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Fig. 7.0 Giraffe (*Giraffa giraffa*) causing a traffic jam with tourist and private vehicles in a South African protected area. Photo credit Manuela González-Suárez

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7.1 Introduction

The human wish to experience nature and view wildlife is not new. For instance, bird watching trips and safaris to observe African mammals were already taking place in the 1800s [1]. Traditionally, terrestrial animal tourism has mainly focused on the observation of vertebrate species, with bird watching being the most popular activity worldwide [2]. Some other examples include observations of bears (*Ursus* spp.), wolves (*Canis lupus*), and lynx (*Lynx* spp.) in Europe and North America; large mammals in Africa (the “Big Five”); koala (*Phascolarctos cinereus*) and kangaroos (*Macropus* spp.) in Australia; and orang-utans (*Pongo* spp.) and Komodo dragon (*Varanus komodoensis*) in Asia [3]. Nowadays, however, the wildlife tourism market is also expanding towards the observation of invertebrates, such as butterflies and glow-worms [3].

Despite the long tradition of terrestrial animal tourism, it has expanded most and fastest in the last decades, and currently many countries, both developed and developing, are investing in these activities to attract visitors [4, 5]. This recent increase has been caused by the economic growth in some countries, accompanied by the development of technology and transportation. This has also led to improved accessibility of remote areas that were previously inaccessible to most people [6, 7]. On the other hand, there has also been an increase in environmental awareness and many countries have recognized the potential of wildlife viewing as a better option, in the long run, when compared to more destructive or consumptive tourism [6, 8]. This was, for example, the case of Kenya, where the government banned sport hunting and trophy trade in the 1970s, while encouraging ecotourism [9].

Terrestrial animal tourism is thus based on positive principles. It may create incentives for area protection and wildlife conservation, and offer more sustainable alternatives to resource exploitation, promote education and pro-environmental attitudes [2, 10–12], and even provide wellness benefits to tourists [13]. However, even though wildlife tourism may originate from good intentions, it is far from innocuous. If misused, it may even be counterproductive, threatening the sustainability of natural areas, wildlife populations, local communities, and even the tourism business itself.

Unfortunately, tourists and tour operators are sometimes unaware of the negative effects that they may cause. That is why the aim of this chapter is to enhance the general awareness about this topic by providing an overview of the main negative biological effects caused by terrestrial animal tourism. Additionally, we will describe some management actions that have been applied to mitigate those negative impacts, and will also examine the positive effects of this tourism. We hope that this information will inspire better practices in the future, maximizing wildlife protection while allowing the continuity of this type of tourism.

7.2 Adverse Effects of Terrestrial Animal Tourism

When first hearing about negative impacts of humans on wildlife, most people think of killing or direct injury of animals, such as that from hunting or the results of vehicular collisions. However, the spectrum of effects triggered by human presence

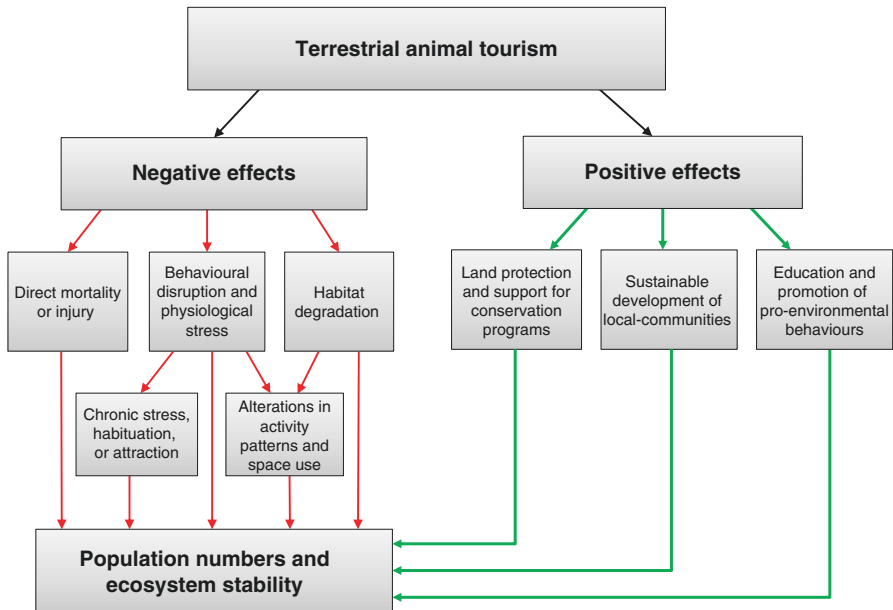


Fig. 7.1 Negative (red) and positive (green) impacts of terrestrial wildlife tourism

is much larger and not always evident. For instance, there may be changes in behavior, breeding success, or space use (see Fig. 7.1). Below we describe the main impacts of wildlife tourism.

7.2.1 Direct Mortality or Injury

Even when wildlife tourism aims to observe and not to damage animals, it can cause collateral mortality and injury, mainly through vehicular collisions and disease transmission (see also Chap. 3). Much wildlife tourism depends on the use of vehicles to reach and move through natural areas, as well as to directly view wildlife from, as in the case of the observation of elephants (*Loxodonta africana* and *Elephas maximus*), rhinos or large felids in Africa or India (Fig. 7.2) [14, 15]. Consequently, wildlife inhabiting famous national parks with many thousands of visitors per year are susceptible to being struck by cars. For instance, in one year, more than 2000 vertebrates (mostly amphibians) were killed on four roads of the Doñana Biosphere Reserve (Spain) [16]. Similarly, almost 2000 road-killed vertebrates were recorded in 1 year on a single road of Biebrza National Park, Poland [17], and almost 700 birds and mammals were killed by vehicles in Banff National Park (Canada) in about 2 years [18]. In response to these collisions, a variety of mitigation efforts have been instituted including the construction of fences next to roads to reduce the likelihood that black bears (*Ursus americanus*), wolves (*Canis lupus*), or moose (*Alces alces*) are hit by vehicles [19].



Fig. 7.2 Typical wildlife tourism in African savannah protected areas: self-driven safari. (a) African elephant (*Loxodonta africana*) on the road, in South African subtropical shrubland. Photo credit Margarita Mulero-Pázmány; (b) White rhinoceros (*Ceratotherium simum*) on the road, in South African semi-arid savanna-lowveld. Photo credit Marcello D'Amico

When animals successfully avoid vehicles, there can be additional negative consequences. For instance, tourist vehicles may separate young deer or antelopes from their mothers, and this increases the potential risk of predation or abandonment of the juveniles [20]. Roadkills in natural areas are one of the impacts directly threatening the persistence of some animal populations and subspecies. This is the case for Florida panthers (*Puma concolor coryi*), whose distribution is restricted to a reserve network that includes Big Cypress National Preserve, Everglades National Park, and the Florida Panther National Wildlife Refuge [21, 22] as well as for Iberian lynx (*Lynx pardinus*) in Doñana Biosphere Reserve (Spain) [23].

Furthermore, high numbers of roadkills can also lead to a decrease in the attractiveness of a given area. This is the case in Tasmania, where the roadkill impact is often highlighted by tourists and calls for mitigation measures are common in the popular press [24]. Not less important is the threat that collisions with wildlife pose for tourists' safety, especially in regions inhabited by large mammals such as Canada [25].

Terrestrial wildlife tourism can also unintentionally transmit diseases to wild animal populations. This impact is especially important, although not exclusive, for great apes, since their genetic similarity to humans makes them especially vulnerable to transmission. Disease transmission is considered as a serious threat for endangered ape populations [26]. In some African parks, such as the Uganda's Bwindi Impenetrable National Park or the Democratic Republic of Congo's Virunga National Park, tourists have often been reported closer than two meters from gorillas (*Gorilla* spp.) and sometimes make physical contact with them [27, 28]. Such behavior increases the risk of disease transmission to these highly endangered apes (see also Chap. 3). There have been indeed many cases of illnesses in apes associated with human respiratory and enteric diseases, such as influenza, measles, or *Salmonella* infections [26]. As wildlife tourism expands into previously pristine areas, the threat that "naïve" animals are exposed to human-transmitted pathogens increases.

7.2.2 Behavioral Disruption and Physiological Stress

Some less evident effects of wildlife tourism emerge from the fact that this type of tourism is founded on a basic contradiction, while humans want to see wild animals and go out of their way to encounter them; animals do not usually want to be seen by humans [29]. As discussed in detail in Chap. 2, animals may perceive humans as potential predators [30, 31], and therefore, when detecting human presence, immediately engage in risk-avoidance behaviors and stress responses in the same way as when encountering a predator. Sometimes animals respond to human presence by escaping or attacking [32]. Escape or panic reactions may result in direct self-injuries or damage to offspring, eggs, or other conspecifics [33]. This is especially important in the case of tourists visiting breeding-bird colonies, where the effects are maximized due to the high concentration of individuals [34, 35]. Other times, however, wildlife responses are subtle and include freezing or hiding [32, 36, 37]. Freezing is a reaction in which animals stay immobile and even may reduce some of their vital physiological activities to avoid being detected by predators [36, 38]. These subtle reactions are sometimes misinterpreted by ecotourists as tameness or lack of reaction, because they allow for closer approach.

By responding to tourists, animals may interrupt crucial activities such as foraging, resting, communicating, watching for predators, mating, and incubating or feeding their young [11, 34]. For example, in the national reserves and parks of Kenya, tourists have been reported to prevent lions (*Panthera leo*) from catching their prey [39] and to alter the cheetah (*Acinonyx jubatus*) feeding behavior [40]. Human disturbance has also been related to nest desertion in birds and crocodiles (*Crocodylus* spp.), with the consequent predation or chilling or overheating of the unattended eggs/offspring [41–43]. For instance, in the Murchison Falls National Park (Uganda), the approach of tourists caused Nile crocodile (*C. niloticus*) females to retreat into the water, leaving their nests unattended, which were then more likely to be preyed upon by predatory lizards and baboons (*Papio* spp.) [41]. In fact, researchers have found that some predators might specialize on attacking

unattended prey, and may learn to follow humans around to take advantage of the disturbance they cause [44, 45].

Vehicles used both on roads and off-roads may disturb animals or otherwise disrupt their natural behavior. In Monfragüe Biosphere Reserve, in western Spain, the breeding success of cinereous vultures (*Aegypius monachus*) is lower in nests located near roads and unpaved tracks, due to the direct disturbance of vehicles on adults while they are brooding or feeding their nestlings [46]. In the Californian deserts, vehicles driving off-roads have been reported to induce the emergence of the western American spade-foot toads (*Scaphiopus couchii*) from their burrows during the wrong season, probably because the sound and vibrations produced by vehicles are similar to those of heavy rain [47]. The negative consequence of this is that toads are unnecessarily exposed to hot dry weather and to predators [47].

Moreover, the lack of behavioral reaction does not necessarily mean that wildlife is not stressed by the presence of tourists. As described in Chap. 2, encounters with humans may also trigger alterations in the internal physiology of animals, such as increases in heart rates, body temperature, and stress hormones [48–50]. These physiological stresses may go unnoticed by many wildlife tourists, since sometimes-distressed animals do not show external (behavioral) signs. For instance, in the Sheep River Wildlife Sanctuary human disturbances led to increases in bighorn sheep (*Ovis canadensis*) heart rate that was not accompanied by an obvious behavioral reaction [51]. The same occurs in the Galápagos Islands, where colonial breeding birds were thought to be “tame” because of the lack of behavioral response when visitors approached. However, studies monitoring the heart rates found that these animals, thought to be unaffected, were actually physiologically stressed by tourists [52]. Both immediate behavioral and physiological responses of wildlife to tourists are energetic costly and may reduce body condition. If disturbances occur during energetically demanding periods, like during breeding or migration, they may reduce reproductive success or even survival [53].

While these animal immediate reactions to people might seem harmless if they only occurred sporadically, this is rarely the case in terrestrial wildlife tourism. Areas used for wildlife tourism receive up to millions of tourists per year. For example, the total number of tourists visiting the Kruger National Park in the year 2014/2015 exceeded 1.6 million guests. This implies that wildlife is likely constantly exposed to disturbances, which might have more permanent consequences, such as the alteration of activity patterns, changes in the use of the available space, chronic levels of stress, or habituation to humans [34, 53–55].

7.2.3 Alterations in Activity Patterns and Space Use

Animals might avoid areas, either temporarily or permanently, where the presence of visitors is more frequent or intense. By doing so, humans alter animals' natural activity or space use patterns [53]. Changes in daily activity have been reported in Katmai National Park and Preserve (Alaska), where brown bears (*Ursus arctos*) using a stream close to a tourist lodge have become crepuscular, while bears using

undisturbed streams are active throughout the day [56]. In Amboseli National Park (Kenya), cheetahs, which are naturally diurnal, also became more crepuscular to try to avoid disturbance by ecotourists [40].

Some studies have also shown that in the presence of humans, some bird species avoid areas that they would normally use for breeding or resting during migration [57]. This was also the case in Punta Suarez (Galápagos Islands), where, as a response to tourism, albatrosses (*Phoebastria irrorata*) have moved their nests away from tourist trails [40]. In the Sumatran Rain Forest, barking deer (*Muntiacus montanus*), sambar (*Rusa unicolor*), and rhino (*Dicerorhinus sumatrensis*) were also found to move away from areas with high human visitation [58]. Vehicle traffic, and related noise, vibrations, light, dust, or pollutants have been reported to have a strong effect on wildlife space use, resulting in animals avoiding areas near roads [59]. This is the case, for example, of a study that experimentally created an acoustic road in an otherwise forest without roads by broadcasting motorized-traffic noise [60]. This study demonstrated that road noise alone caused birds to avoid the areas adjacent to this phantom road.

A strategy often used in terrestrial animal tourism is to concentrate visitors around areas where wildlife aggregate to engage in crucial activities, such as foraging, drinking, breeding, or migrating [61, 62]. The purpose is to maximize tourist-wildlife encounters. For example, in protected areas of Africa, tourist facilities and viewpoints are placed near water holes where large mammals congregate to drink [63]. Similarly, visitation of breeding-bird colonies is also a common activity worldwide [62]. Unfortunately, these methods to maximize wildlife viewing may not be inconsequential. For example, the concentration of tourist facilities along ungulate migration routes in the Masai Mara Ecosystem (Kenya) has been found to alter their migration patterns and cause further habitat deterioration.

By these alterations of space use and activity, wildlife may be pushed into sub-optimal habitats or forced to be active at otherwise costly times. This may prevent animals from acquiring needed resources and could reduce their body condition, interfere with reproduction, or reduce survival [53, 64]. Unfortunately, these effects are difficult to perceive by most people, including tourists and tour operators, since it is not always known what the natural spatial or activity patterns of the animals would be if humans were not there.

7.2.4 Chronic Stress, Habituation, or Attraction

If animals are not able or willing to avoid, permanently or temporarily, a tourist-frequented area, they will either suffer from chronically high levels of stress or they may habituate to humans (Chap. 2, [53]). Chronic stress occurs when the organs involved in producing stress hormones are overstimulated, resulting in high levels of stress hormones and a dysfunction of the stress-hormone production system [54, 65, 66]. As in the case of humans, this chronic stress affects animal health, reducing their ability to reproduce, and potentially interfering with survival [67, 68]. In the Amazonian rainforest hoatzin (*Opisthocomus hoazin*) chicks in areas with

ecotourism had altered stress-hormone responses, lower body mass, and increased mortality compared to nondisturbed areas [69]. Wildlife tourism has also been shown to alter stress-hormone production and immunological responses to diseases in the Galápagos marine iguana (*Amblyrhynchus cristatus*) [70]. In the same way, a study in the Natural Park Montes do Invernadeiro (Spain) found, through the analyses of fecal samples, that tourism pressure was causing chronic elevation in stress hormones in the European pine marten (*Martes martes*) [71].

On the other hand, terrestrial animal tourism has often been reported to lead to animals reducing their response to humans through habituation. That is, after frequent nonthreatening exposures to humans, animals may learn that tourists are not predators and thus stop reacting to them [72]. Habituation can be accidental, by animals simply getting used to the passage of tourists, or deliberate, as reported in great ape tourism [73], where tour operators need to actively teach apes that humans are not dangerous before this tourism can even take place.

Even though habituation, at first sight, might seem an idyllic scenario for wildlife conservation and tourism, it has negative consequences for both animals and humans. For example, animals without a fear of humans may be more likely to be killed by wildlife poachers [74, 75]. This was seen in the Democratic Republic of Congo, where ex-poachers confirmed that habituated gorillas were more likely to be killed than the nonhabituated ones [76]. Habituated wildlife is also more likely to be hit by cars if they do not avoid roads [11, 77]. Similarly, closer approaches of tourists to habituated animals increase their vulnerability to disease transmission from humans [26, 78]. Moreover, wildlife not afraid of humans may venture outside of parks into neighboring rural areas, where they may cause serious human-wildlife conflicts. For instance, the gorillas of the Bwindi Impenetrable Forest (Uganda) have sometimes ventured outside the park, damaging nearby crops and becoming aggressive towards humans trying to chase them out of the fields [79]. Habituation, when not occurring equally for all species, can also alter ecological relationship among species. For example, in the Yellowstone Ecosystem (USA) female moose habituated to tourists choose to give birth in areas close to roads because of the lower presence of predators, which are warier towards humans [80]. This may lead to disruptions of the predator-prey relationships, with potential negative consequences for predators and imbalances in the ecosystem.

An extreme case of habituation occurs when wildlife not only lose fear to tourists but are attracted to them, mostly, but not exclusively, due to human-provided food resources (Fig. 7.3) [29]. Wildlife attraction to humans can also be unintentional or intentional. Unintentional attraction occurred, for example, in the case of grizzly bears in Yellowstone National Park (USA) that until the 1970s were attracted to the park's waste disposal sites [81]. On the other hand, wildlife are often intentionally attracted either by tourists themselves or by tour operators and park staff, as a tool to ensure predictable and longer-lasting encounters that facilitate photography [29]. Methods to attract wild animals range from providing them with food, establishing salt licks, providing artificial water sources, or broadcasting the calls of conspecifics to lure otherwise secretive birds into view [29, 74, 77, 82].

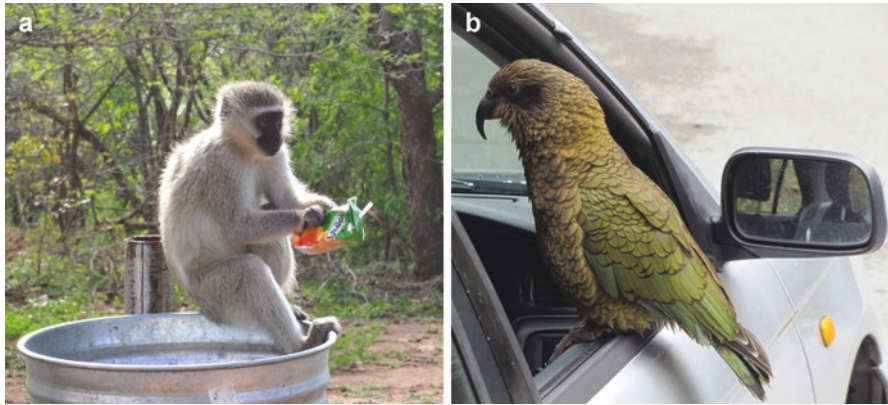


Fig. 7.3 Wildlife attraction towards human-provided food resources. (a) Vervet monkey (*Chlorocebus pygerythrus*) attracted to human waste, in a South African protected area. Photo credit Manuela González-Suárez; (b) Kea (*Nestor notabilis*) towards intentionally provided food, in a New Zealand National park. Photo credit Marcello D'Amico

In most cases, however, tourists are unaware of the negative consequences of these attraction methods. For instance, broadcasting bird songs or calls simulates a territorial intrusion, which may unnecessarily stress birds, making them waste energy in defending their territory and leave their nests unattended [2, 82]. By providing food or water to attract fauna, such as, for example, the creation of artificial water holes in Hwange National Park (Zimbabwe), unnatural and unsustainable concentrations of some species may be created [40]. This, in turn, has been shown to cause devastating damage to local vegetation, to destabilize animal communities, and to favor or attract relatively more aggressive individuals and species [40, 74]. In Aberdare National Park (Kenya), the use of salt to attract wildlife to a tourist lodge had a negative impact when salt leached into the soil and caused the death of vegetation in a nearby waterhole [40]. The provision of food by humans may also alter the natural feeding patterns of the animals, as observed in the Galápagos Islands, where animals became dependent on food supplied by tourist and lost the capacity to find natural food [83]. Finally, attracting and habituating wildlife can create dangers for both tourists and the animals [74]. For example, tourists have been killed by food-conditioned deer in Yosemite National Park (USA) and by dingoes (*Canis dingo*) on Fraser Island (Australia) [84]. In some cases, wildlife managers, seeking to prevent the spread of aggressive behaviors, shoot animals seen begging for food from visitors, as seen with the baboons in the Umfolozi Game Reserve (South Africa) or the elephants in Mana Pools National Park (Zimbabwe) [40, 85].

7.2.5 Habitat Degradation

In addition to the direct effects we discussed above, terrestrial animal tourism is often associated with habitat alterations [34]. For instance, vegetation clearing to construct accommodations, parking spaces, or picnic areas may lead to the

disappearance of wildlife previously inhabiting those areas or the loss of those that depended on those areas during critical periods (e.g., during droughts or migration) [86]. This has been observed in Africa and North America where habitat alterations have disrupted migratory routes of wildebeest (*Connochaetes* spp.) and elk (*Cervus canadensis*), respectively [86]. Another example is the elimination of mature trees in tourist areas, which has had negative consequences for species such as marsupial (possums), owls, and snakes that use tree cavities for shelter and as breeding sites [87, 88]. Firewood collection around campgrounds also causes the loss of many bird nests in Yosemite National Park (USA) [89]. In some areas, such as the Thornybush Game Reserve (South Africa) shrubs are even deliberately cleared to facilitate viewing wildlife [29, 40], negatively affecting birds and mammals that rely on this understory to hide, feed, or breed [86, 90].

Often terrestrial wildlife tourism also depends on the construction of trails and roads to allow tourists to move through natural areas. These linear infrastructures break landscape connectivity and may reduce the likelihood of persistence for species unable to move across fragmented habitats [59, 86]. For example, in the Brazilian Amazon, movements of forest birds were found to be negatively affected by the lack of vegetation along roads, most likely because of the associated increase in exposure to predators [91]. Chemicals found in road pavement have also been shown to further elicit avoidance in some species, such as small mammals in Californian natural reserves [92]. The opposite effect, road attraction, has also been described, with for example scavengers using roads to feed on road-killed animals [93]. However, road attraction does not come without a risk, since it increases the probability of wildlife-vehicle collisions, as seen in Australian cassowaries (*Casuarius casuarius*) and wallabies attracted to human waste around roads [94, 95].

Soil deterioration is also an important impact of terrestrial animal tourism [11]. Vegetation trampling, soil compaction, and increased erosion have been described in roads, trails, and off-road tracks in many protected areas including Golden Gate Highlands National Park (South Africa) and several Kenyan National Parks [40, 96]. These effects lead to decreases in the numbers of invertebrates and young seedlings, land degradation, higher dust pollution, and water turbidity, with potential negative consequences for local biodiversity [59, 86]. Finally, wildlife tourism also has a negative influence through excessive use of local resources (such as water in Africa), garbage production, increases in water and light pollution, and spread of invasive species [40, 86, 97]. For example, mountain lions were seen to avoid artificial lights when moving through the San Ana Mountains in California [98] and increases of invasive plants were observed along roadsides in Wayne National Forest and Glacier National Park (USA) [99, 100].

7.3 Management of Negative Effects

The discussion above suggests that terrestrial animal tourism must be carefully managed to reduce potentially negative impacts of tourism. Mitigation measures mostly focus on managing visitor numbers and spatio-temporal distribution, improving tourist behavior by providing guidelines and education, and physically

modifying the environment [40, 86]. For example, in Uganda, Rwanda, and the Democratic Republic of Congo, great ape tourism operates under strict limitations in numbers of visitors allowed per day and per year [40]. In Kruger National Park (South Africa), wildlife management measures also include reducing the size of rest camps and restricting vehicle numbers per road, among others [101]. Unfortunately, limitations on visitor numbers are not easy to enforce, as seen in the case of the Galápagos Islands National Park, where tourist numbers often largely exceed maximum values set by management plans [102]. The spatial and temporal distribution of tourists is also often managed by delimiting areas within parks where visitor access is restricted either permanently, such as wilderness areas in the core of biosphere reserves [103], or temporarily during sensitive periods [40, 86]. For instance, in Monteverde Cloud Forest Reserve (Costa Rica), trails close to quetzal (*Pharomachrus* spp.) nests are closed during breeding period [104]. A well-designed trail and road network is another useful tool to control where tourists go or not [40].

Additionally, guidelines have been established in many areas to improve visitor behavior and reduce their impact on wildlife. One of the main guidelines is the definition of minimum approaching distances. For example, native communities in the Northwest Territories (Canada) established minimum distances at which visitors must stay away from wolf dens and bird nests [40]. Similarly, in African parks, tourists should not approach closer than 5 m to gorillas [26]. Guidelines can also limit vehicle speed (Fig. 7.4a) and off-trail circulation to avoid wildlife-vehicle collisions, and habitat deterioration [86]. Wildlife feeding, both intentional and unintentional, is also often banned or managed (Fig. 7.4b), as in North American National parks, where feeding animals is prohibited, or in the Currumbin Bird Sanctuary (Australia) where trained staff allow feeding under highly controlled conditions [74].

Recommending or restricting the use of certain clothing or equipment by visitors is another way of minimizing their effects. For example, the use of surgical and respirator masks are recommended for ape tourism to avoid disease transmission from humans [105]. Some parks and tour operators, such as South African National parks and the International Association of Antarctic Tour Operators, are also now banning the use of drones (unmanned aerial systems), which, when used carelessly, may stress animals ([106, 107], Mulero-Pázmány et al. in press).

Some parks, like the Yankari Game Reserve (Nigeria), only allow guided tours [108]. This is positive because the presence of guides or rangers may control the distribution and inappropriate conducts of tourists [77]. Moreover, guides help educate visitors, which is a key management action to reduce tourism impact. Tourist behaviors and expectations can be modified by informing them about animal needs and threats, the guidelines and recommendations to reduce impacts, and by providing tourists with more realistic expectations about what they will experience [86]. This is sometimes implemented by putting up signs (Fig. 7.4c), through visitor information centers or by well-informed guides [40, 86]. For example, in the Masai Mara National Reserve (Kenya), drivers were trained to provide information about the park as a whole (and not only about the most popular species) in order to encourage tourists to visit different areas of the park and reduce congestion [109]. Likewise,



Fig. 7.4 Mitigation measures associated with wildlife tourism: (a) road sign for speed limitation and driver awareness, Doñana biological reserve, Spain, photo credit Nuno Negroes; (b) wildlife-proof waste container, especially focused on monkeys, in a South African protected area, photo credit Marcello D'Amico; (c) Signpost advising tourists of recommended behavioral conduct in a New Zealand nature reserve, photo credit Marcello D'Amico; (d) fencing aiming to prevent wildlife from leaving the protected area and avoid conflicts with humans, South Africa, photo credit Margarita Mulero-Pázmány

in a sanctuary for reintroduced native birds in New Zealand (Kapiti Island Nature Reserve), short talks are given to visitors to prevent harmful tourist behavior [110].

Finally, another way to manage tourism impact is to physically manipulate the environment. For instance, fences can be used to regulate tourist access to vulnerable bird colonies [111] or to prevent wildlife from leaving protected areas and thus

avoiding conflicts with humans (Fig. 7.4d) [112]. Fences are also often placed along roads to decrease human risk of collision with large mammals. This measure also protects animal communities, especially when combined with wildlife road-crossing structures, as in Banff National Park (Canada) [16, 19]. Boardwalks and platforms are also sometimes built to reduce vegetation damage and to keep tourist away from sensitive wildlife areas [86]. Hides and visual shields, as used by birdwatchers or next to waterholes in some African parks, prevent animals from seeing tourists, consequently minimize wildlife stress [29, 86]. Sometimes it might be even necessary to perform habitat restoration to mitigate vegetation damages produced by visitors or to create refuge zones for wildlife outside of the tourism-contact zone [86].

7.4 Favorable Effects of Terrestrial Animal Tourism

Despite the above-mentioned negative effects of wildlife tourism, we do not intend to advocate against this recreation activity. Indeed, impacts of terrestrial animal tourism are often preferable to those of alternative land uses, such as logging, agriculture, or urban development [11]. Moreover, wildlife tourism also has positive effects (see Fig. 7.1). It may contribute to protect species and their ecosystems by creating a link between biodiversity conservation and financial benefits for local people in areas where economic opportunities are scarce [11, 113]. One of the most beneficial outcomes of terrestrial wildlife tourism is the creation of protected areas containing desired species and, sometimes, even the promotion of conservation-oriented management practices in privately owned land [2, 114]. Fees paid by tourists are partially meant to fund conservation programs, or at least to manage tourism-related damages [11, 114]. For example, Galápagos National Park contains eight endangered or critically endangered bird species whose persistence clearly depends on the protected status of this area [113]. Ecotourism revenue has also motivated the preservation of elephant habitat in Thailand [6]. Similarly, income from mountain gorilla tourism has been used in the Democratic Republic of Congo and Rwanda to conserve habitat and establish anti-poaching measures, which are essential for the protection of this species [11].

In addition, some operators and tourists contribute positively by participating in management, monitoring, or even research [11, 114]. In addition, ecotourism can have positive impacts on local communities as long as it is conducted with sensitivity towards local cultures and people [114]. For instance, in many cases people have been barred from using their traditional land in traditional ways (subsistence hunting, fishing, etc.) [40, 115, 116]. However, if the involvement of local people is done thoughtfully and with sensitivity to their needs, the involvement of local communities, through education and employment of local guides, may produce socio-economic changes that also support wildlife and nature protection [2, 114]. Finally, terrestrial animal tourism may have additional positive effects through the education and sensitization of visitors that promote pro-environmental and pro-animal welfare attitudes [12].

Conclusions

As we have seen in this chapter, terrestrial animal tourism can have important negative effects on wild animals and ecosystems. At the same time, the positive effects of wildlife tourism might make preferable to other land use alternatives. A positive balance between the cost and benefits will thus depend on the careful management of these activities and the resources they rely on. Future wildlife tourism should improve this management through the following lines of action: (1) establishing guidelines to minimize impacts, (2) encouraging long-term wildlife monitoring and research programs, (3) enhancing visitor education, and (4) controlling and enforcing appropriate conducts (see also Chap. 10 on best practices).

As seen above, guidelines could include limitations in numbers of visitors and vehicles approaching wildlife, especially during sensitive periods, increases in the use of low-impact structures, such as hides, and the maintenance of safe distances from fauna (e.g., by using scopes). Restricting the use of attracting techniques, such as feeding or call playbacks, is also among important guidelines. Wildlife tourism should also minimize habitat deterioration and favor the creation of core wilderness zones within protected areas. In addition, since many impacts go undetected in the absence of long-time series of data, more investment in monitoring and research is warranted. Ideally, this will not be restricted to large, emblematic animals, but also focus on other vulnerable species. Moreover, parks could further benefit local communities by hiring local people to implement these standardized monitoring programs, and even involving tour operators and tourists in data collection programs.

Tourist education is essential. Even though some tourists accept the furtive nature of wild species and appreciate the experience of being out there looking for wildlife, whether they find it or not, many tourists' expectations are too high. Tourists usually expect good, close-up views of wildlife and otherwise they are not satisfied with the experience. This is pushing the wildlife tourism industry into taking more and more measures to increase wildlife-viewing opportunities, with the negative effects mentioned above. These expectations result from a general lack of knowledge about wildlife requirements and behavior, together with past experiences from years of bad practices in wildlife tourism. For instance, people may have been exposed to wildlife feeding or other potentially stressful activities that attracted animals to facilitate observation. More efficient nature-interpretation programs are needed to help shift the expectation of seeing many animals to having more wild and natural experiences. Finally, education can also help promote tourism of other species, beyond charismatic megafauna.

Stronger regulations are, in some cases, needed to control unethical and harmful behaviors by tourists and tour operators. In the era of environmental consciousness, bioproducts, and green labels, there should be room to promote "greener" wildlife tourism according to these lines of action. It is also in operators and park managers best interest to preserve the resources on which their industries and livelihoods depend. Investment in greener services will benefit not only animal welfare and nature conservation, but also the future sustainability of terrestrial animal tourism.

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