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LARGER MAMMALS AS A TOURIST ATTRACTION: FACTORS INFLUENCING THEIR VISIBILITY IN THE HELL'S GATE NATIONAL PARK, KENYA

I GRANDI MAMMIFERI COME ATTRAZIONE TURISTICA: FATTORI CHE NE INFLUENZANO LA VISIBILITA' NELLO HELL'S GATE NATIONAL PARK, KENYA

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ABSTRACT

The larger (i.e. > 5 Kg) mammals of the Hell's Gate National Park were censused during the dry season. Fourteen species were sighted. Eland and Thomson's gazelles, as well as kongoni and zebras occupied open areas respectively in the early morning and late afternoon, whereas Grant's gazelles were present chiefly around midmorning. The Customer Satisfaction index (Chanter & Owen, 1976), calculated for all mammals, showed little variation throughout the day, but the greatest values were found at sunrise and at sunset. Concentration of animals was the highest around water pools.

Key words: Mammals, Tourism, Management.

RIASSUNTO

Durante la stagione arida è stata studiata la "godibilità turistica" dei grandi mammiferi, attraverso l'indice di Chanter & Owen (1976), in relazione alla loro avvistabilità nello Hell's Gate National Park (Kenya). Eland, gazzelle di Tliomson, alcelafi e zebre di Grant sono risultate specie frequentatrici degli spazi aperti, le prime due soprattutto all'alba e le altre due ai tramonto, mentre le gazzelle di Grant comparivano principalmente a mattino inoltrato nelle aree erbose. Le pozze d'acqua costituivano importanti poli d'attrazione. L' indice di Chanter & Owen, calcolato sulle 14 spccic di mammiferi avvistati nel corso dei transetti (75 Km/d), ha indicato una scarsa variazione di godibilità turistica nei corso della giornata, ma con valori lievemente maggiori all'alba e al tramonto.

Parole chiave: Mammiferi, Turismo, Gestione.

INTRODUCTION

The impact of tourism can be detrimental to the normal activities of wildlife, especially in protected areas (e.g. Geist, 1971; Leuthold, 1977; Cederna & Lovari, 1985). On the other hand, the contribution of tourism to the local economy is often very important in providing compensation for the park residents whose land-use activities are restricted. Furthermore, the income from park visitors constitutes a considerable proportion of the national budget in several African countries.

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Although the effect of bird life on visitors' satisfaction should not be underestimated, the larger mammals are likely to be the main element eliciting interest in tourists, as they are conspicuous, often physically attractive, and sometimes dangerous (Everett, 1978; More, 1979). On the other hand, habitat structure and activity rhythms can influence the visibility of mammals, which in turn may affect the visitors' satisfaction. Therefore, an assessment of the best times of the day to maximise the possibility of seeing animals is an important basis for tour planning. Furthermore, visibility is obviously impaired by tall vegetation, which should also be considered by park managers when devising a tourist itinerary.

This paper concentrates on the effect of time of day and vegetation cover during the dry season on the visibility of mammals, which are an important tourist attraction in the Hell's Gate National Park, Kenya. This park is one of the few protected areas in Kenya where tourists are allowed on foot. Since visitors are not, at present, required to keep to the inaiii track, appropriate forms of control as well as measures to maximise tourist satisfaction will have to be planned. This paper provides some relevant basic information.

STUDY AREA

The Hell's Gate National Park (6825 ha), established in 1984, is located in the Rift Valley Province (between 0°30' e 1°00'S, about 36°30'E), ca. 100 Km North West of Nairobi, Kenya (Fig. 1). *As* a result of its location *it* is expected that it will relieve much of the tourist pressure on the Nairobi National Park (Wildlife Planning Unit, 1985). Mean annual rainfall is about 650 mm, irregularly distributed throughout the year, but with a peak in April/May. The soils, of volcanic or lacustrine origin, are porous. Therefore, rainwater quickly drains away. The main vegetation types in the park are open or sometimes dense scrubland, dominated by *Acacia drepanolobium* and *Tarchonanthus camphoratus,* and open grassland, dominated by *Themeda triandra.* Censuses were carried out in the latter habitat (where visibility is greater), which covers an area of about 20 km^2, located mainly along the Njorowa Gorge. This gorge was originated by volcanic disturbances of the Great Rift Valley and it formed the overflow of nearby Lake Naivasha during the Pleistocene (Wildlife Planning Unit, 1985).

METHODS

The study area was divided into a grid of quadrats (1 km^2/each). The proportion of wood cover was estimated in each of them (S. Page and J.O. Rieley, Universities of Leicester and Nottingham, respectively, 1987, pers. comm.). Quadrats containing a woody cover exceeding 90% of the local vegetalion were considered "closed". The census itinerary (15 km) followed the main track of the park. A total of 25 censuses were carried out during the dry season (August 5-9-21-25; September 1,

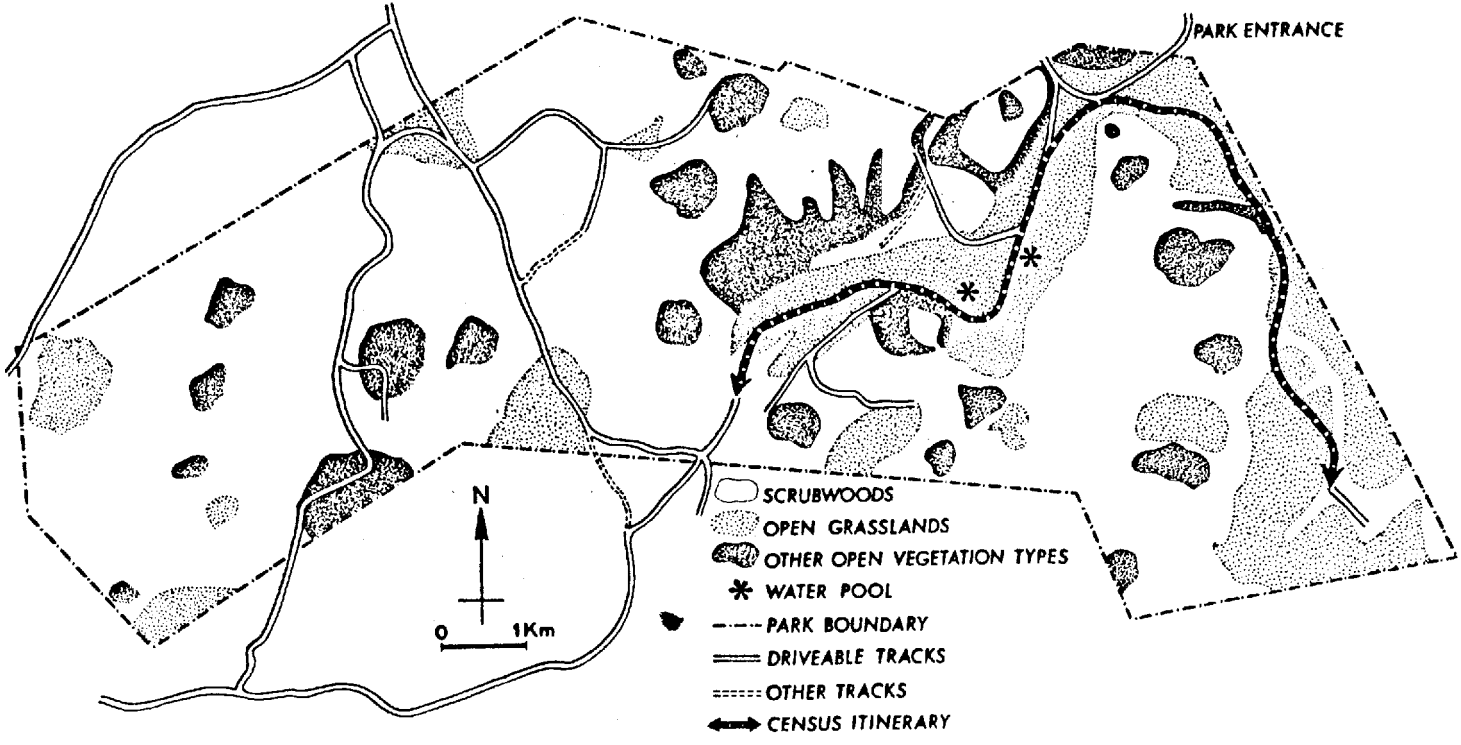

Fig. 1 – Census itinerary and map of the Hell's Gate National Park.
Percorso del censimento e mappa dello Hell's Gate National Park.

Tab. 1 – Maximum number of larger mammals sighted during the censuses and the time of the observations.
Numero massimo di grandi mammiferi avvistati durante i censimenti e relativa ora di avvistamento.

FAMILY AND SPECIES	COMMON NAME	MAX. N° SIGHTED	CENSUS HOUR
Cercopithecidae			
Papio cynocephalus	olive baboon	14	17:00-18:00
Canidae			
Canis mesomelas	black-backed jackal	7	8:00-9:00
Felidae			
Felis lybica	wild cat	1	13:00-14:00
Equidae			
Equus burchelli	Grant's zebra	195	6:30-7:30
Suidae			
Phacochoerus aethiopicus	warthog	7	8:00-9:00
Giraffidae			
Giraffa camelopardalis	giraffe	11	6:30-7:30
Bovidae			
Taurotragus oryx	eland	119	6:30-7:30
Alcelaphus buselaphus	kongoni	369	17:00-18:00
Gazella granti	Grant's gazelle	37	11:30-12:30
		17	17:00-18:00
Gazella thomsoni	Thomson's gazelle	95	6:30-7:30
Oreotragus oreotragus	klipspringer	2	11:30-12:30
		2	17:00-18:00
Raphicerus campestris	steinbok	4	6:30-7:30
Madoqua kirki	Kirk's dik-dik	2	6:30-7:30
Syncerus caffer	buffalo	40	6:30-7:30

1987), five censuses/day (hours: 6:30-7:30; 8:30-9:30; 11:30-12:30; 13:00-14:00; 17:00-18:00). The track was followed by car, at a constant speed of 15-20 km/h, while four observers (two each side) recorded the number of larger (>5 kg) mammal species in each quadrat on either side of the vehicle. The strip visibility ranged between 15 m and 1.5 km, but it was usually good ($\bar{x}$ = 450 m). Observations were carried out with 8x30 and 10x40 binoculars. A 15-60x spotting scope was used, when necessary.

The Customer Satisfaction Index (Chanter & Owen, 1976), henceforward called C.S.I. in this paper, has been used to evaluate the time of day that is most attractive for tourists. The index is

$$\Theta = \log (\beta N)$$

where N is the total number of animals seen and β is the one's complement of Simpson's index of diversity (Simpson, 1949). This index therefore takes both the

total number and the diversity into account. The values have been obtained on all sightings of mammals. The percentages of individuals belonging to the most frequently sighted species (eland, Thomsoii's gazelle, Grant's gazelle, Grant's zebra, kongoni) present in the open during each census hour were also calculated according to the formula

$$\sum_{i=i}^{n} k \; / \; \sum_{i=1}^{n} N \cdot 100$$

where k is the number of individuals of each species seen in each census, n is the number of census days, and N is the maximum number of individuals recorded in the censused area and its environs during one of the five daily censuses in each day. Such percentage values are maximal, as hidden animals could not be considered.

The chi-square test has been used to assess whether some quadrats of the open area were used more often than expected by the commonest species. The number

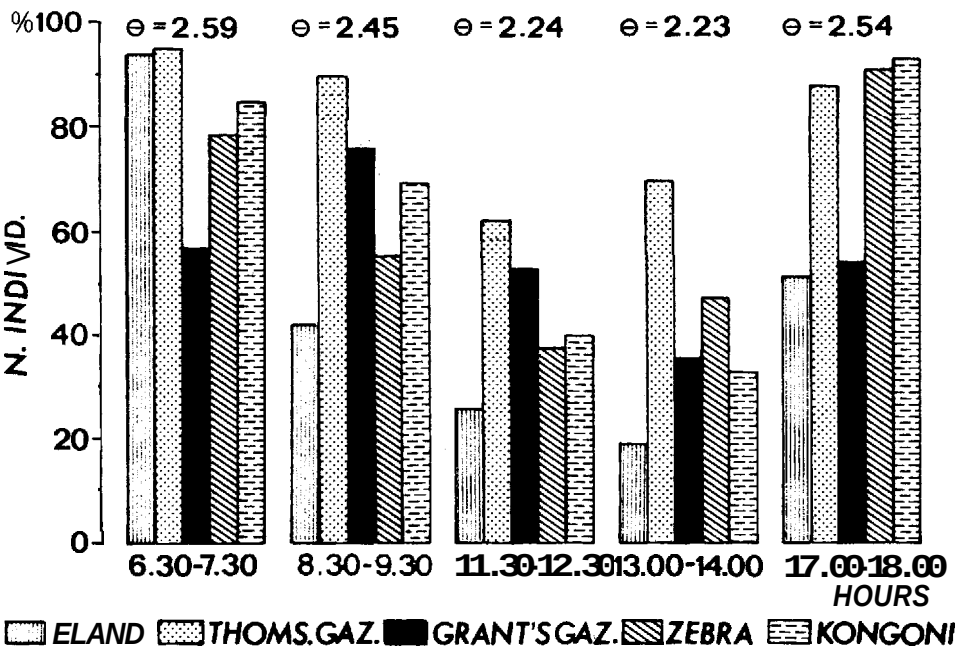

Fig. 2 – Proportions of individuals of ihc more frequently encountered species during each census hour, in the open quadrats (i.e. <90% of wood cover). The Θ **values** have been obtained *on* **all** sightings of mammals. See also "Methods".
Percentuale degli individui di **specie** *più frequentemente avvistate, durante ogni censimento, nelle celle con buona visibilità (<90%* **di** *copertura boscosa). I valori* Θ **sono** *stati* **calcolati** *sul numero* **di** *tutti i mammiferi avvistati.* **Si** *veda la sezione* ***"Metodi"****per ulteriori dettagli.*

Tab. 2 – **Quadrats of the study arca grid significantly used more than expected by the commonest ungulate species. Pcrceiit wood cover in parentheses. Quadrats B and D contained a water pool each.**
Celle della griglia dell'area di studio usate significativamente più spesso dalle specie più comuni di ungulati. La percentuale di copertura boscosa 2 tra parentesi. Le celle B e D contenevano ciascuna una pozza di acqiia.

QUADRATS	UNGULATE SPECIES				
	KONGONI	THOMSON'S GAZELLE	GRANT'S GAZELLE	ZEBRA	ELAND
A(30)	***	***	***	***	*
B(10)	***	***	**	***	**
C(10)	*	***	**	**	
D(13)	*	***	***	**	***
E(80)	*				

* P < 0.05 ** P < 0.01 *** P < 0.001

of occurrences - and. not the actual number of individuals - in each quadrat has been used, to avoid an overestimate of the use of the least wooded quadrats, i.e. where visibility conditions were the best.

RESULTS

During the censuses fourteen species of larger mammals were recorded overall (Tab. 1). **C.S.I.** values calculated for the five census hours are given in Fig. 2. The greatest C.S.I. values were found just after sunrise and before sunset. However, only **slight** variations could be detected throughout the day. In the same figure only liistograms for the most frequently sighted species are shown. The percentages of individuals present in the open, obtained for each census hour, were greatest early in the morning for eland and Thoinson's gazelles, whereas zebras and kongoni showed their maximum scores just before sunset **(Fig.** 2). On **the** other hand, the percentage of Grant's gazelles present in the open quadrats was the highest in the second census hour (8:30-9:30). Thomson's gazelle was the species **most** consistently recorded in open areas (Fig. 2). By contrast, eland mainly occurred in closed quadrats for most of the day.

The frequency analysis on the use of open areas by these species has indicated their significant preference towards some (three to five) of the quadrats (N = 18) **(Tab.** 2). In one case only did tlie woody cover of the preferred quadrats exceed 30%. Furthermore, all species were mainly observed in the same areas (Table 2).

DISCUSSION

The greater visibility of eland, Thomson's gazelles, zebras and kongoni at dawn or at dusk would support the validity of the popular belief that wildlife species are active mainly in the early morning and late afternoon, which therefore are the best times of the day for observation. However, such a view has been questioned by Leuthold (1977) who rightly invites caution before accepting such popular statements. In fact, in this paper we have also reported some different species specific behaviour. Also, local environmental, e.g. climatic, features are likely to influence the activity pattern of animals. Kongoni, zebra and Thomson's gazelle are mainly grazers (Leuthold, 1977). Therefore, not surprisingly, it was easier to sight these species in the open areas (Fig. 2). Among the three species, Thomson's gazelle is the most dependent on free water for its living requirements (Walther, Mungall & Grau, 1983). In fact, it was seen more frequently in the open than all others (Fig. 2; Tab. 2). Eland and Grant's gazelle are browsers (Hofmann & Stewart, 1972) and were therefore less visible in the open (Fig. 2). The data set out in Fig. 2 indicate that dawn and sunset are the best times of day to watch some of the most prominent species. However, the variation of C.S.I. values throughout the day is by no means great. Other species less numerous or less predictably met may also show up, in addition to the easy-to-observe ones listed in Tab. 2.

Quite a few species seem to concentrate in the environs (several square kilometres) of water pools during the dry season (Tab. 2; J. Carver, Warden of the Elsamere Conservation Centre, pers. conim.). In this season, the herbivores have to withstand both a reduced free water availability and coarser forage. Therefore the time allocated by them in searching for suitable food resources increases considerably (Leuthold, 1977). Uncontrolled visitors, particularly if on foot, are likely to have a very disruptive effect on the feeding of wild animals (cf. Cederna & Lovari, 1986), which may be crucial to water-dependent species during the dry season. The dry season is one of the most popular times of the year for visiting East African national parks. For these reasons, some suggestions for tourist management can be given, If several guided visits are organized from dawn to dusk, tlie presence of **a** guide would ensure a number of desirable effects: a much greater control over tourist activities, which will strongly reduce direct and indirect harassment of wildlife; tourists will benefit from the guide's knowledge of local wildlife and terrain; the tourist numbers and use of the park could be suitably regulated; one or more job opportunities for local people would become available.

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