Jumbos or bust: do tourists' perceptions lead to an under-appreciation of biodiversity?

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Ecotourism is widely assumed to provide a mechanism for the maintenance of biodiversity. However, the perceptions of biodiversity by tourists have rarely been evaluated. We assessed this during self-guided wildlife viewing in the Addo Elephant National Park, South Africa, and evaluated the effects of guides on day- and night-drives on the tourists' perceptions of faunal biodiversity. Self-guided tourists recorded seeing few mammals, reptiles and birds, these being largely limited to the large, charismatic and open-habitat species. Self-guided tourists who had seen elephants expressed satisfaction with their wildlife viewing, although some expressed a wish to have seen other vertebrates. Tourists who participated in guided day-drives saw more species than self-guided tourists, while those who participated in guided night-drives saw the greatest diversity of vertebrates. In general, tourist interest in biodiversity was largely focused on a few vertebrates; while invertebrates (with the exception of the flightless dung beetle) and plants were largely ignored. We suggest that the quality of wildlife viewing may be significantly improved through the use of guides. Guiding offers an opportunity to expand the community involvement (through employing game-guides) and environmental education components of ecotourism. The findings of this study indicate that tourists focus on a few charismatic species and may hold misconceptions of the nature of biodiversity. We argue that the assumption of an umbrella role of a few charismatic species in protecting ecosystems and their constituent biodiversity is probably precarious. It is imperative that the public, and politicians who make decisions regarding the conservation of biodiversity, are sensitized to the value of biodiversity. Traditional self-guided wildlife viewing in conservation areas generally leads to the tourists having a lesser wildlife experience, which undervalues biodiversity as an ecotourism resource.

Key words: biodiversity, ecotourism, charismatic fauna, Addo Elephant National Park, elephants.

INTRODUCTION

Ecotourism is seen as a complex, multidisciplinary industry that brings together conservation, development, recreation, culture and education (Lindberg & Hawkins 1993; Goodwin & Leader-Williams 2000). Ecotourism has also frequently been identified as a powerful tool that can be used to conserve biodiversity (Western 1992; Miller *et al.* 1995). This argument suggests that the ecotourism industry relies directly on biodiversity, and that by conferring a value upon biodiversity (*i.e.* recognizing biodiversity as economic 'goods', Aylward & Barbier 1992), the industry will be prepared to contribute to the conservation of the full range of animals and plants, and their ecosystems (Lindberg & Hawkins 1993; Geach 1997). An additional benefit of ecotourism in developing countries is that it is seen as a potential way of spreading wealth from affluent communities (typically urban communities or communities in developed countries) to poorer local communities (Lindberg & Hawkins 1993; Hanekom & Liebenberg 1994; Goodwin & Leader-Williams 2000).

For ecotourism to meet this potential, mechanisms have to be developed to appropriate the value of the biodiversity experience, typically through the sale of goods and services to the tourists by the local community; thus employment benefits of ecotourism are paramount. Another important aspect of ecotourism that is often overlooked is the need to educate tourists about the ecosystem that they are visiting. This has the dual

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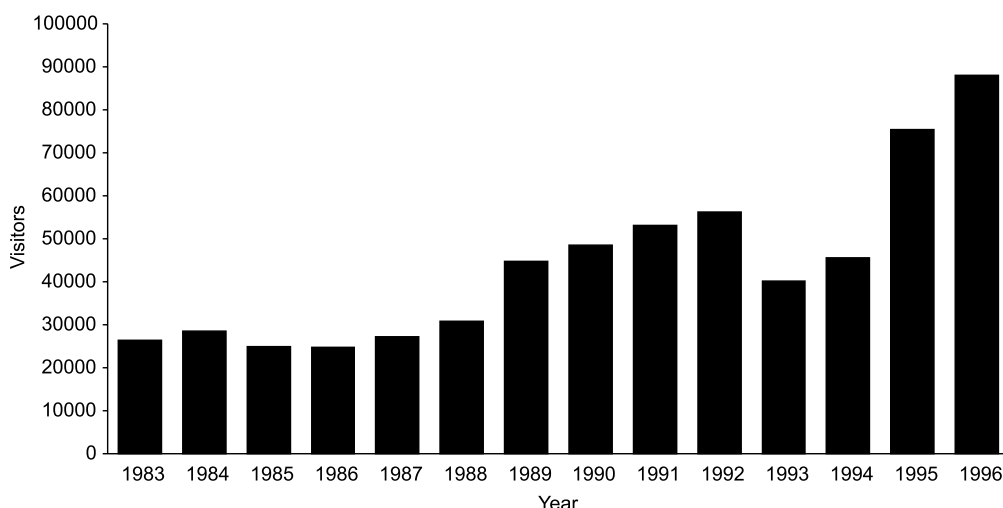 E-mail: zlagik@zoo.upe.ac.za

Fig. 1. Increase in visitor numbers to the Addo Elephant National Park, South Africa, over the period 1983–1996 (Addo Elephant National Park records).

benefit of increasing the value of the tourism experience, while providing employment opportunities for those (preferably) local people providing the information (Lindberg & Hawkins 1993).

However, the full range of biodiversity has yet to be identified by the scientific community and there is also debate regarding the definition of this term and its characterization (*e.g.* Walker 1992; Brown 1998). Tourists, who are rarely taxonomic, ecological or environmental experts, are unlikely to be able to appreciate the full range of biodiversity. By being aware of only a subset of the animals, plants and landscapes that form an ecosystem, it is likely that tourists will not be strongly motivated to demand, or be prepared to subsidize the conservation of biodiversity. Instead, we predicted that tourists would be concerned with only a few charismatic species, as also suggested by Goodwin & Leader-Williams (2000), and that biodiversity *per se* is of little interest and hence value to tourists. This also suggests that it would be beneficial to increase the range of biodiversity experienced by tourists, in order to enhance their wildlife experience (the educational component of ecotourism) and to provide 'tourism value' to a wider range of species.

In order to test these ideas, we investigated tourists' perceptions of biodiversity in the Addo Elephant National Park (AENP), South Africa. We attempted to answer three questions: What components of faunal biodiversity do tourists actually perceive? Can their perceptions of faunal biodiversity be improved? What are the implications of tourists' perceptions of biodiversity for conservation strategies?

STUDY AREA

The AENP is located 70 km northwest of Port Elizabeth, Eastern Cape Province, South Africa. The park has recently been expanded to an area of about 120 000 ha through the amalgamation of the Zuurberg National Park with the AENP, and additional land purchases (Kerley & Boshoff 1997). However, only the 'old' AENP is developed for tourism use, and we restricted our study to this area of 11 000 ha, and refer to it hereafter as the AENP.

The AENP is well developed for tourism, with 60 km of tourist roads, well located waterholes, game-viewing hides and a restaurant overlooking a floodlit waterhole (Kerley *et al.* 1995). Overnight accommodation is available in the form of fully serviced chalets and camping sites. The AENP is a highly popular tourism destination, with 88 000 tourists in 1996, and visitor numbers have been growing at 20% per annum since 1994 (Fig. 1). Nearly half the visitors are foreigners (Geach 1997).

The AENP supports a relatively high diversity of vertebrates, including a recorded 53 species of mammals, 193 species of birds, 37 species of reptiles and 16 species of amphibians (Geach 1997). There are at least 581 species of vascular plants (Johnson *et al.* 1999). Invertebrate diversity has not been surveyed, but is probably orders of magnitude greater than that of vertebrates. As the

name implies, elephant (*Loxodonta africana*) are a major feature of the AENP, with approximately 240 elephants within the Park at the time of the study. Other prominent species include black rhinoceros (*Diceros bicornis*), Cape buffalo (*Syncerus caffer*), kudu (*Tragelaphus strepsiceros*) and red hartebeest (*Alcelaphus buselaphus*).

There are two different opportunities for tourists to experience the wildlife in the AENP. The first is the traditional self-guided option, in which tourists are allowed vehicular access to the 11 000 ha wildlife area. All visitors are provided with an information pamphlet that describes the larger vertebrates and that includes a map of the tourist accessible roads. Additional pamphlets on a variety of species and tourism issues are available *gratis* at the reception office. Self-guided tourists are limited to the daylight hours when they may drive along the various roads within the wildlife area. In addition, they may undertake self-guided walks in the Botanical Reserve, a 400 ha area from which elephant, rhinoceros and buffalo are excluded (few tourists reported using this facility, and we did not include this in our results).

The alternative option is to participate in a guided game-viewing drive in which up to 16 tourists are accompanied by a trained guide (National Parks staff) on a specially modified 'game-viewing vehicle'. Guided drives take place during the day, as well as at night. Game viewing at night is facilitated by the use of powerful hand-held spotlights, operated by the guide.

METHODS

We used questionnaire surveys to measure tourists' perceptions of faunal biodiversity (Geach 1997). A total of 700 questionnaires were handed out to self-guided tourists entering the wildlife area of the AENP, during December 1995 (austral summer) and May/June 1996 (austral winter). These self-guided tourists were asked to record the fauna that they saw, and provide comments on their expectations and levels of satisfaction of their wildlife experience, as well as recommendations for improving their wildlife experience. Note that we pooled some taxa in order to cater for the nature of the reporting of the data, *e.g.* raptors, insects. The complete questionnaires are available in Geach (1997).

The contribution of experienced guides and specialized game-viewing techniques were assessed from records of species sighted during guided drives conducted during the day (day-drives) and at night (night-drives) over the period August 1996 to January 1997. Some drives extended from daylight through to night; these are referred to as sunset-drives. The guides (National Parks staff) were asked to record the fauna that they were able to show the tourists during the drives. Note that the tourists on the guided drives were not interviewed, and that no data on their perceptions of wildlife were available. We attempted to obtain data for every drive over the study period.

RESULTS

Of the 700 questionnaires handed out to self-guided tourists, 446 responses were received (64%). Records of animal sightings for 69 guided day-drives, 25 guided sunset-drives and 64 guided night-drives were obtained. The results from the guided sunset-drives are a combination of those of the guided day- and guided night-drives, and are not presented as they do not add materially to the findings.

A total of 77% of the self-guided tourists listed elephants as an important *a priori* reason for visiting the AENP. Other reasons given for visits included seeing 'big game' (47%), photography (37%), scenery (37%), bird watching (17%) and the proximity to the city of Port Elizabeth (8%). Most self-guided tourists entered the wildlife area between 10:00 and 12:00 (Fig. 2).

A mean of 3.4 taxa (range = 0–11) were recorded by self-guided tourists, compared with 8.3 taxa (range = 1–13) on guided day-drives and 13.8 taxa (range = 1–19) on guided night-drives. Tourists tended to focus on mammals, with a mean of 3.2 mammal species (range = 0–11) recorded by self-guided tourists, compared with 5.1 (range = 1–10) on guided day-drives and 11.0 (range = 0–15) on guided night-drives.

The reporting of mammal sightings by self-guided tourists varied considerably, ranging from 83% reporting elephants through to 1% for scrub hares (*Lepus saxatilis*) (Fig. 3a), while a large proportion (23 species, 43%) of mammals were not reported at all. The frequency of reporting was strongly skewed; after elephants the next most frequently observed mammal was the red hartebeest, which was recorded at a frequency of about half that of elephants (42%, Fig. 3a). The sighting frequency of elephants increased on guided day-drives (97%, Fig. 3b), and the general pattern of the frequency of reporting varied considerably between self-guided and guided day-drives, with the frequency of reporting generally increasing
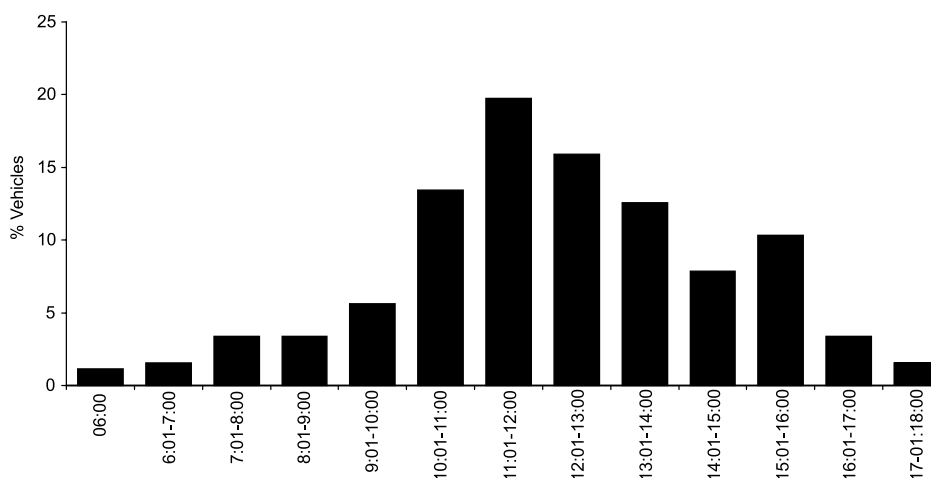
Fig. 2. Time of entry of self-guided visitors to the wildlife area of the Addo Elephant National Park, expressed as the percentage of vehicles.

on guided day-drives (*cf.* Fig. 3a & 3b). Of particular significance is the increase in the frequency of reporting of black rhinoceros by an order of magnitude on the guided day-drives. The pattern of mammal sightings on guided night-drives (Fig. 3c) varied markedly from that of self-guided or guided day-drives, the most obvious feature being the increase in the sightings of nocturnal species such as kudu, black-backed jackal (*Canis mesomelas*) and springhare (*Pedetes capensis*).

Compared with mammals, the frequency of reporting of other animals was extremely low, with the highest reporting frequency of 15% for tortoises (actually three species potentially reported) being significantly below that of elephants for self-guided tourists (*cf.* Figs 3a & 4a). Of the invertebrates, the self-guided tourists were aware only of the presence of the threatened flightless dung beetles *Circellum bacchus.* The frequency of reporting of birds was much higher during the guided day- and night-drives (Fig. 4 b,c), although their attention was largely focused on the bigger, more impressive species such as ostrich (*Struthio camelus*) and raptors.

The ability of tourists to correctly identify species must be accepted with caution, as a total of 10% of self-guided tourists reported species that do not occur within the AENP, including unmistakable species such as cheetah (*Acynonyx jubatus*). This was despite the fact that all visitors are issued with information pamphlets, and 65% reported having commercially available guidebooks.

In terms of faunal biodiversity, self-guided tourists reported seeing an average of only 1.5%

of the total vertebrate diversity within the AENP, while guided (day and night combined) tourists experienced twice as much (3.7% of the vertebrate diversity).

Self-guided tourists were either very satisfied or satisfied (73%) with their game-viewing experience. Paradoxically, 70% of self-guided tourists asked for the provision of a greater diversity of animals within the AENP, indicating that they were unaware of the fact that on average they had failed to record nearly 98% of the vertebrate animals occurring within the park.

A large proportion (60%) of self-guided tourists indicated that clearing of the indigenous thicket vegetation, in order to improve game-viewing opportunities, would increase their enjoyment of the AENP.

DISCUSSION

Tourists' perceptions of biodiversity

Tourists clearly only appreciate a small proportion of vertebrate biodiversity in the AENP, typically focusing on the charismatic megafauna, which in Africa are exemplified by the 'big five'. The 'big five' refers to lion (*Panthera leo*), leopard (*P. pardus*), buffalo, elephant and rhinoceros (black or white), originally considered to be the most dangerous species to hunt in Africa, but now the major wildlife drawcard for the tourism market (Western 1992; Goodwin & Leader-Williams 2000). Elephant, black rhinoceros and buffalo occur in the AENP, the status of leopard is uncertain and lion do not occur. Tourists to the AENP
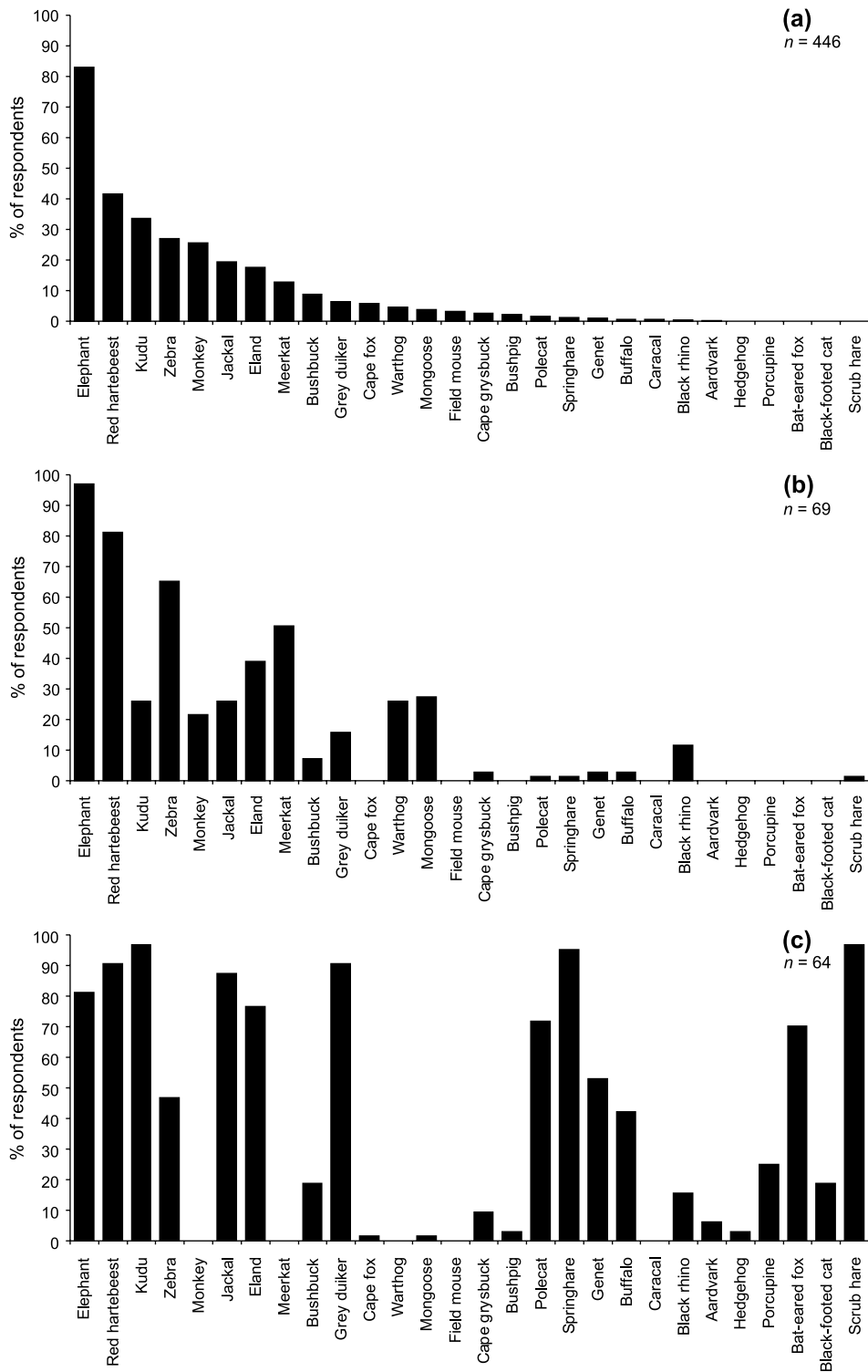
Fig. 3. The frequency of sightings of mammals by (**a**) self-guided tourists, (**b**) guided day-drives and (**c**) guided night-drives for the Addo Elephant National Park.
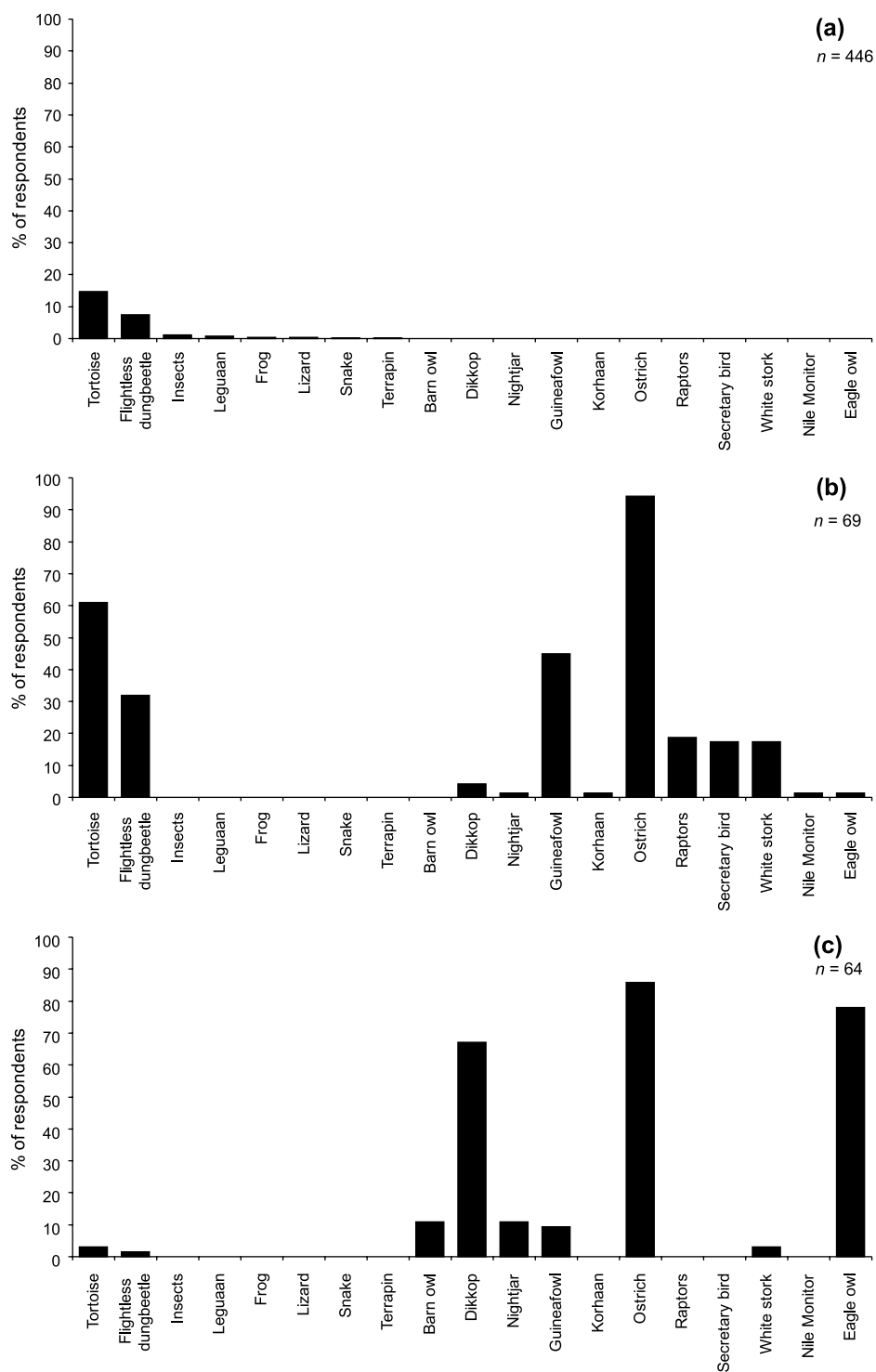
Fig. 4. The frequency of sightings of animals besides mammals by (**a**) self-guided tourists, (**b**) guided day-drives and (**c**) guided night-drives for the Addo Elephant National Park. Note that some taxa have been grouped to allow for the nature of the data reporting.

were clearly focused on elephants and were generally satisfied with seeing them. Tourists also tended to record open-habitat species such as red hartebeest, in contrast to the more secretive thicket-dwelling species such as kudu. Tourists' interest in invertebrates was extremely limited, with the exception of the flightless dung-beetle. The interest in the flightless dung-beetle is a consequence of the information brochures and road signs which draw attention to both the threatened conservation status of this species as well as their intriguing behaviour of dungball rolling. Thus, flightless dung-beetles may be functioning as 'charismatic microfauna'. This illustrates that tourists can be educated and sensitized to relatively obscure species.

The increased efficiency whereby tourists observed vertebrates on guided game-drives clearly demonstrates that tourists' perceptions of biodiversity can be improved. Guided drives therefore have a strong educational function in addition to their recreational value. Ecotourism includes an educational component (Western 1992; Lindberg & Hawkins 1993), and guided game viewing would therefore elevate the traditional self-guided game viewing from nature-based recreation to ecotourism.

It is also apparent that there are limits to the amount of biodiversity that tourists can experience within the typical 1–3 day visit (Geach 1997) to the AENP. Therefore, it is important to manage the expectations of tourists through informing them of what can be experienced rather than presenting them with unrealistic and bewildering lists of plants and animals that occur within a conservation area.

An additional benefit of the guided wildlife viewing is that it provides employment opportunities for local people as trained game-guides. These services could be expanded to include some innovative ones, such as the provision of trained guides to accompany tourists in their own vehicles. Such opportunities are particularly important in South Africa, where unsustainable forms of landuse and high population pressures have led to high levels of unemployment and poverty (Hanekom & Liebenberg 1994). These would be good examples of sustainable, non-consumptive natural resource use and show how biodiversity *per se* can achieve economic value, and thereby attract support from the broader community and politicians (Hanekom & Liebenberg 1994).

Jumbos or bust

The limited perception of biodiversity by self-guided tourists appears to contrast with their high degree of satisfaction with their game-viewing experience. However, this apparent paradox can be resolved in terms of the fact that most visitors to the AENP are not particularly interested in seeing a range of species: they visit the park largely to see elephants (77%) and are generally successful in this regard (83%). This is also reflected in the time of entry into the wildlife area (Fig. 2). Few visitors bother to enter the area early in the morning or late in the afternoon, when it may be possible to encounter some of the more crepuscular/nocturnal species. Instead tourists tend to enter the wildlife area before midday. This coincides with the well-publicized habits of the elephants of congregating at waterholes in the early afternoon. These observations suggest that tourists are mainly interested in the elephants and make little effort to see other species. This agrees with findings in Indian and other African conservation areas, where tourists were most interested in seeing large, and preferably dangerous, animals (Goodwin & Leader-Williams 2000).

The umbrella species concept

It may be argued that it is not necessary for tourists to experience the full range of biodiversity to ensure tourism support for its conservation, but that tourism appreciation of a few 'umbrella' species would be adequate to provide support to conserve the full range of biodiversity. The concept of umbrella species assumes that the conservation of a particular focal species will serve to conserve other species that occur within the umbrella species' conserved habitat (Wilcox 1984; Walker 1992; Berger 1997). Large species have large home ranges and low density and therefore need large areas for their effective conservation, thus generally serve to act as umbrella species.

Large, charismatic, species also attract public attention and act as 'flagship' species (Leader-Williams & Dublin 2000) which stimulate conservation awareness and actions. For example, through the public concern for the Addo elephants (*i.e.* their 'flagship' role), the AENP was established (Hoffman 1993), and the habitat of a range of other animals was thereby also conserved (*i.e.* their 'umbrella' role). Buffalo, in particular, would otherwise have been extirpated from the Eastern Cape (Kerley & Boshoff 1997). The present study shows that elephants still attract the most interest

in this park, and provide the most tourist satisfaction.

However, the umbrella species concept is not infallible. First, there are always possibilities that the umbrella species may not survive in the designated conservation area (Berger 1997) and with their local extinction, the protection status may be removed from the area. For example, population persistence models indicate that the Addo elephants have some risk of extinction (van Jaarsveld *et al.* 1999), an event that would presumably have led to the reconsideration of the future of the park.

A second shortcoming of the umbrella species concept may occur when the public appreciation of a species does not extend to its habitat (and hence the 'sheltered' species within that habitat). This is clearly illustrated by the results presented here, as a large proportion of the visitors to the AENP (60%) actually suggested that the indigenous vegetation should be cleared in order to improve game-viewing opportunities. There is therefore a perspective that seeing the animal is important, while the natural setting is of lesser relevance. Thus, a segment of the tourist population would probably not advocate the conservation of large areas of natural habitat for whatever species they would like to see, and would probably be satisfied with seeing the animal in a zoo-like setting, leading to a failure of the umbrella species concept.

Another problem with the umbrella species concept emerges when the presence of the umbrella species may actually threaten the viability of other species that occur within its habitat and conserved area. The Addo elephants are again a useful example of this, as the primary objective of the AENP is to maintain the elephants (Novellie 1991). However, recent research has shown that elephants cause the loss of a range of plant species, including a number of endemic or near-endemic succulents and geophytes (Moolman & Cowling 1994; Johnson *et al.* 1999; Lombard *et al.* 2001, Cowling & Kerley 2002). The park management is therefore faced with the dilemma of conflicting conservation demands: the elephants or the plants. This is further complicated by the demands of the tourism sector for high densities of elephants in order to increase elephant-viewing opportunities (Novellie, 1991). The current strategy to deal with this problem is through the establishment of botanical reserves from which the elephants are excluded (Novellie 1991; Johnson *et al.* 1999; Lombard *et al.* 2001).

Tourism support for biodiversity

The ecological and economic sustainability of ecotourism/conservation as a landuse option for the AENP has demonstrated that tourism can confer economic value upon biodiversity (Kerley *et al.* 1995; Geach 1997). However this may be limited to situations based on charismatic species. In democratic societies, conservation of biodiversity is ultimately a social activity, with politicians responding to public support for conservation, and legislation and funding reflecting the level of public interest. No matter how sympathetic towards conservation the voting public or politicians are, if they are generally ignorant about biodiversity then it is unlikely that biodiversity conservation will be politically supported. The poor perceptions of biodiversity recorded here suggest that it is unlikely that biodiversity *per se* will attract significant political support, in contrast to the awareness of the charismatic megafauna. Thus, educating tourists about the wealth of biodiversity may play an important role in generating political support for the conservation of biodiversity.

CONCLUSIONS

We conclude that tourists do under-appreciate biodiversity, and that this can weaken a possible mechanism to confer value on, and hence provide protection for biodiversity. This can however be ameliorated through the provision of improved tourist education and hence sustainable local employment opportunities, leading to true ecotourism. We also question the general applicability of the umbrella species concept, and suggest that this needs to be carefully evaluated for each individual case.

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