mostly preys on small mammals but also on birds and reptiles when mammals are scarce. The most important prey species are like the little ground squirrel *Spermophilus pygmaeus*; in some places also takes great gerbil *Rhombomys opimus* (Mebs and Schmidt 2006). In its winter range, the species also feeds on insects like locusts and termites and also on queleas colonies (GRIN 2009). Steppe Eagle also take carrion and will even visit landfills. Steppe Eagles mostly hunt from perches, but also from flight.

1.6 BREEDING AND REPRODUCTION

Although age of first breeding in raptors is yet to be reported, probably it is assumed to be close to the age of 4 year. The breeding season is mostly April- July and timing of hatching is spring. The breeding of these birds are highly dependent on availability of chief prey species. Depending upon the nest material (sticks), nest cup is often lined with smaller twigs and many other materials, eg- old rags, bones, molted feathers and camel dung. Nest usually built on ground that allows good view of surroundings because of habitat alteration and persecution, often nests a few meters up on bushes, small trees and artificial structure etc (Meyburg et al 2016). The size of clutch is normally 1-3 eggs and incubation time is about 45 days (Mebs and Schmidt 2006). The chicks have white down after hatching, later grayish white. Generally breeding density is variable from year to year than other eagles (Meyburg et al 2016). The young ones stay in the nest for about 60 days (Mebs and Schmidt 2006).

1.7 POPULATION

At the beginning of the 1990s population of these steppe eagles in the European part of Russia was estimated at about 20,000 pairs at, but today the population has declined to drastically higher levels. Although exact data is yet not available (Mebs and Schmidt 2006). As per Bird Life International approximate data of steppe eagle population is from 5,000 - 20,000 for the year 1994 (Bird Life International 2004).

1.8 DISTRIBUTION

In Europe it has been reported in Russia, north and north-west of the Caspian Sea. Formerly also nested in Moldova and Romania but it is long extinct in those countries now. Besides these birds also disappeared from the Ukraine since the 1980s (Mebs and Schmidt 2006). Outside of Europe the species is found in the steppes of central Asia eastwards to Mongolia, eastern Kazakhstan, Tibet and northeastern China (GRIN 2009). It also been found in south-eastern Pakistan especially in Karachi where large number are seen at certain places such as Khare in Nepal and the south rim of Kathmandu valley and Himachal Pradesh in India during migration (Decandido et al., 2013).



Figure 1. Khare (Nepal) – location of current migration study at 1,646 m; the town of Dhampus is directly north across a valley at approx. 1,800 m.

(1) Ghasa in the Kaligandaki valley, (2) Kathmandu Valley, (3) Ilam District, (4) Bardia National Park, (5) Jhatingri and Dharamsala, Himachal Pradesh, India, (6) Chihkiang [Hongjiang] China, (7) Eastern Tibet, (8) Kalamaili, Xinjiang Province, China. (After Decandido et al 2013).

2.0 Migration

Some of the birds are gifted with a beautiful system of navigation. Distribution and biogeographic history highly determine the origin of migration in birds of prey. Based on some comparative analyses, diet breadth also has an effect on the evolution of migratory behavior in this group (Nagy and Tokolyi 2014). The Steppe Eagle is blessed to be a migratory species. Most European birds and those from western Asia spend the winter in eastern and southern Africa. Some also spend the winter on the Arabian Peninsula. Birds from farther east spend the winter in India and neighbouring countries. The movement of eagle depends on environmental conditions and food availability, and it is directly related to eagle movement to find food, frequency of thermals, and temperature (Somayeh et al 2014).

2.1 The Migration History

The first notes of this migration were observed and made on 9 November 1923 from the small town of Jhatingri (1,620 m), Himachal Pradesh, northern India (Donald 1923). Here Donald reported about 40 Steppe eagles passing close to him. He wrote, 'occasionally two came very close together but for the most part they followed each other at intervals varying from one to four or five minutes', and that the direction of flight was 'from the east-north-east to west-southwest (Donald 1923).

On 7 November 1970, Tim Inskipp and colleagues recorded south-westerly movements of a number of raptor species in two hours at Daman a pass on the south rim of the Kathmandu valley, including 174 Steppe Eagles, an adult male Northern Goshawk *Accipiter gentilis*, two Eurasian Sparrowhawks, two Common Buzzards *Buteo buteo*, one Booted Eagle *Hieraaetus pennatus*, 18 Himalayan Griffon *Gyps himalayensis*, one Eurasian Hobby *Falco subbuteo* and one Common Kestrel *F. tinnunculus*. On the following morning, they counted 78 migrating Steppe Eagles in migration on a single hour (Inskipp et al 1971).

In the 1970s, Robert Fleming Jr. and others made observations on diurnal raptor migration in various locations in central Nepal, primarily along the Jomsom trek near Dhampus (1,800 m) within sight of the Annapurna range (Fleming 1983).

On 2 November 1976, Fleming counted 305 Steppe Eagles in about an hour passing close to the Dhampus ridge, 70% of them in mixed age groups of up to 11 birds. He also saw a few Greater Spotted Eagles *Aquila clanga* and Imperial Eagles *A. heliaca* (Fleming 1983). Fleming was the first to note that the eagles used different routes at different times of day during migration. As cumulus clouds increase over the Annapurna range, the eagles changed their route to the south, away from the high peaks and closer to the Dhampus ridge. If later clouds begin to obscure Dhampus, they moved further to the south and begin to pass over the small town of Khare at Paudur Hill (1,646 m), varying their route by up to 8 km from morning to late afternoon on exceptionally cloudy days. Overall, Fleming estimated that 45,000 eagles migrated between the last week of October and the end of November (Fleming 1983).

From 6 October to 4 November 1984, Bijlsma (1991) observed Steppe Eagles on the Jomsom trek near Khare, and further west near the small town of Ghasa (2,200 m) in the Kali Gandaki valley, where north–south migration of Demoiselle Cranes *Grus virgo* was also seen. Steppe Eagle migration peaked at Khare in late October, with highest count of 817 on 27 October. Bijlsma also noted 305 Amur Falcons roosting in the outskirts of Pokhara on 29 October 1984 (Bijlsma 1991).

From 20 October to 7 November 1985, de Roder (1989) counted 7,852 Steppe Eagles, passing at a rate of over 58 eagles per hour at the Paudur Hill site near Khare, with a maximum of 1,397 on 1 November. His observations suggested that first year (juvenile) Steppe Eagles migrate in greater number later in the season compared to older birds. He also noted 16 other migrating raptor species including a few Imperial and Greater Spotted Eagles, as well as Lesser Kestrel *Falco naumanni* and Amur Falcon, the numbers of which both peaked between 20 and 30 October (de Roder 1989).

In October 1999, RDC and DA made their first visit to the Paudur Hill site in Nepal to study the migration between late October and early November (DeCandido et al. 2001). In nine days a total of 821 Steppe Eagles were seen (over 15 per hour) as well as eight other raptor species.

Members of the Gurung family recorded 6,503 migrating Steppe Eagles between 24 October and 5 December 2003 (21 per hour), with a peak of 571 on 23 November. This was the first time Steppe Eagle migration was recorded in December. In this study, up to six local vulture species were seen daily, particularly flocks of Himalayan Griffons and lone *Lammergeier Gypaetus barbatus* (Gurung et al 2004).

During autumn 2001 and spring 2002 den Besten studied the migration of Steppe Eagles and other raptors from a site (1,900 m) at Dharamsala, Himachal Pradesh, India (den Besten 2004). He counted 8,194 Steppe Eagles (over 46 per hour) between 23 October and 30 November. The highest daily total was 914 on 20 November, with a peak of 194. Counts of 100–150 eagles per hour were made on several days. In addition, he recorded 15 other raptor species including migrating Greater Spotted and Imperial Eagles.

In November 2011, a team led by TS and SG observed the migration from Paudur Hill, at the same location as de Roder (1989), DeCandido et al. (2001), and Gurung et al. (2004). Between 15 and 28 November, M. Siponen and M. Pajunen (in litt.) counted 1,105 Steppe Eagles (over 16 per hour), comprising first-year (juvenile), subadult (second to fourth year) and adults. At least 15 other raptor species, including three vulture species, were also seen. Besides these large movements south of the Annapurna range, there are other reports of migrating raptors from Nepal of these, the highest Steppe Eagle count is from the Kathmandu Valley where 135 Steppe Eagles and two Greater Spotted Eagles moved west in half an hour on 19 November 1989 (Nielsen and Jakobsen 1989). Small numbers of Steppe Eagles were noted flying west along the Himalayan foothills in Ilam District in east Nepal in October and November 1978 and at Bardia National Park in the west in November 1985 (Cox 1985).

The following discussion and accompanying photographs shows the sequence of plumages of the steppe eagle from juvenile to adult (Clark, W.S. 1996). The annual plumages are –

- (i) Juvenile
- (ii) Second – winter
- (iii) Third – winter
- (iv) Fourth – winter
- (v) Adult



Plate 1.First plumage (juvenile) Steppe Eagle *Aquila nipalensis nipalensis*, 24 November 2011 (After DeCandido et al 2013).



Plate 2. Second plumage Steppe Eagle, 19 November 2011 (After DeCandido et al 2013).



Plate 3. Third plumage Steppe Eagle, 21 November 2011 (After DeCandido et al 2013).



Plate 4. Fourth plumage Steppe Eagle, 21 November 2011 (After DeCandido et al 2013).



Plate 5. Adult Steppe Eagle, 23 November 2011 (After DeCandido et al 2013).

2.2 THREATS

Electrocution is a serious problem which causes the death of many Steppe Eagles. The taking of young eagles out of the nest in order to sell them to western European countries also occurs (Mebs and Schmidt 2006). GRIN 2009, also mention sperecution. Beside that, the large scale destruction of steppe habitat and conversion the agricultural land and the following reduction of prey is the major reason for the decline of the Steppe Eagle (GRIN 2009) .

3.0 CONSERVATION

Raptors provide critical ecosystem services, yet there is currently no systematic, global synthesis of their conservation status or threats. Raptor species that require forest are more likely to be threatened and declining than those that do not. Agriculture and logging are the most frequently identified threats, although poisoning is especially detrimental to raptors. Of the 10 most important IBAs for raptors, six are in Nepal (McClure et al. 2018). The Agricultural practices should respect the habitat and the conservation of steppe birds like the Steppe Eagle. Power lines must be made safe for birds. Illegal trade and persecution must be stopped. Highest priority conservation actions to protect raptors include preventing mortality and conserving key sites and priority habitats. Improved long-term monitoring would allow for conservation to be appropriately targeted and effectiveness of interventions to be assessed. More research about the current population size is also needed.

4.0 CONCLUSION

Reports suggest that a significant number of *A. n. nipalensis* that migrate east to west across central Asia can be found in India and Nepal each winter (Inskipp and Inskipp 1991, Naoroji 2006, Mallalieu 2008), and are common in the Kathmandu Valley with a few returning each evening to roost at the Swayambhunath temple, Kathmandu and Himalayan regions of Uttarakhand between November and March. From the above observations, we strongly believe that a long-term monitoring programme is desperately needed, because the number of migrants seen varies greatly from year to year, partly as a result of local weather conditions, particularly cloud cover over the Annapurna range. From a broader perspective, observers have recently noted a significant decline in the number of European and west Asian race *orientalis* passing through the migratory bottleneck of Eilat, Israel (Zduniak et al. 2010). Bird and Symes (2009) sought solid baseline data from East Asia, a main breeding area for *A. n. nipalensis*, where intensification of agriculture and overgrazing of steppic habitats by domestic

animals may be driving a decline. With the help of ecologists and research aided bodies and government of India we need to further explore the ways to protect the ecosystem by protecting Steppe Eagles, one of the important trophic levels to keep our ecosystem healthy and clean.

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