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Eagle Hill, Kenya: changes over 60 years

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Summary

Eagle Hill, the study site of the late Leslie Brown, was first surveyed over 60 years ago in 1948. The demise of its eagle population was near-complete less than 50 years later, but significantly, the majority of these losses occurred in the space of a few years in the late 1970s. Unfortunately, human densities and land use changes are poorly known, and thus poor correlation can be made between that and eagle declines. Tolerant local attitudes and land use practices certainly played a significant role in protecting the eagles while human populations began to grow. But at a certain point it would seem that changed human attitudes and population density quickly tipped the balance against eagles.

Introduction

Raptors are useful in qualifying habitat and biodiversity health as they occupy high trophic levels (Sergio *et al*. 2005), and changes in their density reflect changes in the trophic levels that support them. In Africa, we know that raptors occur in greater diversity and abundance in protected areas such as the Matapos Hills, Zimbabwe (Macdonald & Gargett 1984; Hartley 1993, 1996, 2002 a & b), and Sabi Sand Reserve, South Africa (Simmons 1994). Although critically important, few draw a direct correlation between human effects on the environment and raptor diversity and density. The variables to consider are numerous and the conclusions unworkable due to different holding-capacities, latitude, land fertility, seasonality, human attitudes, and different tolerances among raptor species to human disturbance.

Although the concept of environmental effects caused by humans leading to raptor decline is attractive and is used to justify raptor conservation, there is a need for caution in qualifying habitat 'health' in association with the quantity of its raptor community. The examination of raptor guilds would be more insightful than focusing on single species studies in proving this theory. The occurrence of Martial Eagle *Polemaetus bellicosus*, Peregrine Falcon *Falco peregrinus minor,* Rüppell's Vulture *Gyps rueppellii* and Crowned Eagle *Stephanoaetus coronatus* would infer that the habitat had open savanna with wildlife, extensive cliff areas, and forest. More significantly, one might conclude that the habitat had a low human occupancy, while maintaining good populations of game birds, doves, small and large wild ungulates, small carnivores, monkeys and forest- or thicket-dwelling small duikers. But they may be wrong. To see a raptor without knowing its individual status within the community implies very little. Such as seeing (as has been the case) all four of these species in the middle of Nairobi City where only one could possibly be resident as the habitat is totally unsuitable for the other three (pers. obs.). Such observations can easily be the result of rapid 'one off' assessments; a road count for example. The longer the time spent observing a wildlife community, the more it is understood. Ideally a complete generation or more of observation is needed prior to understanding trends in a population and this rigor should be applied to raptors.

Single species studies may fail in accurately describing typical behaviour, habitat needs, and foraging, since these conclusions are based in isolation from factors imposed upon them by congeners. A Peregrine Falcon is equally at home in Kenya on a wild cliff top in the semi-arid desert, on cold wet moorlands, or in Nairobi city centre (Thomsett 1988) but the effects imposed by Lanner *Falco biarmicus* and Taita Falcons *Falco fasciinucha* upon them should be considered. There are many examples of single raptor species occupying widely different environments, many of which are man-made and support a small percentage of the original biota. Seen alone, some may be poor 'indicator species'. Seen as an assemblage of multiple species, their biology is better exposed.

In order to validate the generalization regarding the value of raptors as indicators of habitat health, it is advisable to study many species and particularly those that have: 1) specific habitat and food requirements and 2) slow reproduction and maturation rates. Of all the species, eagles are perhaps the best group and they fit the above conditions.

Study location

Eagle Hill, locally known as Kiritiri, in Embu District, Kenya is one of four unexceptional hills rising 457 m (1500 ft) to a summit at 1524 m (5000 ft) within the 378 km^2 study area of the late Leslie Brown. The upper wooded slopes were, and remain gazetted 'protected' forests and the surrounding bush land in the 1950s was rich in wildlife. Black Rhinoceros in particular, were common. Leslie Brown noted as early as 1954 that most of the game which had 'abounded' only six years previously had decreased rapidly (Brown 1956). Eagles survived longer, presumably by adapting to feed on a different and smaller prey base.

Sixty years have elapsed since the first surveys were initiated in 1948 and it is not surprising that the eagle population has decreased. But given that the hill tops remain gazetted as 'forest' it would imply the protection of the eagles. Eagle Hill itself is some 10.8 km^2 and had 6 to 7 breeding eagle pairs, whereas neighbouring hills of 10.6 km^2 and 19.4 km^2 had one pair each (Brown 1956). It is reasonable to assume that the success of the protection afforded to the upper slopes of Eagle Hill could be gauged by the number of nesting eagles found there today.

Results

Table 1. shows the number of nesting pairs of eagles between 1948 and 1979 in a 378 km^2 area of Embu. The data collected during this period and on more recent visits to the site span 46 years.

By 1968 the human population had more than doubled and had destroyed much of the riparian forest and cultivated land that in the 1950s was uninhabited (Brown 1976). Seventeen years after the first census the number of eagles had slightly decreased to 23 pairs of 8 species. Pairs had decreased by 12%, by about 1% per annum. The number of species had declined by 20%.

Within the 17-year period (1951–1968) Brown (1976) speculated that the increase in African Hawk Eagles *Aquila spilogaster* was the result of the increase in people and their poultry. He noted with surprise the decrease of Wahlberg's Eagles *A. wahlbergi*, "The total population and variety of species had altered surprisingly little, despite drastic changes in land use" (Brown 1976).

Table 1. Number of breeding pairs of eagles in 378 km^2 Embu study site from 1948–1979. Data from Brown 1956, 1976.

Year(s)	Verreaux's	Wahlberg's	African Hawk	Ayres's	Martial	Crowned	Long-Crested	Bateleur	Brown Snake	Af Fish Eagle	pairs/100 km^2	Reference
1948–51	1	11	2	1	3	1	1	2	2	2	6.9	Brown 1956
1968	0	7	5	2	3	1	1	3	1	0	6.0	Brown 1976
1978	0	<4	1	1	2	1	0	0	0	0	2.4	ST, L. Brown and P. Davey unpublished data
1979	0	1	2	2	2	0	1	0	0	0	2.2	Jackson *et al.* 1979

Brown (1976) assumed that the loss of stream dwelling/riparian African Fish Eagles *Haliaeetus vocifer* was a direct consequence of wood harvesting. The loss of the last pair of Brown Snake Eagles *Circaetus cinereus* is significant as this species, in the author's experience, appears to be particularly intolerant of human occupation for nesting sites, but can be observed foraging or over-flying areas with moderate human occupation.

The loss of the Verreaux's Eagle *A. verreauxii* was the result of its nest collapsing. Although the species was seen in 1978, the farms had encroached to the base of its cliff nest site making occupancy at that site impossible. Its reappearance, but non breeding, in 1978 illustrates the need to be vigilant in determining the actual breeding status of individuals, and not assume birds seen are resident. Not included in the tables, is the observation that the study area had five pairs of Secretarybirds *Sagittarius serpentarius* in 1950, one pair in 1951 and none in 1952 (Brown 1956). There has been none since.

The Martial Eagle nest sites were on very large trees on inaccessible slopes. They and the African Hawk Eagle are partial to poultry and game birds, which also tend to prosper in some human-degraded landscapes.

In 1978, I accompanied Leslie Brown and Peter Davey on two trips to this site. Thirty years after the first census, nine pairs of five species remained. Pairs had decreased by 75%. The number of species had declined by 50%.

The 1979 survey by the Cambridge Kenyan Eagle Study Expedition acknowledged incomplete coverage of the area. However, they did note, "People were no longer indifferent to the eagles and claimed that the eagles were killing their chickens and because of this the people cut or burnt down nests of some pairs" (Jackson *et al.* 1979). Their study 31 years after the first census counted 8 pairs of 5 species. This represented a 69% decrease in the number of pairs and a 50% decline in the number of species.

These two independent surveys agree well with each other despite using different methods and the 1979 survey did not cover all possible sites. Only the status of the Wahlberg's Eagle is open to question, but the declining trend for the species was consistent in both surveys.

In 1986 another university expedition found only one pair of Martial Eagles (Johnson *et al.* 1986). Although this survey was incomplete, it did verify the existence of one nest, formerly belonging to the single Crowned Eagle pair that collapsed in 1980, being acquisitioned by the Martial Eagle pair. They saw one Wahlberg's Eagle but did not locate a nest. Their data, while inconclusive, suggest a pair decline of 92% or more, and a species decline of 80% or more.

The majority of the loss appears to have happened in as short a period as two to five years between 1977 and 1981. Perhaps significantly, the last known individual Black Rhinoceros on Eagle Hill (and adjacent hills) also vanished in the earlier part of the same period (pers. obs.).

In 1995 I was awarded the Leslie Brown Memorial Grant to help build a library for Gataka Primary School in the foothills; when I went there for that work, between 1995 and 1996, I observed one pair of Martial Eagles in the old Crowned Eagle nest and one pair of Ayres's Hawk Eagle *Aquila ayresii* in the original site. More importantly, I confirmed the extirpation of African Hawk Eagle, Crowned Eagle, Bateleur *Terathopius ecaudatus*, Brown Snake Eagle, and other Martial Eagle and Ayres's Hawk Eagle nests and/or occupation. Eagle density was 0.5/100 km^2.

The status of Wahlberg's Eagle remains an enigma as they appeared to have de-

clined dramatically from 11 pairs to fewer than 5 pairs in 1978, and to one pair in 1979. One Wahlberg's Eagle was seen in 1986, while none was observed in 1995 and only one in 1996. The same loss of Wahlberg's Eagles was noted on the entire route from Nairobi to Embu, with four well known nests near Thika in 1978 having declined to none in 1995. Why this happened is difficult to understand, although the trend is widely observed throughout rural farmed and livestock-rearing parts of Kenya, despite birds' liking for exotic eucalyptus trees.

Meanwhile, the Kamburu Dam, which flooded the former nesting trees of some species, has offered new opportunities for African Fish Eagles with one new nest site in the southern study area.

In 1999, I returned to confirm that the Martial Eagle pair at Kiritiri had gone. Farms had reached the upper slopes and I observed no eagles at all. The raptors I was shown by a Gataka School student were an African Harrier Hawk *Polyboroides typus* and its nest, an African Goshawk *Accipiter tachiro*, and a Great Sparrowhawk *Accipiter melanoleucus* in the mango plantations of the farms.

In 1996 the Martial Eagle pair was not observed and the tall croton trees in which they nested had been severely thinned. The Ayres's Hawk Eagle was not observed either, but the nest tree remained. The Ayres's was observed in 2002, although its breeding status was not verified. No other eagles were observed.

The primary school students informed me of the near total loss of all wildlife on the hill and surroundings, with the loss of all wild ungulates due to poaching. Charcoal burners had denuded the former closed canopy forests on the upper slopes, although some large crotons remained. It is plausible that only the Ayres's Hawk Eagle is capable of remaining in this severely altered environment; rather ironic, as Leslie Brown frequently drew attention to this species as a rarity.

Discussion and Conclusion

The effects of increased human disturbance appeared to exceed a threshold within the large raptor community that led to rapid loss. Stability in the population after the loss is predicted, but not observed, due to the continued rapid loss of habitat. The rapid loss at a certain point during a steady human increase implies an ability by raptors to withstand change, but a sudden collapse once those changes exceed a definable (if theoretical) level. These records suggest a stratified tolerance level among species to anthropogenic disturbance. These conditions may be expected to be duplicated elsewhere in areas with similar human and habitat variables.

Today we are asked to predict the status of raptors and answer complex questions regarding the rate of their decline for IUCN Red Data listings. In the time it takes to acquire the information the status of the species under investigation may have changed. Even if we do understand the biology of the species we must accept that, regionally, raptors and people behave differently. It would be incorrect to suppose that where one prospers it will do so wherever it is found.

Over 48 years, Eagle Hill fell from a place of extraordinary abundance of eagles, 6.9 pairs/100 km^2 , to an area of great paucity, 0.5 pairs/100 km^2 by 1996. The former density of eagles at Eagle Hill was comparable to the density of eagles in two conservation areas in Zimbabwe (Table 2).

Table 2. Comparison of eagle densities in Kenya and Zimbabwe.

Location	One nesting pair per	Source
Eagle Hill, Embu, Kenya	14.5 km^2	Brown 1956
Siabuwa Communal Land, Zimbabwe	31.0 km^2	Hartley 2002
Save Conservancy, Zimbabwe	8.2 km^2	Hartley *et al.* 2002

To have a study group of raptors and document their decline over time is invaluable. Unfortunately it is not possible to add local human variables to the equation as accurate national data do not exist. If it were, it would indicate what we already suspect, but find hard to prove — a catastrophic loss of large and sensitive raptors in areas across Kenya that have undergone a similar transformation. The mechanism that put this catastrophe in place is rural man armed with simple non-mechanized farming implements, accompanied by his livestock. We accept that in the need for food, fuel and protection of crops and domestic animals, wildlife will suffer and decline. What we do not often appreciate is the extent of these losses, down to the very last eagle.

What occurred on Eagle Hill is no different from what has occurred in some 50% to 90% of Kenya in the same time span. Given that less than 10% of Kenya is effectively protected within national parks, reserves and sanctuaries few would argue that man has not used the majority of fertile areas for farming and the dry areas for rearing livestock, resulting in biota impoverishment. The density of livestock inside our protected systems is a major concern that further stresses already impoverished and minimally sized areas. Outdated land policies that neglect to understand that 'idle land' is, by definition, land with the greatest abundance of natural biomass, greatly diminishes appeals made to protect land from overexploitation. As a measure of the changes observed in Kenya, I know of no place, within or outside protected areas, that holds the same density of raptors that Eagle Hill held in the late 1970s.

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